



FUJITSU A3CA08733-A230-02 Storage ETERNUS AX HX Series iSCSI Configuration User Guide

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A3CA08733-A230-02
FUJITSU Storage ETERNUS AX/HX Series
iSCSI Configuration for ESXi® using VSC Express Guide

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Deciding whether to use the iSCSI Configuration for ESX Express Guide

This guide describes how to quickly set up the iSCSI service on a storage virtual machine (SVM), provision a LUN, and make the LUN available using an iSCSI initiator on an ESX host computer.

This guide is based on the following assumptions:

- You want to use best practices, not explore every available option.
- You do not want to read a lot of conceptual background.
- You want to use ONTAP System Manager, not the ONTAP command-line interface or an automated scripting tool.

[Cluster Management Using ONTAP System Manager](#)

- You are using the native ESX iSCSI software initiator on ESXi 5.x.
- You are not using CHAP authentication for iSCSI.
- You are using a supported version of Virtual Storage Console for VMware vSphere to configure storage settings for your ESX host.
- Your network uses IPv4 addressing.
- You want to assign addresses to logical interfaces using any of the following methods:
 - Automatically from a subnet, you define
 - Manually, using an address selected from an existing subnet
 - Manually, using an address that will be added to an existing subnet

You have at least two high-speed Ethernet ports (1 GbE minimum, 10 GbE recommended) available on each node in the cluster.

Onboard UTA2 (also called “CNA”) ports are configurable. You configure those ports in the ONTAP CLI; that process is not covered in this guide.

You should see the Network Management Guide for using the CLI to configure Ethernet port flow control.

[Network Management Guide](#)

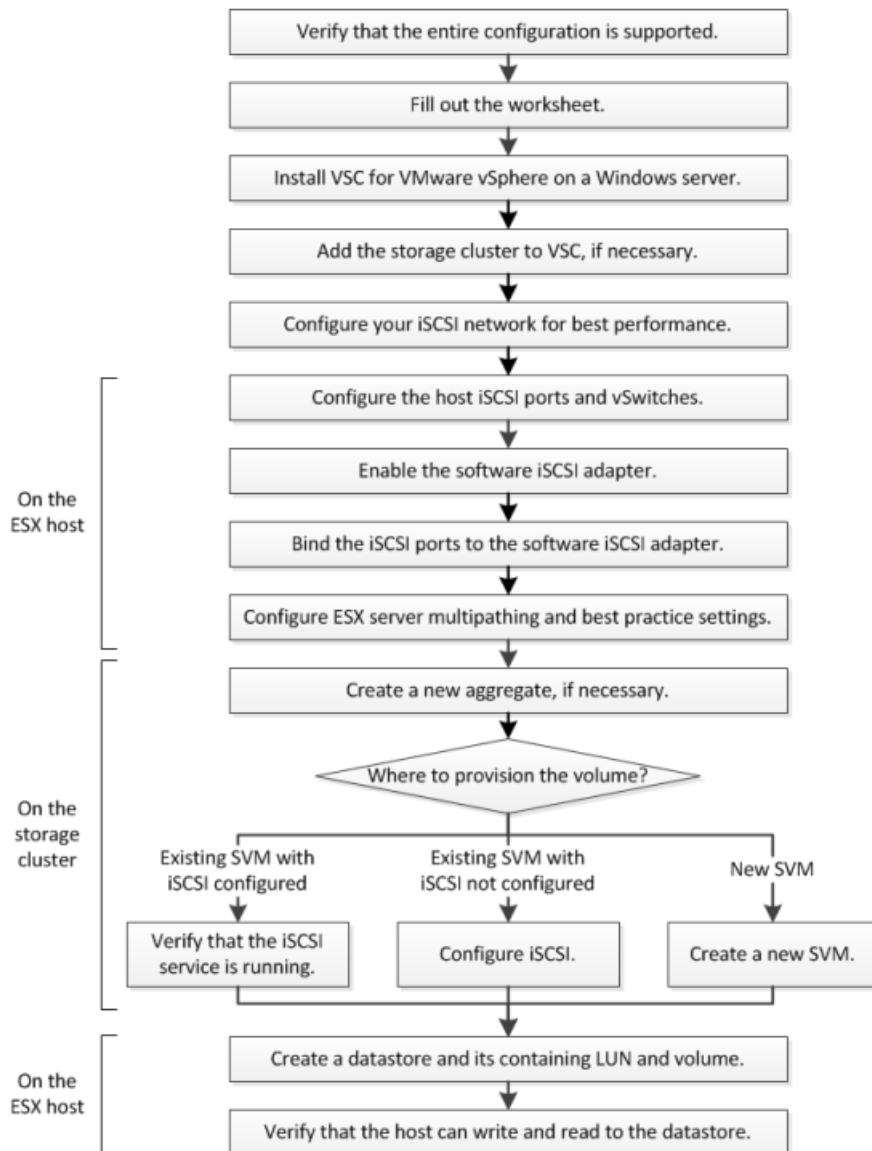
- You are not configuring iSCSI SAN boot.
- You are providing storage to VMs through the ESX hypervisor and not running an iSCSI initiator within the VM.

If these assumptions are not correct for your situation, you should see the following resources:

- [SAN Administration Guide](#)
- [SAN Configuration Guide](#)
- VMware vSphere Storage for your version of ESX 5 (available from [VMware](#))

iSCSI configuration workflow

When you make storage available to an ESX host using iSCSI, you provision a volume and LUN on the storage virtual machine (SVM) using Virtual Storage Console for VMware vSphere, and then connect to the LUN from the host.



Verifying that the iSCSI configuration is supported

For reliable operation, you must verify that the entire iSCSI configuration is supported.

Procedure

1. Refer to the Server Support Matrix to verify that you have a supported combination of the following components:
 - ONTAP software
 - Host computer CPU architecture (for standard rack servers)
 - Specific processor blade model (for blade servers)
 - Storage protocol (iSCSI)
 - ESXi operating system version
 - Guest operating system type and version

- Virtual Storage Console (VSC) for VMware vSphere software
- Windows Server version to run VSC

For Server Support Matrix, contact Fujitsu support personnel.

2. Click the configuration name for the selected configuration.

Details for that configuration are displayed in the Configuration Details window.

3. Review the information in the following tabs:

- **Notes**

Lists important alerts and information that are specific to your configuration.

- **Policies and Guidelines**

Provides general guidelines for all SAN configurations.

Completing the iSCSI configuration worksheet

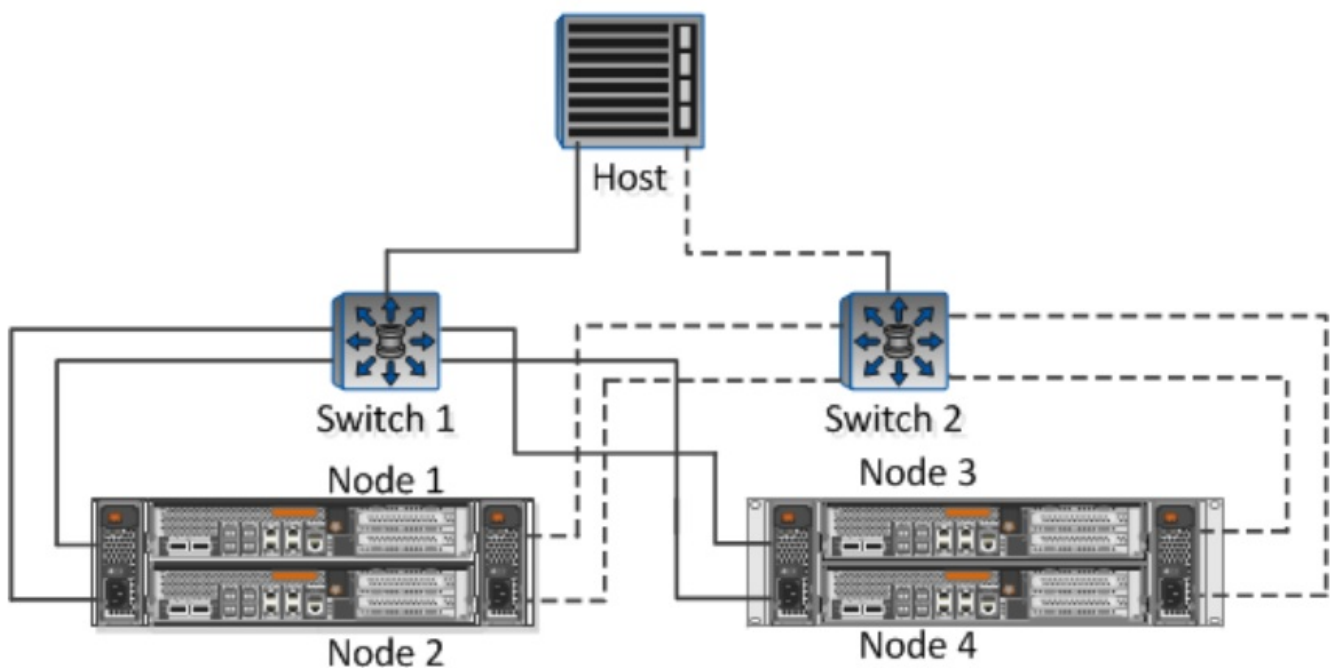
You require network addresses and storage configuration information to perform iSCSI configuration tasks.

Target network addresses

The storage virtual machine (SVM) is the iSCSI target.

You require a subnet with two IP addresses for iSCSI data LIFs for each node in the cluster. There should be two separate networks for high availability. The specific IP addresses are assigned by ONTAP when you create the LIFs as part of creating the SVM.

If possible, separate iSCSI traffic on separate physical networks or on VLANs.



Subnet for LIFs: _____

Table 1:

Node or LIF with port to switch	IP address	Network mask	Gateway	VLAN ID	Home port
Node 1 / LIF to switch 1					
Node 2 / LIF to switch 1					
Node 3 / LIF to switch 1					
Node 4 / LIF to switch 1					
Node 1 / LIF to switch 2					
Node 2 / LIF to switch 2					
Node 3 / LIF to switch 2					
Node 4 / LIF to switch 2					

Storage configuration

If the aggregate and SVM are already created, record their names here; otherwise, you can create them as required:

Table 2:

Node to own LUN	
Aggregate name	
SVM name	

LUN information

Table 3:

LUN size	
LUN name (optional)	
LUN description (optional)	

SVM information

If you are not using an existing SVM, you require the following information to create a new one:

Table 4:

SVM name	
SVM IP space	
Aggregate for SVM root volume	
SVM user name (optional)	
SVM password (optional)	
SVM management LIF (optional)	Subnet:
	IP address:
	Network mask:
	Gateway:
	Home node:
	Home port:

Installing Virtual Storage Console

Virtual Storage Console for VMware vSphere automates many of the configuration and provisioning tasks required to use Fujitsu iSCSI storage with an ESXi host. Virtual Storage Console is a plug-in to vCenter Server.

Before you begin

You must have administrator credentials on the vCenter Server used to manage the ESXi host.

About this task

- Virtual Storage Console is installed as a virtual appliance that includes Virtual Storage Console, vStorage APIs for Storage Awareness (VASA) Provider, and Storage Replication Adapter (SRA) for VMware vSphere capabilities.

Procedure

- Download the version of Virtual Storage Console that is supported for your configuration, as shown in the Server Support Matrix.

For Server Support Matrix, contact Fujitsu support personnel.

- Deploy the virtual appliance and configure it following the steps in the Deployment and Setup Guide.

Adding the storage cluster or SVM to VSC for VMware vSphere

Before you can provision the first datastore to an ESXi host in your Datacenter, you must add the cluster or a specific storage virtual machine (SVM) to Virtual Storage Console for VMware vSphere. Adding the cluster enables you to provision storage on any SVM in the cluster.

Before you begin

You must have administrator credentials for the storage cluster or the SVM that is being added.

About this task

Depending on your configuration, the cluster might have been discovered automatically or might have already been added.

Procedure

1. Log in to the vSphere Web Client.
2. Select Virtual Storage Console.
3. Select Storage Systems and then click the Add icon.
4. In the Add Storage System dialog box, enter the hostname and administrator credentials for the storage cluster or SVM and then click OK.

Configuring your network for best performance

Ethernet networks vary greatly in performance. You can maximize the performance of the network used for iSCSI by selecting specific configuration values.

Procedure

1. Connect the host and storage ports to the same network.
It is best to connect to the same switches. Routing should never be used.
2. Select the highest-speed ports available, and dedicate them to iSCSI.
10 GbE ports are best. 1 GbE ports are the minimum.
3. Disable Ethernet flow control for all ports.
You should see the Network Management Guide for using the CLI to configure Ethernet port flow control.
Network Management Guide
4. Enable jumbo frames (typically MTU of 9000).
All devices in the data path, including initiators, targets, and switches, must support jumbo frames. Otherwise, enabling jumbo frames actually reduces network performance substantially.

Configuring host iSCSI ports and vSwitches

The ESXi host requires network ports for the iSCSI connections to the storage cluster.

About this task

It is recommended that you use IP Hash as the NIC teaming policy, which requires a single VMkernel port on a single vSwitch.

The host ports and storage cluster ports used for iSCSI must have IP addresses in the same subnet.

This task lists the high-level steps for configuring the ESXi host. If you require more detailed instructions, see the VMware publication VMware vSphere Storage for your version of ESXi.

VMware

Procedure

1. Log in to the vSphere Client, and then select the ESXi host from the inventory pane.
2. On the Manage tab, click Networking.
3. Click Add Networking, and then select VMkernel and Create a vSphere standard switch to create the VMkernel port and vSwitch.
4. Configure jumbo frames for the vSwitch (MTU size of 9000, if used).
5. Repeat the previous step to create a second VMkernel port and vSwitch.

Enabling the iSCSI software adapter

The iSCSI software adapter creates the iSCSI connection on the ESX host. It is built into the operating system but

must be enabled before it can be used.

Before you begin

You must have a VMware vSphere Client installed on your workstation or you must have access to a vSphere Web Client.

Procedure

1. Log in to the vSphere Client.
2. Select the ESX host from the inventory pane.
3. Click Configuration > Storage Adapters.
4. Select the iSCSI software adapter and click Properties > Configure.
5. Select Enabled and then click OK.

Binding iSCSI ports to the iSCSI software adapter

The ports you created for iSCSI must be associated with the iSCSI software adapter to support multipathing.

Before you begin

- The iSCSI VMkernel ports must be created.
- The iSCSI software adapter must be enabled on the ESX host.

About this task

You can bind the iSCSI ports using the vSphere Client.

For detailed instructions, see VMware vSphere Storage for your version of ESXi 5 from VMware.

VMware

Procedure

1. Bind the first iSCSI port to the iSCSI software adapter by using the Network Port Binding tab of the iSCSI software adapter Adapter Details dialog box in the vSphere Client.
2. Bind the second iSCSI port to the iSCSI software adapter.

Configuring the ESXi host best practice settings

You must ensure that the host multipathing and best practice settings are correct so that the ESXi host can correctly manage the loss of an iSCSI connection or a storage failover event.

Procedure

1. From the VMware vSphere Web Client Home page, click vCenter > Hosts.
 2. Right-click the host, and then select Actions > Fujitsu VSC > Set Recommended Values.
 3. In the Fujitsu Recommended Settings dialog box, ensure that all of the options are selected, and then click OK.
- The vCenter Web Client displays the task progress.

Creating an aggregate

If you do not want to use an existing aggregate, you can create a new aggregate to provide physical storage to the volume which you are provisioning.

Procedure

1. Enter the URL www://IP-address-of-cluster-management-LIF in a web browser and log in to ONTAP System Manager using your cluster administrator credential.
2. Navigate to the Aggregates window.
3. Click Create.
4. Follow the instructions on the screen to create the aggregate using the default RAID-DP configuration, and then click Create.

Create Aggregate

To create an aggregate, select a disk type then specify the number of disks.

Name:

? Disk Type:

Number of Disks: *Max: 8 (excluding 1 hot spare), min: 5 for RAID-DP*

RAID Configuration: RAID-DP; RAID group size of 16 disks [Change](#)

New Usable Capacity: 4.968 TB (Estimated)

Results

The aggregate is created with the specified configuration and added to the list of aggregates in the Aggregates window.

Deciding where to provision the volume

Before you provision a volume to contain your LUNs, you need to decide whether to add the volume to an existing storage virtual machine (SVM) or to create a new SVM for the volume. You might also need to configure iSCSI on an existing SVM.

About this task

If an existing SVM is already configured with the needed protocols and has LIFs that can be accessed from the host, it is easier to use the existing SVM.

You can create a new SVM to separate data or administration from other users of the storage cluster. There is no advantage to using separate SVMs just to separate different protocols.

Procedure

- If you want to provision volumes on an SVM that is already configured for iSCSI, you must verify that the iSCSI service is running.

Verifying that the iSCSI service is running on an existing SVM on page 10

- If you want to provision volumes on an existing SVM that has iSCSI enabled but not configured, configure iSCSI on the existing SVM. Configuring iSCSI on an existing SVM

This is the case when you followed another Express Guide to create the SVM while configuring a different protocol.

- If you want to provision volumes on a new SVM, create the SVM.

Verifying that the iSCSI service is running on an existing SVM

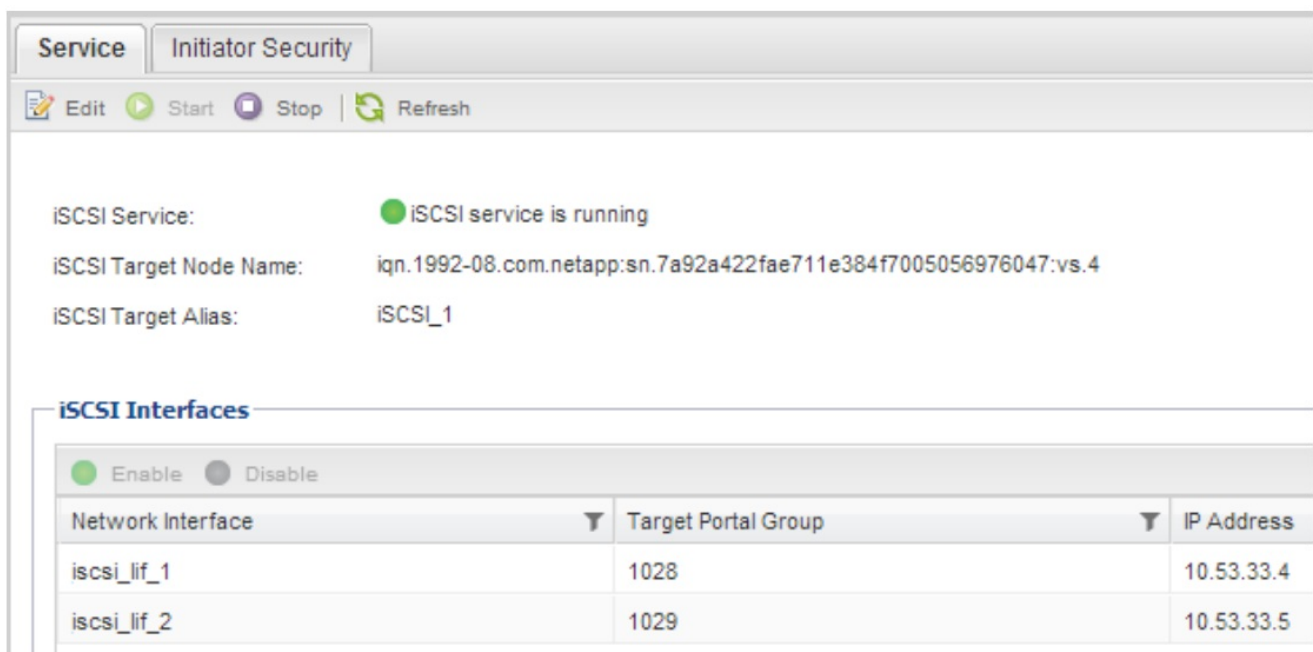
If you choose to use an existing storage virtual machine (SVM), you must verify that the iSCSI service is running on the SVM.

Before you begin

You must have selected an existing SVM on which you plan to create a new LUN.

Procedure

1. Navigate to the SVMs window.
2. Click the SVM Settings tab.
3. In the Protocols pane, click iSCSI.
4. Verify that the iSCSI service is running.



5. Record the iSCSI interfaces listed for the SVM.

What to do next

If the iSCSI service is not running, start the iSCSI service or create a new SVM.

If there are fewer than two iSCSI interfaces per node, update the iSCSI configuration on the SVM or create a new SVM for iSCSI.

Configuring iSCSI on an existing SVM

You can configure iSCSI on an existing storage virtual machine (SVM). The iSCSI protocol must already be enabled but not configured on the SVM. This information is intended for SVMs for which you are configuring multiple protocols, but have not yet configured iSCSI.

Before you begin

You must have enough network addresses available to create two LIFs for each node.

Procedure

1. Navigate to the SVMs window.
2. Select the SVM that you want to configure.
3. In the SVM Details pane, verify that iSCSI is displayed with a gray background, which indicates that the protocol is enabled but not fully configured.

If iSCSI is displayed with a green background, the SVM is already configured.



4. Click the iSCSI protocol link with the gray background.

The Configure iSCSI Protocol window is displayed.

5. Configure the iSCSI service and LIFs from the Configure iSCSI protocol page:

- a) Optional: Enter a target alias name.

- b) Enter 2 in the LIFs per node field.

Two LIFs are required for each node to ensure availability and data mobility.

- c) Assign IP addresses for the LIFs either with a subnet or without a subnet.

- d) Ignore the optional Provision a LUN for iSCSI storage area, because the LUN is provisioned by Virtual Storage Console for VMware vSphere in a later step.

- e) Click Submit & Close.

6. Review the Summary page, record the LIF information, and then click OK.

Creating a new SVM

The storage virtual machine (SVM) provides the iSCSI target through which a host accesses LUNs. When you create the SVM, you also create logical interfaces (LIFs) that provide paths to the LUN. You can create an SVM to separate the data and administration functions of a user from those of the other users in a cluster.

Before you begin

- You must have enough network addresses available to create two LIFs for each node.

Procedure

1. Navigate to the SVMs window.

2. Click Create.

3. In the Storage Virtual Machine (SVM) Setup window, create the SVM:

- a) Specify a unique name for the SVM.

The name must either be a fully qualified domain name (FQDN) or follow another convention that ensures unique names across a cluster.

- b) Select the IPspace that the SVM will belong to.

If the cluster does not use multiple IPspaces, the "Default" IPspace is used.

- c) Keep the default volume type selection.

Only FlexVol volumes are supported with SAN protocols.

- d) Select all of the protocols that you have licenses for and that you might use on the SVM, even if you do not want to configure all of the protocols immediately.

Selecting both NFS and CIFS when you create the SVM enables these two protocols to share the same LIFs. Adding these protocols later does not allow them to share LIFs.

If CIFS is one of the protocols you selected, then the security style is set to NTFS. Otherwise, the security style

is set to UNIX.

e) Keep the default language setting C.UTF-8.

f) Select the desired root aggregate to contain the SVM root volume.

The aggregate for the data volume is selected separately in a later step.

g) Click Submit & Continue.

The SVM is created, but protocols are not yet configured.

4. If the Configure CIFS/NFS protocol page appears because you enabled CIFS or NFS, click Skip and then configure CIFS or NFS later.
5. Configure the iSCSI service and create LIFs from the Configure iSCSI protocol page:
 - a) Optional: Enter a target alias name.
 - b) Assign IP address for the LIFs either by using a subnet or without a subnet.
 - c) Enter 2 in the LIFs per node field.

Two LIFs are required for each node to ensure availability and data mobility.
 - d) Skip the optional Provision a LUN for iSCSI storage area because the LUN is provisioned by Virtual Storage Console for VMware vSphere in a later step.
 - e) Click Submit & Continue.
6. If the Configure FC/FCoE protocol page appears because you enabled FC, click Skip and then configure FC later.
7. When the SVM Administration appears, configure or defer configuring a separate administrator for this SVM:
 - Click Skip and configure an administrator later if desired.
 - Enter the requested information, and then click Submit & Continue.
8. Review the Summary page, record the LIF information, and then click OK.

Testing iSCSI paths from the host to the storage cluster

To ensure successful storage failover and data mobility, you need to ensure that you have two paths from the host to every node in the storage cluster. Because the number of paths advertised by the iSCSI target is limited, you need to ping the storage cluster ports from the host.

Before you begin

You must know the IP address or host name of all of the logical interfaces (LIFs) to be used for iSCSI paths.

About this task

LUNs are mapped to a subset of the initiators in the igroup to limit the number of paths from the host to the LUN.

- By default, only paths from the host to the node containing the storage virtual machine (SVM) where the LUN was created, and paths to the HA partner of that node, are visible to the host.
- You still must create and test paths from the host to every node in the cluster, but the host can access only those paths on the owning node and its HA partner.
- You should use the default LUN mapping behavior.

Only add nodes in other HA pairs to the LUN map in preparation for moving the LUN to a different node.

Procedure

1. From the ESX host, use the ping command to verify the path to the first LIF.

The ping command is available from the ESX service console.

2. Repeat the ping command to verify connectivity to each iSCSI LIF on each node in the cluster.

Provisioning a datastore and creating its containing LUN and volume

A datastore contains virtual machines and their VMDKs on the ESXi host. The datastore on the ESXi host is provisioned on a LUN on the storage cluster.

Before you begin

Virtual Storage Console for VMware vSphere (VSC) must be installed and registered with the vCenter Server that manages the ESXi host.

VSC must have sufficient cluster or storage virtual machine (SVM) credentials to create the LUN and volume.

About this task

VSC automates the datastore provisioning, including creating a LUN and volume on the specified SVM.

Procedure

1. From the vSphere Web Client Home page, click Hosts and Clusters.
2. In the navigation pane, expand the datacenter where you want to provision the datastore.
3. Right-click the ESXi host, and then select Fujitsu VSC > Provision Datastore.
Alternatively, you can right-click the cluster when provisioning to make the datastore available to all hosts in the cluster.
4. Provide the required information in the wizard:

FUJITSU Fujitsu Datastore Provisioning Wizard

✓ **1 Name and type**
2 Storage system
3 Details
4 Ready to complete

Specify the name and type of datastore you want to provision.

You will be able to select the storage system for your datastore in the next page of this wizard.

Name : * ESX_1_DS2

Type : * ☐ NFS ☒ VMFS

VMFS Protocol : * ☐ FC/FCoE ☒ iSCSI

Select the storage capability profile you want to use to provision a new datastore.

Storage Capability Profile * None

Back Next Finish Cancel

- Select VMFS as the datastore type.
- Select iSCSI as the VMFS protocol.
- Select None as the Storage Capability Profile.
- Ensure that the Thin provision check box is not selected.
- Select the Create new volume check box.

Verifying that the host can write to and read from the LUN

Before using the LUN, you should verify that the host can write data to the LUN and read it back.

About this task

If the cluster node on which the LUN is created can be failed over to its partner node, you should verify reading the data while the node is failed over. This test might not be possible if the cluster is in production use.

Procedure

1. On the vSphere Web Client Home page, click Hosts and Clusters.
2. In the navigation pane, click the Storage tab.
3. Expand the datacenter, and then select the new datastore.
4. In the center pane, click Manage > Files.

The contents of the data store are displayed.

5. Create a new folder in the datastore and upload a file to the new folder.

You might need to install the Client Integration Plug-in.

6. Verify that you can access the file you just wrote.
7. Optional: Fail over the cluster node containing the LUN and verify that you can still write and read a file.

If any of the tests fail, verify that the iSCSI service is running on the storage cluster and check the iSCSI paths to the LUN.

8. Optional: If you failed over the cluster node, be sure to give back the node and return all LIFs to their home ports.
9. For an ESXi cluster, view the datastore from each ESXi host in the cluster and verify that the file you uploaded is displayed.

Related information

High-Availability Configuration Guide

Where to find additional information

There are additional documents to help you learn more about iSCSI configuration.
All of the following documentation is available:

- SAN Configuration Guide
Describes supported FC, iSCSI, and FCoE topologies for connecting host computers to storage controllers in clusters.
- SAN Administration Guide
Describes how to configure and manage the iSCSI, FCoE, and FC protocols for clustered SAN environments, including configuration of LUNs, igroups, and targets.

VMware documentation

Documentation about iSCSI for ESXi servers is available directly from VMware.

VMware

- vSphere Storage
This VMware guide describes FC and iSCSI configuration for ESXi 5.x.
- Multipathing Configuration for Software iSCSI Using Port Binding
Technical White Paper describes MPIO setup for ESXi servers.

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<https://www.fujitsu.com/global/support/products/computing/storage/manuals-list.html>

If necessary, refer to the manuals for your model.

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iSCSI Configuration for ESXi® using VSC Express Guide
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Documents / Resources

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References

-  [Trademarks : Fujitsu Global](#)
-  [Manuals for ETERNUS : Fujitsu Global](#)

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