iSCSI configuration workflow

System Manager Classic

NetApp
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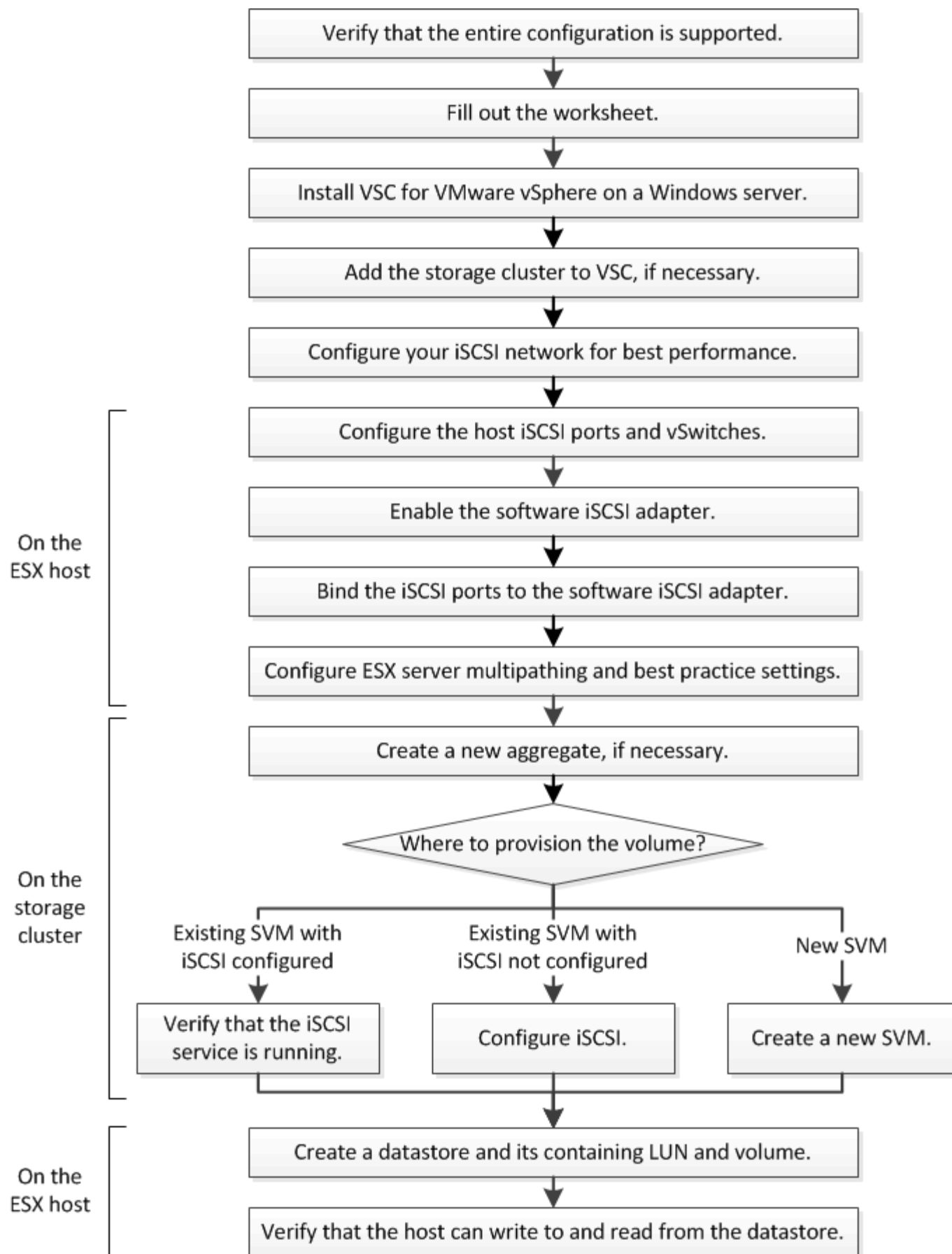# Table of Contents

iSCSI configuration workflow

When you make storage available to an ESXi 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.

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                    ┌─────────────────────────────────────────────────┐
                    │   Verify that the entire configuration is supported. │
                    └─────────────────────────────────────────────────┘
                                        │
                    ┌─────────────────────────────────────────────────┐
                    │                Fill out the worksheet.            │
                    └─────────────────────────────────────────────────┘
                                        │
                    ┌─────────────────────────────────────────────────┐
                    │   Install VSC for VMware vSphere on a Windows server. │
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                                        │
                    ┌─────────────────────────────────────────────────┐
                    │      Add the storage cluster to VSC, if necessary. │
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                    ┌─────────────────────────────────────────────────┐
                    │   Configure your iSCSI network for best performance. │
                    └─────────────────────────────────────────────────┘
                                        │
                    ┌─────────────────────────────────────────────────┐
                    │    Configure the host iSCSI ports and vSwitches.  │
                    └─────────────────────────────────────────────────┘
                                        │
                    ┌─────────────────────────────────────────────────┐
On the              │          Enable the software iSCSI adapter.       │
ESX host            └─────────────────────────────────────────────────┘
                                        │
                    ┌─────────────────────────────────────────────────┐
                    │  Bind the iSCSI ports to the software iSCSI adapter. │
                    └─────────────────────────────────────────────────┘
                                        │
                    ┌─────────────────────────────────────────────────┐
                    │  Configure ESX server multipathing and best practice settings. │
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                                        │
                    ┌─────────────────────────────────────────────────┐
                    │         Create a new aggregate, if necessary.     │
                    └─────────────────────────────────────────────────┘
                                        │
                              ◇ Where to provision the volume? ◇
                           ┌────────────┼────────────┐
            Existing SVM with    Existing SVM with       New SVM
            iSCSI configured     iSCSI not configured
On the           │                   │                   │
storage   ┌─────────────┐     ┌─────────────┐     ┌─────────────┐
cluster   │ Verify that │     │             │     │             │
          │ the iSCSI   │     │ Configure   │     │ Create a    │
          │ service is  │     │ iSCSI.      │     │ new SVM.    │
          │ running.    │     │             │     │             │
          └─────────────┘     └─────────────┘     └─────────────┘
                 └───────────────────┼───────────────────┘
                    ┌─────────────────────────────────────────────────┐
                    │  Create a datastore and its containing LUN and volume. │
On the              └─────────────────────────────────────────────────┘
ESX host                            │
                    ┌─────────────────────────────────────────────────┐
                    │  Verify that the host can write to and read from the datastore. │
                    └─────────────────────────────────────────────────┘
```

Verify that the iSCSI configuration is supported

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

Steps

1. Go to the Interoperability 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

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:

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:

Node to own LUN
Aggregate name
SVM name

LUN information

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:

SVM name	
SVM IPspace	
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:

Install Virtual Storage Console

Virtual Storage Console for VMware vSphere automates many of the configuration and provisioning tasks required to use NetApp 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.

Steps
1. Download the version of Virtual Storage Console that is supported for your configuration, as shown in the Interoperability Matrix tool.

   NetApp Support

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

Add 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.

Steps

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 host name and administrator credentials for the storage cluster or SVM and then click **OK**.

Configure 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.

Steps

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 ONTAP 9 Network Management for using the CLI to configure Ethernet port flow control.

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.

Configure 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](#)

Steps

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.

Enable the iSCSI software adapter

The iSCSI software adapter creates the iSCSI connection on the ESXi 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.

Steps

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**.

Bind 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 ESXi 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

Steps

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.

Configure 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.

Steps

1. From the VMware vSphere Web Client **Home** page, click **vCenter** > **Hosts**.

2. Right-click the host, and then select **Actions** > **NetApp VSC** > **Set Recommended Values**.

3. In the **NetApp Recommended Settings** dialog box, ensure that all of the options are selected, and then click **OK**.

    The vCenter Web Client displays the task progress.

Create 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.

Steps

1. Enter the URL `https://IP-address-of-cluster-management-LIF` in a web browser and log in to 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**.

Results

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

Decide 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

- 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 did not follow this procedure to create the SVM while configuring a different protocol.

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

Verify 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.

Steps

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.
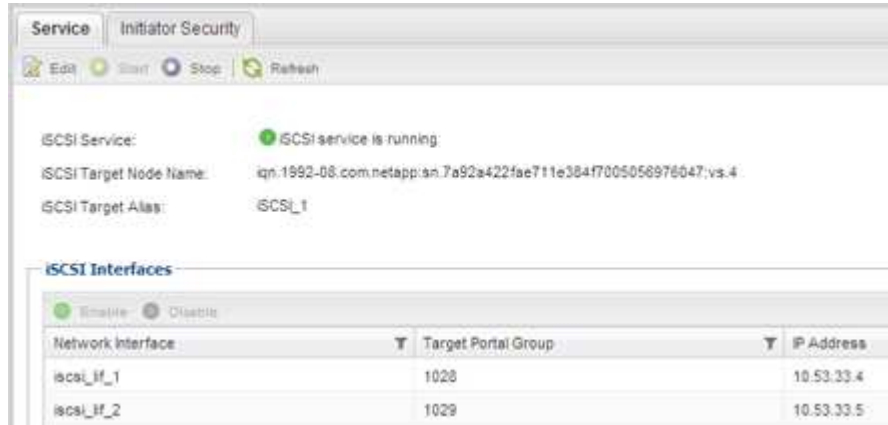
5. Record the iSCSI interfaces listed for the SVM.

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.

Configure 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.

Steps

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. 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**.

Create 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.

Steps

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. 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**.

Test 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.

Steps

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

   The `ping` command is available from the ESXi service console.

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

Related information

VMware KB article 1003486: Testing network connectivity with the ping command

Provision 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.

Steps

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 **NetApp 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:

- Select **VMFS** as the datastore type.
- Select **iSCSI** as the VMFS protocol.
- Select **None** as the Storage Capability Profile.
- Select the box for **Thin provision**.
- Select the **Create new volume** check box.

Verify 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.

Steps

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 datastore 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 management