

# StarWind Virtual SAN™: Installation and Configuration of Hyper-Converged 2 Nodes with Hyper-V Cluster

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## CONTENTS

| Introduction   | 4    |
|--|------|
| Pre-Configuring The Servers                                | 5    |
| Downloading, Installing, And Registering The Software      | 6    |
| Creating Highly Available Storage For The Failover Cluster | 13   |
| Discovering Target Portals                                 | 21   |
| Connecting Targets And Configuring Multipathing            | . 24 |
| Creating A Cluster   | . 30 |
| Adding Cluster Shared Volumes                              | . 33 |
| Contacts   | . 34 |



# INTRODUCTION

**StarWind Virtual SAN™** is a native Windows hypervisor-centric hardware-less VM storage solution. It creates a fully fault tolerant and high performing storage pool purpose built for the virtualization workloads by mirroring existing server's storage and RAM between the participating storage cluster nodes. The mirrored storage resource is then connected to all cluster nodes treated just as local storage by both hypervisors and clustered applications. Fault tolerance is achieved by providing multipathed access to all storage nodes. **StarWind Virtual SAN** delivers supreme performance compared to any dedicated SAN solution since it runs locally on the hypervisor and all IO is processed by local RAM, SSD cache, and disks and never bottlenecked by storage fabric.

This guide provides detailed instructions on installation, registration, and detailed steps that are need to be taken to create **StarWind Virtual SAN** High-Availability Device. It also highlights how to connect to the StarWind HA data store with the Microsoft iSCSI initiator. Additionaly you can find step-by-step guidance on how to create the Hyper-V cluster and configure the StarWind shared storage as the Cluster Shared Volumes.

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



# **PRE-CONFIGURING THE SERVERS**



Here is a reference network diagram of the configuration described in this guide.

The Sync and iSCSI data are direct links between the servers with 2 VLANs dedicated in each link.

This document assumes that you have a domain controller and you have added the servers to the domain. It also assumes that you have installed the **Failover Clustering** and **Multipath I/O** features, as well as the **Hyper-V** role on both servers. These actions can be performed using **Server Manager** (the **Add Roles and Features** menu item).

1. In order to allow **StarWind Virtual SAN** to use the Loopback accelerator driver and access the local copy of the data faster you have to add a minor modification to the StarWind configuration file. Locate the configuration and open it using Notepad. The default path is:

C:\Program Files\StarWind Software\StarWind\StarWind.cfg

2. Find the string «<!--<iScsiDiscoveryListInterfaces value=»1»/> -->» and uncomment it (should look as follows: <iScsiDiscoveryListInterfaces value=»1»/>). Save the changes and exit Notepad.

Should there be any issues saving the document, launch Notepad with Administrator rights and then load the starwind.cfg file to do the modifications.

**3.** Restart the **StarWind Service** and repeat the same procedure on the second StarWind node.



# DOWNLOADING, INSTALLING, AND REGISTERING THE SOFTWARE

1. Download the StarWind setup executable file from our website: http://www.starwindsoftware.com/registration-starwind-virtual-san

**Note:** The setup file is unified for x86 and x64 systems, as well as for all Virtual SAN deployment scenarios.

2. Launch the downloaded setup file on the server where you wish to install **StarWind Virtual SAN** or one of its components. The **Setup** wizard will appear:



Click **Next** to continue.

3. Read and accept the License Agreement.

| 8 | Setup - StarWind 📃 🗖 🗙  |
|---|---|
|   | License Agreement<br>Please read the following important information before continuing.   |
|   | Please read the following License Agreement. You must accept the terms of this<br>agreement before continuing with the installation.  |
|   | StarWind Software   |
|   | StarWind iSCSI Target StarWind Software End User License Agreement  |
|   | IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING  |
|   | Do not use or load install this software the StarWind iSCSI Target or any associated materials (collectively refered to as, the "Software") until you have carefully read the following terms and conditions. By loading installing or using the Software, you agree to the terms of this Agreement. If you do not wish to so |
|   | I accept the agreement  |
|   | $\bigcirc$ I <u>d</u> o not accept the agreement  |
|   | < <u>B</u> ack <u>N</u> ext > Cancel  |



4. Carefully read the information about new features and improvements.

Red text indicates warnings for users who are updating existing software installation.

| 8 | Setup - StarWind 📃 🗖 🗙  |
|---|---|
|   | Information Please read the following important information before continuing.  |
|   | When you are ready to continue with Setup, click Next.  |
|   | StarWind iSCSI SAN Version V8   |
|   | New Features and Improvements   |
|   |   |
|   | New Log-structured File System container  |
|   | It implements thin-provisioning, snapshots, optional deduplication.<br>Synchronous and asynchronous replication can be configured for a<br>LSFS device. |
|   | LSFS device is flash-friendly. It eliminates multiple rewrites of same  |
|   | < <u>B</u> ack <u>N</u> ext > Cancel  |
|   |   |

Click **Next** to continue.

5. Click Browse to modify the installation path if necessary.

| 0 | Setup - StarWind 📃 🗖 🗙   |
|---|--|
|   | Select Destination Location<br>Where should StarWind be installed?                     |
|   | Setup will install StarWind into the following folder.                                 |
|   | To continue, click Next. If you would like to select a different folder, click Browse. |
|   | C:\Program Files\StarWind Software\StarWind Browse                                     |
|   |  |
|   | At least 1,4 MB of free disk space is required.  |
|   | < <u>B</u> ack <u>N</u> ext > Cancel   |



- 6. Specify one of the following installation types:
- Full installation (recommended)

Full installation includes both StarWind Service and the Management Console elements. It allows users to manage storage resources on the machine where **StarWind Virtual SAN** is installed, as well as manage other **StarWind Virtual SAN** installations on the network.

• StarWind Virtual SAN Service

This installation type is designed for Core OS editions. StarWind Service is the core of the software. It enables the creation of iSCSI targets as well as sharing virtual and physical devices. The service can be managed using StarWind Management Console from any Windows computer on the network.

StarWind Management Console

The Management Console is the Graphic User Interface (GUI) part of the software that controls and monitors all storage-related operations (e.g. allows users to create targets and devices on the available Virtual SAN servers). Once installed, StarWind Management Console is connected to the servers running **StarWind Virtual SAN**.

| 0   | Setup - StarWind 📃 💻 🗖   | x |  |  |
|---|--|---|--|--|
|   | Select Components<br>Which components should be installed?   | B |  |  |
|   | Select the components you want to install; clear the components you do not want to install. Click Next when you are ready to continue. |   |  |  |
|   | Full installation  |   |  |  |
|   | ISCSI Server     11,0 MB ∧     Incompare Accelerator Driver  |   |  |  |
|   | Management Console 50,1 MB   |   |  |  |
|   | ··· 🗹 VSAN Deployment Tool 11,8 MB ≡   |   |  |  |
|   | 🗹 NAS Configuration Tool 1,4 MB  |   |  |  |
|   | V2V Converter Tool 4,8 MB  |   |  |  |
|   | StarWindX Library 2,7 MB   |   |  |  |
|   | PowerShell Management Library 0,9 MB   |   |  |  |
|   | IVI SMI-S Adent 47.7 MB  |   |  |  |
| Current selection requires at least 112,3 MB of disk space. |  |   |  |  |
|   | < <u>B</u> ack <u>N</u> ext > Cancel   |   |  |  |



7. Specify the Start Menu folder.

| 8  | Setup - StarWind   | _         |       | x  |
|----|--|-----------|-------|----|
| Se | elect Start Menu Folder<br>Where should Setup place the program's shortcuts?   |           | 0     | D  |
|    | Setup will create the program's shortcuts in the following Start N             | 1enu folo | der.  |    |
|    | To continue, click Next. If you would like to select a different folder, click | Browse.   |       |    |
|    | StarWind Software\StarWind   | Browse    | ə     |    |
|    |  |           |       |    |
|    |  |           |       |    |
|    |  |           |       |    |
|    |  |           |       |    |
|    |  |           |       |    |
|    |  |           |       |    |
|    | < <u>B</u> ack <u>N</u> ext >  |           | Cance | el |

Click **Next** to continue.

**8.** Enable the checkbox if you want to create a desktop icon.

| 0 | Setup - StarWind 📃 🗖 🗙   |
|---|--|
|   | Select Additional Tasks Which additional tasks should be performed?  |
|   | Select the additional tasks you would like Setup to perform while installing StarWind,<br>then click Next.<br>Additional icons:<br>Create a desktop icon |
|   | < <u>B</u> ack <u>N</u> ext > Cancel   |



**9.** You will be prompted to request a time-limited fully functional evaluation key, or a FREE version key, or a fully commercial license key sent to you with the purchase of **StarWind Virtual SAN**. Select the appropriate option.

| 8   | Setup - StarWind   | <b>– – X</b>   |
|---|--|--|
| <b>License key</b><br>Get your license key                        |  |  |
| Now when you have<br>FREE version key or<br>don't have any key it | nstalled StarWind you need to apply<br>ommercial license key you've got wit<br>'s time to request one now! | / either evaluation key or<br>th your purchase. If you |
| Request time-lim  | ted fully functional evaluation key  |  |
| Request FREE vi   | ersion key   |  |
| 🔘 Thank you, I do   | nave a key already   |  |
|   |  |  |
|   |  |  |
|   |  |  |
|   |  |  |
|   |  |  |
|   | < <u>B</u> ack   | Next > Cancel  |

Click **Next** to continue.

**10.** Select the hypervisor you are going to use primarily with **StarWind Virtual SAN**.

**Note:** For all non-virtualized Microsoft applications e.g. SQL or Exchange, as well as other hypervisors like Xen or VirtualBox, select the **StarWind Virtual SAN for Hyper-V** option.

| 0 | ) Setup - StarWind 📃 🗖 🗙  |
|---|---|
|   | License key<br>Which StarWind solution do you want to use?  |
|   | StarWind iSCSI SAN & NAS is designed for use with solutions like VMware vSphere,<br>Microsoft Hyper-V and Citrix XenServer.<br>StarWind Native SAN for Hyper-V is designed especially for Hyper-V-based shared<br>storages. |
|   | StarWind Virtual SAN for vSphere  |
|   | StarWind Virtual SAN for Hyper-V  |
|   |   |
|   |   |
|   |   |
|   |   |
|   |   |
|   | < <u>B</u> ack Next > Cancel  |



11. Click Browse to locate the license file.

| 8  | Setup - StarWind                 | <b>– – ×</b> |
|--|----------------------------------|--------------|
| Select your license key<br>Where is license key located?       |                                  |              |
| Select where license key is lo<br>Location of StarWind license | cated, then click Next.<br>file: | Browse       |
|  | < <u>B</u> ack <u>N</u> ex       | t > Cancel   |

Click **Next** to continue.

12. Review the licensing information.

| 8                                       |   | Setup - S       | tarWind         |                  | -    |       | x  |
|---|---|-----------------|-----------------|------------------|------|-------|----|
| <b>Apply y</b><br>Here<br>to ap         | our license key<br>is listed information aboul<br>oly this license key.                                   | t license key f | ile that you pr | ovided. Press "N | ext" | 6     | D  |
| Produ<br>Name<br>Orga<br>Expiri<br>Numb | ct: StarWind iSCSI SAN (<br>: Simon Bolivar<br>nization: Starwind<br>e Date: 20140611<br>er of servers: 3 | TRIAL)          |                 |                  |      |       |    |
|   |   |                 | < <u>B</u> ack  | Next >           |      | Cance | el |

Click **Next** to apply the license key.



13. Verify the installation settings. Click **Back** to make any changes.

| 0 | Setup - StarWind 📃 🗖 🗙  |   |
|---|---|---|
| R | eady to Install Setup is now ready to begin installing StarWind on your computer.   |   |
|   | Click Install to continue with the installation, or click Back if you want to review or<br>change any settings.   |   |
|   | Destination location:<br>C:\Program Files\StarWind Software\StarWind  |   |
|   | Setup type:<br>Full installation  |   |
|   | Selected components:     iSCSI Server       Loopback Accelerator Driver     Management Console       VSAN Deployment Tool     V       NAS Configuration Tool     V       V2V Converter Tool     V |   |
|   | < <u>B</u> ack Install Cancel   | _ |

Click Install to continue.

**14.** Select the appropriate checkbox to launch the **StarWind Management Console** immediately after setup wizard is closed.



Click **Finish** to close the wizard.

Repeat steps 2 to 14 on the second server where you wish to install StarWind Virtual SAN.

**Note:** To manage **StarWind Virtual SAN** installed on a Server Core OS edition, StarWind Management console has to be installed on a different computer running the GUI-enabled Windows edition.



# CREATING HIGHLY AVAILABLE STORAGE FOR THE FAILOVER CLUSTER

1. Launch the StarWind Management Console: double-click the StarWind tray icon.

**Note: StarWind Management Console** cannot be installed on an operating system without a GUI. You can install it on any of the GUI-enabled Windows Editions including the desktop versions of Windows.

| 0  |             | StarWind M         | anagement Console   |                                |                     |        | _ <b>D</b> X |
|--|-------------|--------------------|---|--------------------------------|---------------------|--------|--------------|
| FILE HOST TARGET TOOLS OPTIONS   | HELP        | 100                | 1000  |                                |                     |        |              |
| Refresh Connect Disconnect Add Server Ren  | nove Server | Add Device Remov   | Pe Device Help  |                                |                     |        |              |
| Clusters   | General     | Configuration      | CHAP Permissions  | Access Rights                  | Server Log          | Events | Performance  |
| • E Servers  |             |                    |   |                                |                     |        |              |
| ▲ 🛄 SW1.SW.COM (172.16.0.11): E  | - SV        | V1.SW.COM          | (172.16.0.11): 3<br>Remove Server of<br>anced) Add Cor<br>Aanager O Refresh | Add Target c<br>htrol Device d | Add Device          | t.     |              |
|  | Ad          | dress              | 172.16.0.11   |                                |                     |        |              |
|  | Sei         | iver Name          | SW1.SW.CO   | M                              |                     |        |              |
|  | Po          | rt                 | 3261  |                                |                     |        |              |
|  | Au          | thentication       | Basic   |                                |                     |        |              |
|  | Sta         | tus                | Logged-in   |                                |                     |        |              |
|  | Lic         | ense Type          | Enterprise H  | IA (High Availability          | /) unlimited Editio | n      |              |
|  | M           | iximum Storage Cap | acity Unlimited   |                                |                     |        |              |
|  | Ser         | wers per License   | 3   |                                |                     |        |              |
| and the second | <           |                    |   |                                |                     |        | >            |
| StarWind Software Ready  |             |                    |   |                                |                     |        | 1.           |

If **StarWind Service** and **Management Console** are installed on the same server, the **Management Console** will automatically add the local StarWind instance to the **Console tree** after the first launch. Then, the **Management Console** automatically connects to it using the default credentials. To add remote StarWind servers to the console use the **Add Server** button on the control panel.

**Note:** The default login and password are "root" and "starwind". You can always change them later. It's strongly recommended to change the default username/password to protect your StarWind Server from unauthorized access!

2. StarWind Management console will ask you to specify the default storage pool on the server you're connecting to for the first time. Please configure the storage pool to use the one of the volumes you've prepared earlier. All the devices created through the Add Device wizard will be stored on it. Should you decide to use an alternative storage path for your StarWind virtual disks, please use the Add Device (advanced) menu item.

| StarWind Management Console  |
|--|
| Storage pool is not configured!<br>Would you like to set the default location of the storage<br>pool to My Computer\E? |
| Yes Choose path Disconnect   |



Press **Yes** button to configure the storage pool. Should you require to change the storage pool destination, press **Choose path**... and point the browser to the necessary disk.

**Note:** Each of the arrays which will be used by **StarWind Virtual SAN** to store virtual disk images has to meet the following requirements:

- initialized as GPT
- Have a single NTFS-formatted partition
- Have a drive letter assigned
- **3.** Select the StarWind server where you wish to create the device.
- 4. Press the Add Device (advanced) button on the toolbar.
- 5. Add Device Wizard will appear. Select Hard disk device and click Next.
- 6. Select Virtual disk and click Next.
- 7. Specify the virtual disk location and size.

| ?  | x     |
|--|-------|
| Add Device Wizard  |       |
| Virtual Disk Location  |       |
| Path to virtual Device Header File   |       |
| My Computer\E\Witness.swdsk v  |       |
| ● Create new File<br>1 GB ✓<br>○ Use existing File   |       |
| <ul> <li>Use 512 bytes sector size</li> <li>Use 4096 bytes sector size. May be incompatible with some clients</li> </ul> |       |
| Next   | ancel |

Click Next.



8. Specify virtual disk options.

|   |         | ?    | x  |
|---|---------|------|----|
| I Add Device Wizard   |         |      |    |
| Virtual Disk Options  |         |      |    |
| Thick-provisioned   |         |      |    |
| Add Device Wizard   Virtual Disk Options <ul> <li>Thick-provisioned</li> <li>Thin-provisioned</li> </ul> Press "Options" to change LSFS Options   Options |         |      |    |
| Press "Options" to change LSFS Options  | Options |      |    |
|   |         |      |    |
|   |         |      |    |
|   |         |      |    |
|   |         |      |    |
|   |         |      |    |
|   |         |      |    |
|   | Next    | Cano | el |

#### Click Next.

9. Define the caching policy and specify the cache size (in MB).

|        |   | ?  | x    |
|--------|---|----|------|
| 🔶 Ad   | d Device Wizard   |    |      |
| Specif | y Device Cache Parameters   |    |      |
| _ Mo   | de  |    | 1    |
| ٩      | Write-Back<br>Writes are performed asynchronously, actual Writes to Disk are delayed, Reads<br>are cached |    |      |
| C      | <ul> <li>Write-Through</li> <li>Writes are performed synchronously, Reads are cached</li> </ul>           |    |      |
| C      | N/A<br>Reads and Writes are not cached  |    |      |
| □s     | et Maximum available Size   |    | ,    |
| Size   | in MB 128   |    |      |
|        |   |    |      |
|        | Next  | Ca | ncel |

#### Click Next.



**10.** Define the L2 caching policy and size if necessary. Click **Next** to continue.

**11.** Specify the destination directory for the L2 cache, if any.

**Note:** It is strongly recommended to use SSD-based storage for L2 caching.

12. Specify target parameters.

Select the **Target Name** checkbox to enter a custom name of a target. Otherwise, the name will be generated automatically based on the target alias.

|   | ? X    |
|---|--------|
| Add Device Wizard                                   |        |
|   |        |
| Target Parameters                                   |        |
| Choose a Target Attachment Method                   |        |
| Create new Target                                   | ~      |
| Target Alias  |        |
| Witness   |        |
| Target Name   |        |
| iqn.2008-08.com.starwindsoftware:sw1.sw.com-witness |        |
| ✓ Allow multiple concurrent iSCSI Connections       |        |
|   |        |
|   |        |
|   |        |
|   |        |
|   |        |
|   |        |
| Next  | Cancel |

Click **Next** to continue.

13. Click **Create** to add a new device and attach it to the target. Then click **Finish** to close the wizard.



14. Right-click on the device you just created and select Replication Manager.

| 0  | StarWind Manage  | ment Console   | _ <b>D</b> X               |
|--|--|--|----------------------------|
| FILE HOST TARGET TOOLS OPTIONS                                   | HELP   | -  |                            |
| Refresh Connect Disconnect Add Server Rer                        | nove Server Add Device Remove Device   | Help   |                            |
| Clusters   | _  |  | <u>^</u>                   |
| Servers  | IMAGEFILE1   |  |                            |
| <ul> <li>SW1.SW.COM (172.16.0.11): 3</li> <li>Witness</li> </ul> | ★ <u>Remove Device</u> ★ <u>Free Sectors</u> ★ <u>Detach from iqn.2008-1</u> | orce remove Device St Attach to Target<br>08.com.starwindsoftware:sw1.sw.com-witness | © <u>Extend Image Size</u> |
| imagefile1 Remo<br>SW2.SW.COM (172.16 Korce                      | re Device<br>remove Device   | le1<br>nputer\E\Witness.img  |                            |
| 음· Attack<br>알프 Detacl   | to Target<br>h from iqn.2008-08.com.starwindsoftware:                        | sw1.sw.co<br>es  | =                          |
| Extend<br>Replic   | Tmage Size<br>ation Manager  |  |                            |
|  | Serial Id  | 90B27A66A2C45273   |                            |
|  | Asynchronous Mode  | Yes  |                            |
|  | Mode   | Write-Back   |                            |
|  | Size   | 100  |                            |

15. Replication Manager Window will appear. Press the Add Replica button.

**16.** Select **Synchronous two-way replication**.

| <b>4</b>                         | Replication Manager for imagefile1   | ? X   |
|----------------------------------|--|-------|
| $\circ$ =                        | ×  |       |
| Refresh Add<br>Replication Par   | ? x  |       |
|                                  |  |       |
|                                  | Replication Mode   |       |
|                                  | Synchronous "Two-Way" Replication<br>Replication Partner must be connected to Client as Source Device as well, MPIO on Client<br>must be enabled, needs dedicated high Performance Network Connection for<br>Synchronization   |       |
|                                  | <ul> <li>Asynchronous "One-Way" Replication         Replica is used to store replicated Data, Data is stored as Snapshots, Client cannot             connect to Replication Partner, mount Snapshot from Replica to get Access to replicated             Data     </li> </ul>  |       |
| PROPERTIES                       | O Heartbeat Node   |       |
| Host Name<br>Target Name<br>Mode | Heartbeat node is used to prevent split-brain issue in case of loss of connection (both<br>sync and heartbeat channels) between nodes. This node doesn't store any data. It can<br>be placed to dient side to ensure that HA node with healthy connection to client machine<br>remains in service in case when inter-node connection is completely lost. |       |
| Priority<br>Synchronizatio       |  |       |
| Synchronizatio<br>Heartbeat Cha  | Next Cancel  |       |
|                                  |  | Close |

Click **Next** to proceed.



17. Specify the partner server IP Address or Host name.

Default StarWind management port is 3261. If you have configured a different port, please type it in the **Port number** field.

|   | ?   | X    | [ |
|---|-----|------|---|
| 📀 Replication Wizard  |     |      |   |
| Add Partner Node  |     |      |   |
| Specify Partner Host Name or IP Address where Replication Node would be created |     |      |   |
| Host Name or IP Address 172.16.0.22   |     |      |   |
| Port Number 3261  |     |      |   |
|   |     |      |   |
|   |     |      |   |
|   |     |      |   |
|   |     |      |   |
|   |     |      |   |
|   |     |      |   |
|   | _   |      |   |
| Next  | Car | ncel |   |

Click Next.

**18.** Choose **Create new Partner Device** 

|   | ?  | x    |
|---|----|------|
| 📀 Replication Wizard  |    |      |
| Partner Device Setup  |    |      |
| Create new Partner Device<br>Existing Device Parameters would be used as a Template |    |      |
| Select existing Device     Select existing Device on Partner Server                 |    |      |
|   |    |      |
|   |    |      |
|   |    |      |
|   |    |      |
| Next  | Ca | ncel |

Click Next.



**19.** On this screen you can select the synchronization and heartbeat channels for the HA device. You can also modify the ALUA settings and modify the target name of the device.

|   |  | ? X    |
|---|--|--------|
| € | Replication Wizard   |        |
|   | Network Options for Synchronous Replication Networks for Synchronization and Heartbeat Press "Change Network Settings" to configure Interfaces |        |
|   | Networks for Heartbeat<br>Press "Change Network Settings" to configure Interfaces  |        |
|   | Change Network Settings<br>ALUA preferred 172.16.0.11, 172.16.0.22<br>Change ALUA Settings   |        |
|   | iqn.2008-08.com.starwindsoftware: 172.16.0.22-witness Modify Target Name   |        |
|   | Next   | Cancel |

Click Change network settings....

**20.** Specify the interfaces for synchronization and Heartbeat.

| Speci  | ify Interfaces for Sync | hronization and Heartbeat C | hannels   | X  |  |
|--|-------------------------|-----------------------------|-----------|----|--|
| Select Synchronization Channel and at least one Heartbeat Channel different from Synchronization Channel |                         |                             |           |    |  |
| Interfaces   | Networks                | Synchronization and H       | Heartbeat |    |  |
| Host Name: 172   | 2.16.0.22               |                             |           |    |  |
| 172.16.0.22  | 172.16.0.0              |                             | <b>v</b>  | _  |  |
| 172.16.110.22  | 172.16.110.0            | •                           |           |    |  |
| 172.16.111.22  | 172.16.111.0            | <b>v</b>                    |           |    |  |
| 172.16.210.22  | 172.16.210.0            |                             |           |    |  |
| 172.16.211.22  | 172.16.211.0            |                             |           |    |  |
| 🖃 Host Name: SW  | 1.SW.COM                |                             |           |    |  |
| 172.16.0.11  | 172.16.0.0              |                             | ~         |    |  |
| 172.16.110.11  | 172.16.110.0            |                             |           |    |  |
| 172.16.111.11  | 172.16.111.0            |                             |           |    |  |
| 172.16.210.11  | 172.16.210.0            |                             |           |    |  |
| 172.16.211.11  | 172.16.211.0            |                             |           |    |  |
|  |                         |                             |           |    |  |
|  |                         |                             |           |    |  |
|  |                         |                             |           |    |  |
|  |                         |                             |           |    |  |
|  |                         |                             | OK Cance  | el |  |

## Click OK. Then click Next.



21. Press the Create Replica button. Then click Finish to close the wizard.

22. The added device will appear in the StarWind Management Console.

| FILE HOST TARGET TOOLS OPTIONS HELP   Refersh Connect Disconnect Add Server Remove Server Add Device Remove Device Help   Clusters   Clusters   Servers   SwitsWCOM (172.16.0.11)::   Witness   HAImage1   Sw2.SW.COM (172.16.0.22)::   Sw2.SW.COM (172.16.0.22)::   Sw2.SW.COM (172.16.0.22)::   Witness   HAImage1   Sw2.SW.COM (172.16.0.22)::   Sw2.SW.COM (172.16.0.22)::   Stee   HAImage1   Sw2.SW.COM (172.16.0.22)::   Stee   HAImage1   Sw2.SW.COM (172.16.0.22)::   Stee   HAImage1   Sw2.SW.COM (172.16.0.22)::   Stee   HAImage1   Sw2.SW.COM (172.16.0.22)::   Perice   HAImage1   Size   IDEVice   HAImage1   Size   HAImage1   Size   IDEVice   Size   IDEVice   Inagefiel   Serial Id   Synchronization Steus   Synchronization Steus   Synchronization Steus   Synchronization Steus   Synchronization Steus   Synchronization Steus   Synchronization   Haire   Stee   IDEVice   Inagefiel   Stein Id   Step Server   Size   IDEVice   IDEVice   Step Server   Size   Size   Size <th>0</th> <th>StarWind Managen</th> <th>nent Console</th> <th>_ <b>D</b> X</th>   | 0  | StarWind Managen                     | nent Console  | _ <b>D</b> X                               |
|---|--|--------------------------------------|---|--|
| Refresh Connect Disconnect Add Server Remove Server Add Device Remove Device Hep  Clusters Cl      | FILE HOST TARGET TOOLS OPTIONS               | HELP                                 |   |  |
| Clusters Cl       | Refresh Connect Disconnect Add Server Rer    | nove Server Add Device Remove Device | ()<br>Help  |  |
| Image:   | Clusters                                     |                                      |   | ^  |
| <ul> <li>Image: Switzer S</li></ul> | Servers                                      | HAIMAGE1                             |   |  |
| Image 1       Device       HAImage 1         Image 1       Device       HAImage 1         Image 1       Size       1 GB         Image 1       Target Name       iqn.2009-08.com.starwindsoftwaressw1.sw.com-witness       Virtual Disk         Image 1       Size       1 GB       Target Name       iqn.2009-08.com.starwindsoftwaressw1.sw.com-witness       Virtual Disk       Image 1         Image 1       Size       1 GB       Size  | ▲ SW1.SW.COM (172.16.0.11): 5<br>▲ ♦ Witness |                                      | rce remove Device III Change Partner Author<br>Priority I Replication Node Interfaces | entication Settings<br>Replication Manager |
| Perice       HAImage1         Size       1 GB         Size       1 GB         Target Name       ign.2008-08.com.starwindsoftwaressv1.sw.com-witness         Witness       Virtual Disk         Witness       First         Mode       Synchronous         Auto Synchronization after       Yes         Failure       Synchronized         StorAGGE       StorAGGE         Device       imagefile1         Virtual Disk       My Computer/E/Witness.img         Persistent Reservations       Yes         Size       1 GB         Virtual Disk       My Computer/E/Witness.img         Persistent Reservations       Yes         Size       1 GB         Virtual Disk       My Computer/E/Witness.img         Persistent Reservations       Yes         Size       1 GB         Virtual Disk Sector Size       1 2 Bytes         Read-Only Mode       No         Header Size in Bytes       0         Serial Id       90827A66A2C45273         V       III   | HAlmage1                                     | Contend Size of HA (High             | Availability) Device  |  |
| Size 168<br>Size 168<br>Target Name iqn.2008-08.com.starwindsoftwaresw1.sw.com-witness<br>Virtual Disk imagefile1<br>Serial Id 90827A66A2C45273<br>Priority First<br>Mode Synchronous<br>Auto Synchronization after Yes<br>Failure<br>Synchronization Status Synchronized<br>STORAGE<br>Device imagefile1<br>Virtual Disk My Computer/E/Witness.img<br>Persistent Reservations Yes<br>Size 168<br>Virtual Disk My Computer/E/Witness.img<br>Persistent Reservations Yes<br>Size 168<br>Virtual Disk Size 512 Bytes<br>Read-Only Mode No<br>Header Size in Bytes 0<br>Serial I 90827A66A2C45273 v v  | 4 SW2 SW COM (172 16 0 22 ) · · ·            | Device                               | HAlmage1  |  |
| Witness       Iarget Name       Igh.203-020m.starWindsoftWaresW1.3W.com-writtess         Witness       Witness       Igh.203-020m.starWindsoftWaresW1.3W.com-writtess         Witness       Serial Id       90827A66A2C45273         Priority       First       Mode         Mode       Synchronous       Auto Synchronization after       Yes         Failure       Synchronization Status       Synchronized         STORAGE       Device       imagefile1         Virtual Disk       My Computer/E/Witness.img       Persistent Reservations         Yes       Size       1 G8         Virtual Disk Sector Size       512 Bytes       Read-Only Mode         Header Size in Bytes       0       Serial Id       90827A66A2C45273         Virtual Disk Is Bytes       0       Serial Id       90827A66A2C45273  |  | Size                                 | 1 GB  |  |
| Image 1     Image 1     Image 1     Image 1       Serial Id     90827A66A2C45273     Image 1       Mode     Synchronous       Auto Synchronization after     Yes       Failure     Synchronized       STORAGE     Image file1       Virtual Disk     My Computer/EWitness.img       Persistent Reservations     Yes       Size     1 G8       Virtual Disk Sector Size     512 Bytes       Read-Only Mode     No       Header Size in Bytes     0       Serial Id     90827A66A2C45273  | - Vitness                                    | l'arget Name                         | ign.2008-08.com.starwindsoftware:sw1.sw.com-w   | Itness                                     |
| Priority First<br>Mode: Synchronous<br>Auto Synchronization after Yes<br>Failure<br>Synchronization Status Synchronized<br>STORAGE<br>Device imagefile1<br>Virtual Disk My Computer/E\Witness.img<br>Persistent Reservations Yes<br>Size 1 G8<br>Virtual Disk Sector Size 512 Bytes<br>Read-Only Mode No<br>Header Size in Bytes 0<br>Serial Id 90827A66A2C45273 ▼  | HAImage1                                     | Serial Id                            | 90B27A66A2C45273  |  |
| Mode:       Synchronous         Auto Synchronization after       Yes         Failure       Synchronization Status         Synchronization Status       Synchronization         StoRAGE  | -  | Priority                             | First   | =  |
| Auto Synchronization after<br>Failure<br>Synchronization Status     Yes<br>Synchronization Status       STORAGE       Device     imagefile1       Virtual Disk     My Computer/E/Witness.img       Persistent Reservations     Yes       Size     1 GB       Virtual Disk Sector Size     512 Bytes       Read-Only Mode     No       Header Size in Bytes     0       Serial Id     90827A66A2C45273   |  | Mode:                                | Synchronous   |  |
| Failure     Synchronization Status     Synchronized       STORAGE   |  | Auto Synchronization after           | Yes   |  |
| STORAGE       Device       imagefile1         Virtual Disk       My Computer\E\Witness.img         Persistent Reservations       Yes         Size       1 GB         Virtual Disk Sector Size       512 Bytes         Read-Only Mode       No         Header Size in Bytes       0         Sector Size       0         Sector Size in Bytes       0         Sector Size in Bytes       >  |  | Failure<br>Synchronization Status    | Synchronized  |  |
| Device     imagefile1       Virtual Disk     My Computer\E\Witness.img       Persistent Reservations     Yes       Size     1 GB       Virtual Disk Sector Size     512 Bytes       Read-Only Mode     No       Header Size in Bytes     0       Serial Id     90827A66A2C45273   |  | STORAGE                              |   |  |
| Virtual Disk     My Computer\E\Witness.img       Persistent Reservations     Yes       Size     1 GB       Virtual Disk Sector Size     512 Bytes       Read-Only Mode     No       Header Size in Bytes     0       Serial Id     90827A66A2C45273   |  | Device                               | imagefile1  |  |
| Persistent Reservations     Yes       Size     1 GB       Virtual Disk Sector Size     512 Bytes       Read-Only Mode     No       Header Size in Bytes     0       Serial Id     90827A66A2C45273     V  |  | Virtual Disk                         | My Computer\E\Witness.img   |  |
| Size     1 GB       Virtual Disk Sector Size     512 Bytes       Read-Only Mode     No       Header Size in Bytes     0       Serial Id     90827A66A2C45273       ✓     III  |  | Persistent Reservations              | Yes   |  |
| Virtual Disk Sector Size         512 Bytes           Read-Only Mode         No           Header Size in Bytes         0           Serial Id         90827A66A2C45273         V  |  | Size                                 | 1 GB  |  |
| Read-Only Mode         No           Header Size in Bytes         0           Serial Id         90827A66A2C45273         ✓           <         III         >   |  | Virtual Disk Sector Size             | 512 Bytes   |  |
| rieader size in systes         0           Serial Id         90827A66A2C45273           <         III   |  | Read-Only Mode                       | No  |  |
| Senai 10 Subc/A00A2C432/3 V   |  | Header Size in Bytes                 | 0002706602045272  |  |
|   |  | Serial ID                            | 50527A00A2C43273  | ×  |
| StarWind Software Ready   | StarWind Software Ready                      |                                      |   |  |

Repeat the steps 3 – 20 for the remaining virtual disks that will be used as Cluster Shared Volumes.

Once all devices are created the Management console should look as follows:



**Note:** It is recommended to create at least one CSV volume per cluster node according to **StarWind Virtual SAN** best practices.

# **DISCOVERING TARGET PORTALS**

In this chapter we will connect the previously created disks to the servers that will be added to the cluster:

- 1. Launch Microsoft iSCSI Initiator: Start > Administrative Tools > iSCSI Initiator or iscsicpl from the command line interface. The iSCSI Initiator Properties window appears.
- 2. Navigate to the **Discovery** tab.
- 3. Click the **Discover Portal** button. Discover Target Portal dialog appears. Type in 127.0.0.1.

| Discover Target Portal   |                          |  |  |  |  |  |
|--|--------------------------|--|--|--|--|--|
| Enter the IP address or DNS name and port number of the portal you want to add.                  |                          |  |  |  |  |  |
| To change the default settings of the discovery of the target portal, click the Advanced button. |                          |  |  |  |  |  |
| IP address or DNS name:  | Port: (Default is 3260.) |  |  |  |  |  |
| 127.0.0.1 3260   |                          |  |  |  |  |  |
| Advanced   | Advanced OK Cancel       |  |  |  |  |  |

Click the **Advanced button**. Select **Microsoft ISCSI Initiator** as your **Local adapter** and select your **Initiator IP** (leave default for 127.0.0.1).

|                   | Advanced Settings         | ? X |
|-------------------|---------------------------|-----|
| General IPsec     |                           |     |
| Connect using     |                           |     |
| Local adapter:    | Microsoft iSCSI Initiator | ~   |
| Initiator IP:     | Default                   | ~   |
| Target portal IP: |                           | ~   |
| CRC / Checksum    |                           |     |
| Data digest       | Header digest             |     |
| Enable CHAP log o | n                         |     |

Click **OK**. Then click **OK** again to complete the Target Portal discovery.



4. Click the **Discover Portal**... button again.

| iSCSI Initiator Properties          |                               |                        |                      |  |  |
|-------------------------------------|-------------------------------|------------------------|----------------------|--|--|
| Targets Discovery                   | Favorite Targets              | Volumes and Devices    | RADIUS Configuration |  |  |
| Target portals                      | ook for Targets on fo         | bllowing portals:      | Refresh              |  |  |
| Address                             | Port                          | Adapter                | IP address           |  |  |
| 127.0.0.1                           | 3260                          | Microsoft iSCSI Initia | tor Default          |  |  |
| To add a target                     | portal, click Discover        | Portal.                | Discover Portal      |  |  |
| To remove a tar<br>then click Remov | get portal, select the<br>/e. | address above and      | Remove               |  |  |

**5.** Discover Target Portal dialog appears. Type in the first IP address of the partner node you will use to connect the secondary mirrors of the HA devices.

| Discover Target Portal   |                                   |  |  |  |
|--|-----------------------------------|--|--|--|
| Enter the IP address or DNS name and port number of the portal you<br>want to add. |                                   |  |  |  |
| To change the default settings of the disc<br>the Advanced button.                 | covery of the target portal, dick |  |  |  |
| IP address or DNS name:  | Port: (Default is 3260.)          |  |  |  |
| 172.16.210.22 3260   |                                   |  |  |  |
| Advanced   | OK Cancel                         |  |  |  |

#### Click Advanced.

6. Select Microsoft ISCSI Initiator as your Local adapter, select the Initiator IP in the same subnet as the IP address on the partner server from the previous step.

|                     | Advanced Settings         | ? × |
|---------------------|---------------------------|-----|
| General IPsec       |                           |     |
| Connect using       |                           |     |
| Local adapter:      | Microsoft iSCSI Initiator | ~   |
| Initiator IP:       | 172.16.210.11             | ~   |
| Target portal IP:   |                           | ~   |
| CRC / Checksum      |                           |     |
| 🗌 Data digest       | Header digest             |     |
| CHAP Log on informa | tion                      |     |

Click **OK**. Then click **OK** again to complete the Target Portal discovery.

## 7. Click the **Discover Portal** button once again.

Discover Target Portal dialog appears. Discover Target Portal dialog appears. Type in the second IP address of the partner node you will use to connect the secondary mirrors of the HA devices.

Select **Microsoft ISCSI Initiator** as your **Local adapter**, select the **Initiator IP** in the same subnet as the IP address on the partner server from the previous step.

|                    | Advanced Settings         | ? X |
|--------------------|---------------------------|-----|
| General IPsec      |                           |     |
| Connect using      |                           |     |
| Local adapter:     | Microsoft iSCSI Initiator | ~   |
| Initiator IP:      | 172.16.211.11             | ~   |
| Target portal IP:  |                           | ~   |
| CRC / Checksum     |                           |     |
| Data digest        | Header digest             |     |
| Enable CHAP log or | 1                         |     |

Click **OK**. Then click **OK** again to complete the Target Portal discovery.

8. All target portals added on the first node.

| iSCSI Initiator Properties                                 |  |                              |        |                       |  |
|--|--|------------------------------|--------|-----------------------|--|
| gets Discovery   | Favorite Targets                                     | Volumes and Devices          | RADIUS | Configuration         |  |
| arget portals  |  |                              |        |                       |  |
| The system will lo   | ok for Targets on fo                                 | ollowing portals:            |        | Refresh               |  |
| Address  | Port   | Adapter                      | 1      | IP address            |  |
| 127.0.0.1  | 3260   | Microsoft iSCSI Initiat      | tor [  | Default               |  |
| 172.16.210.22  | 3260   | Microsoft iSCSI Initiat      | tor 1  | 172.16.210.11         |  |
| 172.16.211.22  | 3260   | Microsoft iSCSI Initiat      | tor 1  | 172.16.211.11         |  |
| To add a target p<br>To remove a targ<br>then click Remove | ortal, click Discover<br>et portal, select the<br>e. | Portal.<br>address above and | Disco  | over Portal<br>Remove |  |

- 9. Complete the same steps for the second node.
- **10.** All target portals added on the second node.





# CONNECTING TARGETS AND CONFIGURING MULTIPATHING

Click the Targets tab. The previously created targets are listed in the Discovered Targets section.
 Note: If the created targets are not listed, check the firewall settings of the StarWind Server as well as the list of networks served by the StarWind Server (go to StarWind Management Console -> Configuration -> Network).

|   |  | i   | SCSI In   | itiator P                                     | roperties                           | ;      |      |  | 2 |
|---|--|---|---|---|-------------------------------------|--------|------|--|---|
| argets<br>Quick Co  | Discov   | ery Favorite  | Targets   | Volumes a                                     | nd Devices                          | RAD    | IUS  | Configuration                                  |   |
| To disco<br>DNS na  | over an<br>me of t   | d log on to a ta<br>he target and   | arget usin<br>then click                                    | ng a basic co<br>Quick Conn                   | nnection, t<br>ect.                 | ype th | e IP | address or                                     |   |
| Target:   | : [  |   |   |   |                                     |        | Qu   | ick Connect                                    |   |
| Discove   | red tar  | gets  |   |   |                                     |        |      | Refresh  |   |
| Name  |  |   |   |   |                                     | Statu  | s    |  | 1 |
| iqn.20  | 08-08.0  | com.starwindso  | oftware: 1  | 72.16.0.22                                    | -csv1                               | Inact  | ive  |  |   |
| iqn.20  | 08-08.0  | com.starwindso  | oftware: 1  | 72.16.0.22                                    | -csv2                               | Inact  | ive  |  |   |
| iqn.20  | 08-08.0  | com.starwindso  | oftware: 1  | 72.16.0.22                                    | -witness                            | Inact  | ive  |  |   |
| iqn.20  | 08-08.0  | com.starwindso  | oftware:s   | w1.sw.com                                     | -csv1                               | Inact  | ive  |  |   |
| iqn.20  | 08-08.0  | com.starwindso  | oftware:s   | w1.sw.com                                     | -csv2                               | Inact  | ive  |  |   |
| ign.20  | 08-08.0  | com.starwindso  | oftware:s   | w1.sw.com                                     | witness                             | Inact  | ive  |  |   |
| To conr   |  |   | otions of   | elect a targ                                  | et and then                         |        |      |  |   |
| click Co  | nect usi<br>nnect.   | ng advanced o   | puons, se   |   |                                     |        |      | Connect  |   |
| click Co<br>To com<br>then cli  | nect usi<br>nnect.<br>pletely<br>ck Disco  | ng advanced o<br>disconnect a ta<br>onnect.   | arget, sel  | ect the targ                                  | et and                              |        |      | Connect<br>Disconnect                          |   |
| click Co<br>To com<br>then clic<br>For targ<br>select t                       | nect usi<br>nnect.<br>pletely<br>ck Disco<br>get prop<br>he targ                         | ng advanced o<br>disconnect a ta<br>onnect.<br>perties, includir<br>et and click Pro                                      | arget, sel<br>ng configu<br>operties.                       | ect the targ                                  | et and<br>essions,                  |        | F    | Connect<br>Disconnect<br>Properties            |   |
| click Co<br>To com<br>then cli<br>For targ<br>select t<br>For con<br>the targ | nect usi<br>nnect.<br>pletely<br>ck Disco<br>get proj<br>he targ<br>nfigurati<br>get and | ng advanced o<br>disconnect a ta<br>nnect.<br>perties, includir<br>et and click Pro<br>on of devices a<br>then click Dev  | ng configu<br>operties.<br>associated                       | ect the targ<br>uration of s<br>d with a tar  | et and<br>essions,<br>get, select   |        | F    | Connect<br>Disconnect<br>Properties<br>Devices |   |
| click Co<br>To com<br>then cli<br>For targ<br>select t<br>For con<br>the targ | nect usi<br>nnect.<br>pletely<br>ck Disco<br>get proj<br>he targ<br>nfigurati<br>get and | ng advanced o<br>disconnect a ta<br>onnect.<br>Derties, includir<br>et and click Pro<br>on of devices a<br>then click Dev | ng configu<br>ng configu<br>perties.<br>associater<br>ices. | ect the targ<br>uration of su<br>d with a tar | et and<br>et solons,<br>get, select |        | F    | Connect<br>Disconnect<br>Properties<br>Devices |   |

- 2. Select a target located on the local server and click **Connect**.
- 3. Enable both checkboxes. Click Advanced...

| Connect To Target   | x      |
|---|--------|
| Target name:<br>iqn.2008-08.com.starwindsoftware:sw1.sw.com-witness   |        |
| Add this connection to the list of Favorite Targets.<br>This will make the system automatically attempt to restore the<br>connection every time this computer restarts. |        |
| ☑ Enable multi-path   |        |
| Advanced  | Cancel |



- 4. Select Microsoft iSCSI Initiator in the Local adapter text field.
- 5. In the Target portal IP select 127.0.0.1. Click OK.

|                        | Advanced Settings  | ?      | x   |
|------------------------|--|--------|-----|
| General IPsec          |  |        |     |
| Connect using          |  |        | _   |
| Local adapter:         | Microsoft iSCSI Initiator  | ~      |     |
| Initiator IP:          | Default  | ~      |     |
| Target portal IP:      | 127.0.0.1 / 3260   | ~      |     |
|                        |  |        |     |
| CRC / Checksum         | Header digest  |        |     |
|                        |  |        | - 1 |
| Enable CHAP log o      | n  |        |     |
| CHAP Log on inform     | ation  |        |     |
| CHAP helps ensure co   | onnection security by providing authentication between a target (  | and    |     |
| an initiator.          |  |        |     |
| To use, specify the sa | ame name and CHAP secret that was configured on the target for     | r this |     |
| initiator. The name w  | ill default to the Initiator Name of the system unless another nam | ne is  |     |
| specificu.             |  |        |     |
| Name:                  | iqn.1991-05.com.microsoft:sw1.sw.com                               |        | 1   |
|                        |  |        |     |
| Target secret:         |  |        |     |
|                        |  |        |     |
| Perform mutual au      | Ithentication  |        |     |
| To use mutual CHAP,    | either specify an initiator secret on the Configuration page or us | в      |     |
| RADIUS.                |  |        |     |
| Use RADIUS to ge       | nerate user authentication credentials                             |        |     |
|                        | thenticate target credentials                                      |        |     |
|                        | a le nacate target el cuentials                                    |        |     |
|                        |  |        |     |
|                        | OK Cancel  | Ap     | ply |
|                        |  |        |     |

6. Select the partner-target from other StarWind node and click **Connect**..

| Connect To Target   | x      |
|---|--------|
| Target name:<br>iqn.2008-08.com.starwindsoftware:172.16.0.22-witness  |        |
| Add this connection to the list of Favorite Targets.<br>This will make the system automatically attempt to restore the<br>connection every time this computer restarts. |        |
| ☑ Enable multi-path   |        |
| Advanced  | Cancel |



7. Select Microsoft iSCSI Initiator in the Local adapter text field. In the **Initiator IP** field select the IP address. In the **Target portal IP** select the corresponding portal IP from the same subnet.

| Advanced Settings         | ? X               |
|---------------------------|-------------------|
|                           |                   |
|                           |                   |
| Microsoft iSCSI Initiator | ~                 |
| 172.16.210.11             | ~                 |
| 172.16.210.22 / 3260      | ~                 |
|                           |                   |
| Header digest             |                   |
|                           | Advanced Settings |

#### Click **OK**.

8. Select the same target like in step before and again click **Connect**.

| Connect To Target   |  |  |
|---|--|--|
| Target name:<br>iqn.2008-08.com.starwindsoftware:172.16.0.22-witness  |  |  |
| Add this connection to the list of Favorite Targets.<br>This will make the system automatically attempt to restore the<br>connection every time this computer restarts. |  |  |
| ☑ Enable multi-path   |  |  |
| Advanced OK Cancel  |  |  |

#### Press Advanced.

**9.** This time in target portal IP in dropdown list select another data channel IP addresses for initiator and target portal.

|                   | Advanced Settings               | ? X |
|-------------------|---------------------------------|-----|
| General IPsec     |                                 |     |
| Connect using     |                                 |     |
| Local adapter:    | Microsoft iSCSI Initiator       | ¥   |
| Initiator IP:     | 172.16.211.11                   | ¥   |
| Target portal IP: | portal IP: 172.16.211.22 / 3260 |     |
| CRC / Checksum    |                                 |     |
| Data digest       | Header digest                   |     |
| Enable CHAP log o | n                               |     |

Click **OK**, click **OK** again to connect to the target.



**10.** Repeat actions described in the steps above for other HA devices (CSV1 and CSV2).

**11.** Repeat steps 1-10 of this section on the second StarWind node, specifying corresponding local and data channel IP addresses. The result should look like on the screenshot below.

| iSCSI Initiator Propertie   | s X                    |
|---|------------------------|
| Targets Discovery Favorite Targets Volumes and Devices  | RADIUS Configuration   |
| Quick Connect<br>To discover and log on to a target using a basic connection,<br>DNS name of the target and then click Quick Connect. | type the IP address or |
| Target:   | Quick Connect          |
| Discovered targets  | D-6-th                 |
| Name  | Status                 |
| iqn.2008-08.com.starwindsoftware:172.16.0.22-csv1   | Connected              |
| ign.2008-08.com.starwindsoftware:172.16.0.22-csv2   | Connected              |
| iqn.2008-08.com.starwindsoftware: 172.16.0.22-witness   | Connected              |
| iqn.2008-08.com.starwindsoftware:sw1.sw.com-csv1  | Connected              |
| iqn.2008-08.com.starwindsoftware:sw1.sw.com-csv2  | Connected              |
| To connect using advanced options, select a target and ther   | Connect                |
| click Connect.<br>To completely disconnect a target, select the target and<br>then click Disconnect.                                  | Disconnect             |
| For target properties, including configuration of sessions, select the target and click Properties.                                   | Properties             |
| For configuration of devices associated with a target, select the target and then dick Devices.                                       | Devices                |
|   |                        |
| OK  | Cancel Apply           |

**12.** Once all targets are connected, launch the **MPIO manager**: **Start** > **Administrative Tools** > **MPIO** Or **mpiocpl** from the command line interface. MPIO manager window will appear.

Go to the **Discover Multi-Paths** tab and enable the **Add support for iSCSI devices** checkbox.

| MPIO Properties                             | s <b>x</b>                |
|---|---------------------------|
| MPIO Devices Discover Multi-Paths DSM Insta | II Configuration Snapshot |
| SPC-3 compliant                             |                           |
| Device Hardware Id                          |                           |
|   |                           |
|   |                           |
| Add support for iSCSI devices               |                           |
| Add support for SAS devices                 |                           |
|   | Add                       |

Press the **Add** button. Restart the server to apply the changes. After the server is restarted, wait for the HA devices to resynchronize. Repeat step 12 on the second StarWind node once the synchronization is finished.



**13.** After both StarWind nodes are restarted and the MPIO support is enabled you have to configure the MPIO policy for each device specifying localhost (127.0.0.1) as the active path.

|   |  | ISCSI In  | itiator Properties  | ;          |  |
|---|--|---|---|------------|--|
| Targets                                 | Discovery  | Favorite Targets  | Volumes and Devices   | RADIUS     | Configuration                                  |
| - Ouick C                               | Connect  | _   |   |            |  |
| To disc<br>DNS na                       | over and log<br>ame of the ta  | on to a target usin<br>arget and then click   | ig a basic connection, t<br>Quick Connect.                            | ype the IP | address or                                     |
| Target                                  | :  |   |   | Qu         | iick Connect                                   |
| Discove                                 | ered targets   |   |   |            |  |
|   |  |   |   |            | Refresh  |
| Name                                    |  |   |   | Status     |  |
| iqn.20                                  | )08-08.com.s   | starwindsoftware: 1   | 72.16.0.22-csv1   | Connecte   | d  |
| ign.20                                  | )08-08.com.  | starwindsoftware:1  | 72.16.0.22-csv2   | Connecte   | d  |
| ign.20                                  | )08-08.com.s   | starwindsoftware:1  | 72.16.0.22-witness  | Connecte   | d  |
| ign.20                                  | )08-08.com.s   | starwindsoftware:s  | w1.sw.com-csv1  | Connecte   | d  |
| ign.20                                  | )08-08.com.s   | starwindsoftware:s  | w1.sw.com-csv2  | Connecte   | d  |
| ign.20                                  | 008-08.com.  | starwindsoftware:s  | w1.sw.com-witness   | Connecte   | d  |
| To con<br>click Co                      | nect using a   | dvanced options, se   | elect a target and then   |            |  |
| -                                       |  |   |   |            | Connect  |
| then d                                  | pletely disco<br>ick Disconne  | nnect a target, sel<br>:t.  | ect the target and  |            | Connect<br>Disconnect                          |
| For tar                                 | npletely disco<br>ick Disconneo<br>get propertio<br>the target ar                                  | onnect a target, sel<br>ct.<br>es, including configu<br>nd click Properties.  | ect the target and<br>uration of sessions,                            |            | Connect<br>Disconnect<br>Properties            |
| For tar<br>select<br>For cor<br>the tar | npletely disco<br>ick Disconner<br>get propertie<br>the target ar<br>nfiguration o<br>get and ther | nnect a target, sel<br>ct.<br>es, including configu<br>nd click Properties.<br>f devices associated<br>n click Devices. | ect the target and<br>uration of sessions,<br>d with a target, select |            | Connect<br>Disconnect<br>Properties<br>Devices |
| For tar<br>select<br>For cor<br>the tar | pletely disco<br>ick Disconner<br>get properti<br>the target ar<br>nfiguration o<br>get and ther   | nnect a target, sel<br>ct.<br>es, including configu<br>d click Properties.<br>f devices associate:<br>n click Devices.  | ect the target and<br>uration of sessions,<br>d with a target, select |            | Connect<br>Disconnect<br>Properties<br>Devices |

Select a target and click **Devices**...

14. Devices dialog appears. Click MPIO.

|                              |                                  | Devices   | x          |
|------------------------------|----------------------------------|---|------------|
|                              |                                  |   |            |
| Name                         | Address                          |   |            |
| Disk 2                       | Port 3: Bus                      | 0: Target 0: LUN 0                                      |            |
| Volume path                  | names:                           |   |            |
| Legacy devic                 | e name:                          | \\PhysicalDrive2  |            |
| Device interf                | ace name:                        | <pre>\/?/mpio#disk&amp;ven_starwind∏_starwin &lt;</pre> | id&rev_000 |
| Configure M                  | ultipath IO (M                   | 1PIO)   |            |
| To configure<br>selected dev | e the MPIO po<br>vice, click MPI | olicy for a<br>IO. M                                    | PIO        |
|                              |                                  |   | OK         |



15. Select Fail Over Only load balance policy and then designate the local path as active.

|   |  | Device  | e Details                                       |   | x   |
|---|--|---|---|---|-----|
| MPIO  |  |   |   |   |     |
| Load balance  | e policy:  |   |   |   |     |
| Fail Over O   | nly  |   |   | ~   |     |
| Description   | 1  |   |   |   | _   |
| The fail or<br>other pat<br>round-rob<br>available<br>This device b | ver policy er<br>hs as standt<br>pin approach<br>path is foun<br>nas the follo | nploys one a<br>by. The star<br>upon failure<br>d.<br>wing paths: | active path a<br>ndby paths v<br>e of the activ | nd designates all<br>will be tried on a<br>ve path until an |     |
| Path Id   | Status   | Type  | Weight  | Session ID  |     |
| 0x7703  | Conne  | Active  | n/a   | ffffe000009fe020-4  | 000 |
| 0x7703  | Conne  | Standby   | n/a   | ffffe000009fe020-4  | 000 |
| 0x7703  | Conne  | Standby   | n/a   | ffffe000009fe020-4  | 000 |
| <   |  | III   | Det   | tails Edit  | >   |
|   |  | 0   | к   | Cancel App  | ly  |

**16.** You can check that 127.0.0.1 is the active path by selecting it from the list and clicking **Details** 

|   | MPIO Path Deta                           | ails 🗙                             |
|---|--|------------------------------------|
|   |  |                                    |
| Path identifier:  | 0x77030000                               |                                    |
| Session identifier:                                     | ffffe000009fe02                          | 20- <mark>4</mark> 000013700000006 |
| Initiator:  | Microsoft iSCSI 1                        | Initiator                          |
| Connections<br>The identified path has<br>Source Portal | as the following connec<br>Target Portal | ctions:                            |
| 0.0.0/41664   | 127.0.0.1/3260                           | 0x5                                |
|   |  | ОК                                 |

- 17. Repeat the same steps on the second node.
- **18.** Initialize the disks and create partitions on them using the computer management snap-in. It is required that the disk devices are visible on both nodes to create the cluster.

Note: it is recommended to initialize the disks as GPT.



# **CREATING A CLUSTER**

1. Open Server Manager. Select the Failover Cluster Manager item from the Tools menu.

| <u>8</u>                   | Failover Cluster Manager   |    | _ <b>D</b> X            |
|----------------------------|--|----|-------------------------|
| File Action View Help      |  |    |                         |
|                            |  |    |                         |
| 📲 Failover Cluster Manager | Failover Cluster Manager   | ^  | Actions                 |
|                            | Create failover clusters, validate hardware for potential failover clusters, and perform configuration changes   | to | Failover Cluster Mana 🔺 |
|                            |  |    | Validate Configuration  |
|                            | Overview   |    | Create Cluster          |
|                            | A failover cluster is a set of independent computers that work together to increase the availability of server roles. T  | he | View                    |
|                            | clustered servers (called nodes) are connected by physical cables and by software. If one of the nodes fails, anoth node begins to provide services. This process is known as failover.  | er | Q Refresh               |
|                            |  |    | Properties              |
|                            | Clusters   |    | Help                    |
|                            | Name Role Status Node Status   |    |                         |
|                            |  | =  |                         |
|                            | No items found   |    |                         |
|                            |  |    |                         |
|                            |  |    |                         |
|                            |  |    |                         |
|                            |  | _  |                         |
|                            | <ul> <li>Management</li> </ul>   | _  |                         |
|                            | To begin to use failover clustering, first validate your hardware configuration, and then create a cluster. After these<br>steps are complete, you can manage the cluster. Managing a cluster can include copying roles to it from a cluster   |    |                         |
|                            | running Windows Server 2012 R2, Windows Server 2012, or Windows Server 2008 R2.  |    |                         |
|                            | Windere Control and Control an |    |                         |
|                            | Mill Connect to Cluster  |    |                         |
|                            |  |    |                         |
|                            | More Information   |    |                         |
|                            |  | ×  | <u>  </u>               |

Click the **Create Cluster** link in the Actions section of the Failover Cluster Manger.

2. Specify the servers to be added to the cluster.

| - <b>1</b>   |   | Create Cluster Wizard  | x |
|--|---|--|---|
| Select Se  | ervers                                  |  |   |
| Before You Begin<br>Select Servers<br>Validation Warning<br>Access Point for | Add the names of all the s              | ervers that you want to have in the cluster. You must add at least one server. | _ |
| Administering the<br>Cluster   | Enter server name:<br>Selected servers: | Browse<br>sw1.sw.com   | · |
| Confirmation   |   | sw2.sw.com   |   |
| Creating New Cluster   |   | Remove   |   |
| Summary  |   |  |   |
|  |   | < Previous Next > Cancel   |   |



3. Validate the configuration by passing the cluster validation tests: select "Yes..."

| Create Cluster Wizard                                    |  |  |  |  |
|--|--|--|--|--|
| Validatio  | n Warning  |  |  |  |
| Before You Begin<br>Select Servers<br>Validation Warning | For the servers you selected for this cluster, the reports from cluster configuration validation tests<br>appear to be missing or incomplete. Microsoft supports a cluster solution only if the complete<br>configuration (servers, network and storage) can pass all the tests in the Validate a Configuration<br>wizard. |  |  |  |
| Access Point for<br>Administering the<br>Cluster         | Do you want to run configuration validation tests before continuing?   |  |  |  |
| Confirmation   | View Report  |  |  |  |
| Creating New Cluster<br>Summary                          | <ul> <li>Yes. When I click Next, run configuration validation tests, and then return to the process of creating<br/>the cluster.</li> </ul>  |  |  |  |
|  | No. I do not require support from Microsoft for this cluster, and therefore do not want to run the validation tests. When I click Next. continue creating the cluster.   |  |  |  |
|  | More about cluster validation tests  |  |  |  |
|  | < Previous Next > Cancel   |  |  |  |

Click **Next** to continue.

4. Specify a cluster name.

**Note:** If the cluster servers get IP addresses over DHCP, the cluster also gets its IP address over DHCP. If the IP addresses are set statically, you need to set a cluster IP address manually as well.

| Access Point for Administerin<br>Before You Begin<br>Select Servers<br>Access Point for    | ing the Cluster   |  | ] |
|--|---|--|---|
| Before You Begin Type the name you want to<br>Select Servers<br>Access Point for SWo       | to use when administering the cluster.  |  | ] |
| Administering the<br>Cluster The NetBIOS name is li<br>automatically. For each<br>address. | limited to 15 characters. One or more IPv4<br>ch network to be used, make sure the netw | addresses could not be configured<br>ork is selected, and then type an |   |
| Creating New Cluster<br>Summary  | Networks           172.16.0.0/24  | Address<br>172.16.0.2  |   |



5. Make sure that all of the settings are correct. Click **Previous** to make any changes.

| <b>4</b>  |  | Create Cluster Wizard                                    | ×             |
|---|--|--|---------------|
| Confirma  | tion   |  |               |
| Before You Begin<br>Select Servers  | You are ready to create<br>The wizard will create y    | e a cluster.<br>our cluster with the following settings: |               |
| Access Foint for<br>Administering the<br>Cluster<br>Confirmation<br>Creating New Cluster<br>Summary | Cluster:<br>Node:<br>Node:<br>IP Address:              | SWcluster<br>sw2.sw.com<br>sw1.sw.com<br>172.16.0.2      | <u>`</u>      |
|   | I<br>Add all eligible stora<br>To continue, click Next | ge to the cluster.                                       |               |
|   |  | < Previous   | Next > Cancel |

**6.** The process of cluster creation starts. After it is completed, the system displays a report with detailed information.

| <b>1</b>   |  | Create Cluster Wizard  | ×                     |
|--|--|--|-----------------------|
| Summary  |  |  |                       |
| Before You Begin<br>Access Point for<br>Administering the<br>Cluster | You have succ  | essfully completed the Create Cluster Wizard.  |                       |
| Confirmation   |  | Create Cluster   | ~                     |
| Creating New Cluster   |  | 010000 010000  |                       |
| Summary  | Cluster:<br>Node:<br>Node:<br>Quorum:<br>IP Address: | SWcluster<br>sw2.sw.com<br>sw1.sw.com<br>Node and Disk Majority (Cluster Disk 1)<br>172.16.0.2 | v                     |
|  | To view the report crea<br>To close this wizard, cli | ted by the wizard, click View Report.<br>ck Finish.  | View Report<br>Finish |

Click **Finish** to close the wizard.

# ADDING CLUSTER SHARED VOLUMES

To add Cluster Shared Volumes (CSV) that is necessary to work with Hyper-V virtual machines:

- 1. Open Failover Cluster Manager.
- **2.** Go to Cluster->Storage -> Disks.
- 3. Right-click the required disk and select Add to Cluster Shared Volumes.

|                            |                  | Fai  | ilover Cluster                   | Mana     | ager                         |               |                    |                 |             | x          |
|----------------------------|------------------|--|----------------------------------|----------|------------------------------|---------------|--------------------|-----------------|-------------|------------|
| File Action View Help      |                  |  |                                  |          |                              |               |                    |                 |             |            |
| 🗢 🄿 🖄 🖬 🚺 🗊                |                  |  |                                  |          |                              |               |                    |                 |             |            |
| 📲 Failover Cluster Manager | Disks (3)        |  |                                  |          |                              |               |                    | Actions         |             |            |
| ⊿ i SWcluster.sw.com       | Search           |  |                                  |          | ρ (                          | Queries 🔻 🔚 🔻 | $\mathbf{\bullet}$ | Disks           |             | •          |
| Nodes                      | Name             | Status   | Assigned To                      |          | Owner Node                   | Disk Number   |                    | 🛃 🛛 Add Disk    |             |            |
| 🔺 📇 Storage                | 📇 Cluster Disk 1 | Cluster Disk 1 💿 Online Disk Witness in Quorum sw1 |                                  | 4        | 4 🏼 🛃 Move Available Storage |               |                    |                 |             |            |
| 🔠 Disks                    | 📇 Cluster Disk 2 | () Online  | Online Cluster Shared Volume sw2 |          |                              | 4             | 1 View             |                 | •           |            |
| Pools                      | 📇 Cluster Disk 3 | Online   | Available Sto                    | rade     | sw1                          |               | 3                  | Refresh         |             |            |
| B Cluster Events           |                  |  |                                  | <b>*</b> | Bring Online                 |               |                    | Help            |             |            |
|                            |                  |  |                                  |          | Take Offline                 |               |                    | - nep           |             |            |
|                            |                  |  |                                  |          | Add to Cluster Shared        | Volumes       |                    | Cluster Disk    | 3           | -          |
|                            |                  |  |                                  | 5        | Information Details          |               |                    | Bring Onli      | ne          |            |
|                            |                  |  |                                  | <u>1</u> | Show Critical Events         |               |                    | 🛛 🚮 Take Offlin | ie          |            |
|                            |                  |  |                                  |          | More Actions                 | •             |                    | 📑 Add to Clu    | ster Shared |            |
|                            |                  |  |                                  |          | Remove                       |               |                    | 🚯 Informatio    | n Details   |            |
|                            |                  |  |                                  |          | Properties                   |               |                    | Show Criti      | cal Events  |            |
|                            |                  |  |                                  |          |                              |               | 1                  | More Action     | ons         | - <b>+</b> |
|                            | <                | ш  |                                  |          |                              |               | >                  | 🚗 Remove        |             |            |
|                            | 10               |  |                                  |          |                              | Properties    |                    |                 |             |            |
|                            | V 💦 Cluster Disk | 3  |                                  |          |                              |               |                    | 🛛 Help          |             |            |
|                            | Velumes (1)      |  |                                  |          |                              |               |                    |                 |             |            |
|                            | volumes (1)      |  |                                  |          |                              |               |                    |                 |             |            |
|                            | CSV2 (G:)        |  |                                  |          |                              |               |                    |                 |             |            |
|                            | NTFS 24.9 GE     | free of 25.0 GB                                    |                                  |          |                              |               |                    |                 |             |            |
|                            |                  |  |                                  |          |                              |               |                    |                 |             |            |
|                            |                  |  |                                  |          |                              |               |                    |                 |             |            |
|                            |                  |  |                                  |          |                              |               |                    |                 |             |            |
|                            |                  |  |                                  |          |                              |               |                    |                 |             |            |
| Disks: Cluster Disk 3      | 17               |  |                                  |          |                              |               |                    |                 |             |            |

Once the disks are added to the cluster shared volumes list you can start creating highly available virtual machines.

**Note:** to avoid unnecessary CSV overhead configure each CSV to be owned by one cluster node. This node should also be the preferred owner of the VMs running on that node.



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