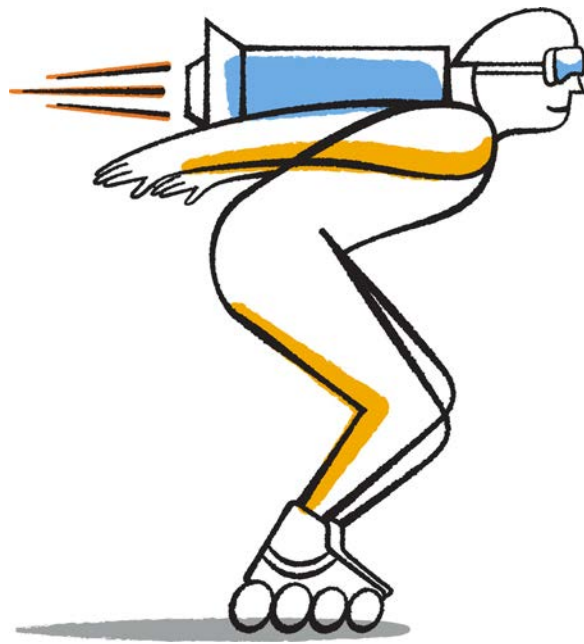




**NetApp®**

## SANtricity® Storage Manager 11.25 Express Guide

For Windows and iSCSI



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## Deciding whether to use this guide

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The "express method" for installing SANtricity Storage Manager software is appropriate for setting up a standalone Windows host to E-Series or EF-Series storage systems. It is designed to get the storage system up and running as quickly as possible with minimal decision points. This method includes: 1) setting up the iSCSI environment; 2) provisioning a LUN; and 3) making the LUN available on a Windows host.

This guide does not provide information about data storage concepts or all the available options for installing and configuring the storage system.

This guide is based on the following assumptions:

- You have installed your storage array hardware.
- You have installed all other hardware and made the necessary connections.
- You are using out-of-band management.
- You are using a separate station for management rather than the data (I/O attached) host.
- During SANtricity configuration, you plan to attach the management station to the same subnet as the storage management ports.
- You have reserved at least one static IP address for each NetApp controller on a 1 Gb/s management network.
- You are using Ethernet switches capable of transporting iSCSI traffic.
- You have configured the Ethernet switches according to the vendor's recommendation for iSCSI.
- You are not configuring the data (I/O attached) host to boot from SAN.
- You are not using Windows as a virtualized guest.
- You are not using shared volumes.
- You have installed the host operating system.

If these assumptions are not correct for your installation, or if you want more conceptual background information, see the documentation listed in the **Related information** section. For topics related to the SANtricity Storage Manager software, see the SANtricity Online Help systems for the Enterprise Management Window (EMW) and the Array Management Window (AMW).

### Related information

[\*NetApp E-Series and EF-Series Systems Documentation Center\*](#)

[\*NetApp Interoperability Matrix Tool\*](#)

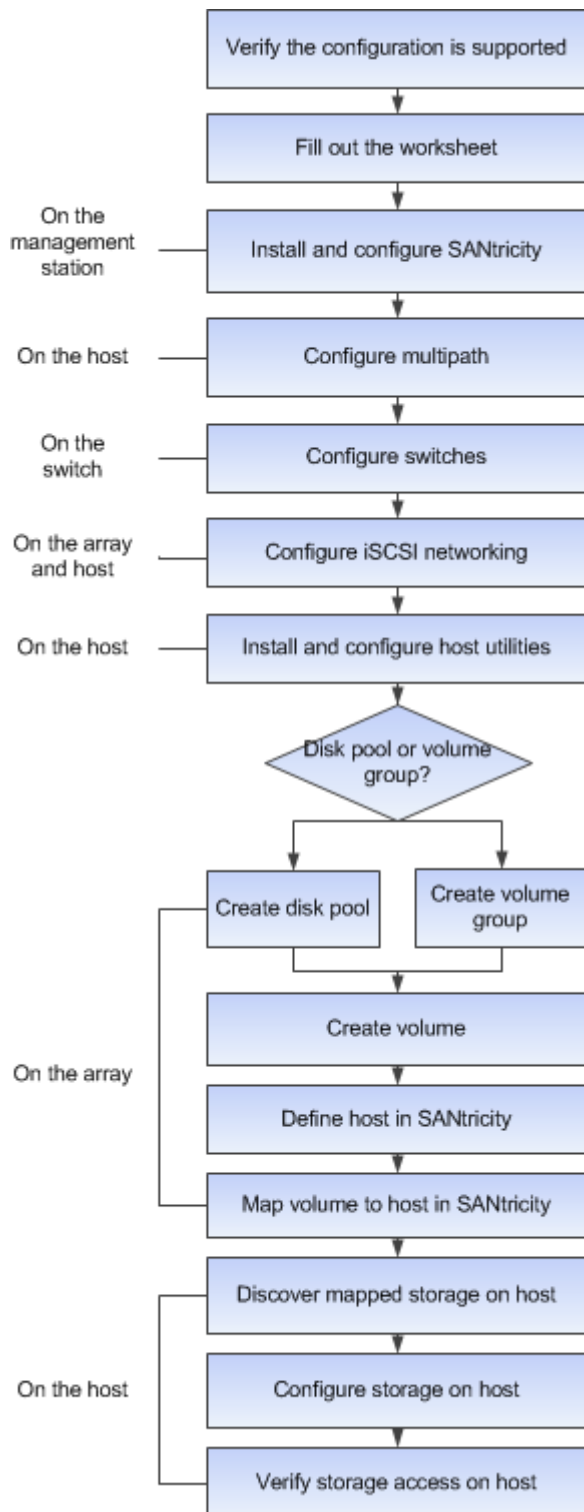
[\*SANtricity Storage Manager 11.25 Multipath Drivers Guide\*](#)

[\*SANtricity Storage Manager 11.25 Software Installation Reference\*](#)

[\*Hardware Cabling Guide\*](#)

## Configuration and provisioning workflow

When you make storage available to a host using iSCSI, you provision a volume in SANtricity Storage Manager, and then map the volume to a host or host group.

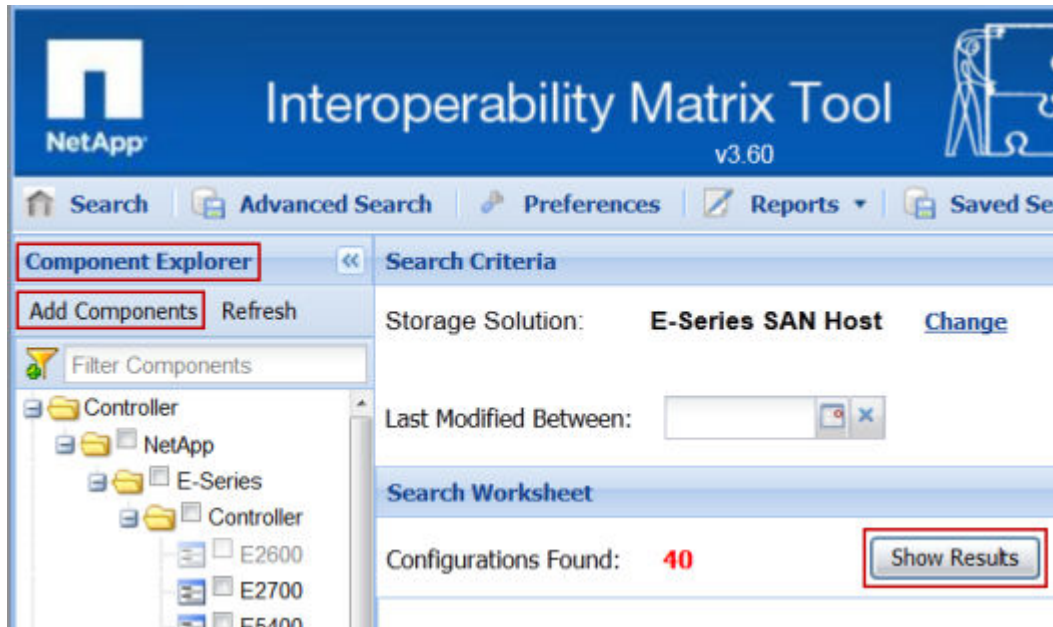


## Verifying the configuration is supported

To ensure reliable operation, you create an implementation plan and then use the NetApp Interoperability Matrix Tool (IMT) to verify that the entire configuration is supported.

### Steps

1. Go to the [NetApp Interoperability Matrix Tool](#).



2. Use the Component Explorer in the left panel to select the following components:

- Host OS version
- Host computer CPU architecture (for standard rack servers)
- Specific processor blade model (for blade servers)
- Protocol

3. Select the **Show Results** button.

A matrix of possible configurations is displayed. The **Status** column indicates whether each configuration is supported.

4. Select the configuration link in the **Name** column.

The Configuration Details window displays information for each component.

5. Review the information in the following tabs in the **Configuration Details** window:

- **Notes:** Lists important information specific to your configuration. Review the alerts to identify the hot fixes that are required for your operating system.
- **Policies & Guidelines:** Provides general guidelines for all SAN configurations.

6. Make the necessary updates:

- Update NIC driver, firmware, and bootcode as necessary.

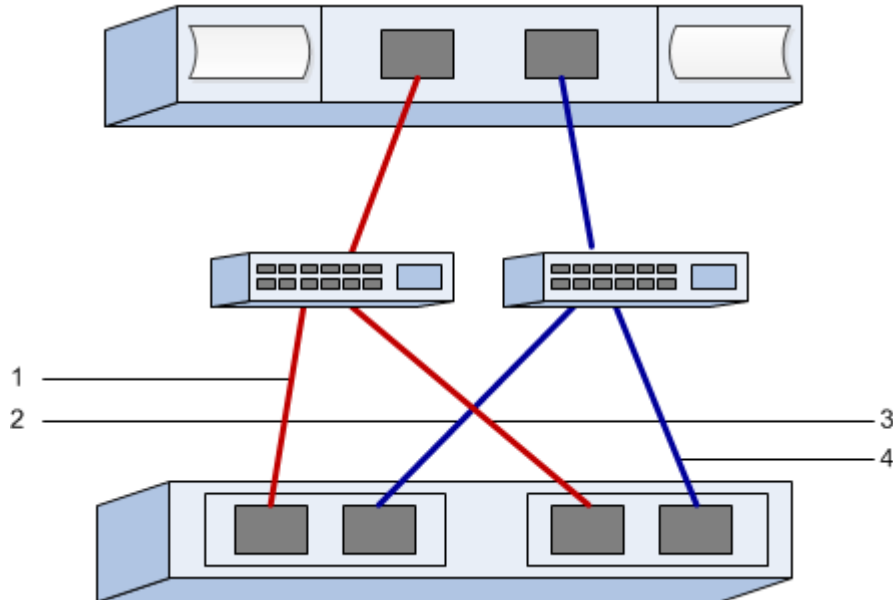
- You might need to install out-of-box drivers to ensure proper functionality and supportability.

**Related information**

[\*NetApp Interoperability Matrix Tool\*](#)

## Filling out the worksheet

As you progress through this guide, you can use this worksheet to record storage configuration information. You will need this information to perform provisioning tasks.



### Host identifiers

The software initiator IQN is found in the **Configuration** tab of the iSCSI Initiator Properties.

Software Initiator IQN	
------------------------	--

### Target identifiers

Callout No.	Array controller (target) port connections	WWPN
1	Target (storage) port Controller A connected to iSCSI switch 1	
2	Target (storage) port Controller A connected to iSCSI switch 2	
3	Target (storage) port Controller B connected to iSCSI switch 1	
4	Target (storage) port Controller B connected to iSCSI switch 2	

### Mappings Host Name

Mappings Host Name	
Host OS Type	



# Installing and configuring SANtricity Storage Manager

---

When you install the SANtricity Storage Manager software on your management station, a graphical user interface (GUI) and a command line interface (CLI) are installed by default. These instructions assume you will install the SANtricity Storage Manager GUI on a management station and *not* on the I/O host.

## Before you begin

- You must have the correct administrator or superuser privileges.
- You must ensure the system that will contain the SANtricity Storage Manager client has the following minimum requirements:
  - **RAM:** 2 GB for Java Runtime Engine
  - **CPU:** Confirm that your host's architecture is supported. Use the [NetApp Interoperability Matrix Tool](#).
  - **Disk space:** 5 GB

## About this task

You will install the SANtricity Storage Manager software on the management station.

For more information about installation methods and customizations, see the *SANtricity Storage Manager Software Installation Reference*.

## Steps

1. Download the SANtricity software release from the *NetApp Support* site.
2. Run the SANtricity installer. Double-click the `SMIA*.exe` install package to execute.
3. Use the installation wizard to install the software on the management station.
  - a. Read the **Introduction** screen, and then select **Next**.
  - b. On the **License Agreement** screen, read the agreement, select the **I accept the terms of the License Agreement** radio button, and then select **Next**.
  - c. On the **Choose Install Folder** screen, select the radio button for the installation directory for the software, and then select **Next**.
  - d. On the **Select Installation Type** screen, select the **Management Station** radio button, and then select **Next**.

**Note:** A management station installation is not appropriate for the data host.
  - e. On the **Automatically Start Monitor** screen, select the **Automatically start monitor** radio button, and then select **Next**.

**Note:** Only the primary management station should run the monitor function. When installing the SANtricity software on laptops or secondary management stations, select **Do not automatically start the monitor**.
  - f. On the **Pre-Installation Summary** screen, review the information, and then select **Install**.

- g. On the **Install Complete** screen, select **Done**.

#### Related information

[NetApp Interoperability Matrix Tool](#)

[NetApp Support](#)

## Configuring IP addresses

In this best-practices method for configuring communications, you configure the management station and array controllers to reside on the same private network.

#### Steps

1. Connect an Ethernet cable to the management station and to management port 1 on controller A or B. Wait 3 minutes for DHCP addressing to time out.

**Note:** Do not use port 2 on either controller. These ports are reserved for use by NetApp technical personnel.

2. Follow these steps to temporarily change the IP address of the TCP/IP port on the management station so that it will reside on the same private network as the controllers:

- a. If you have a static IP address, make note of the current IP address of the management station. You will revert back to this IP address after you have completed the procedure.

- b. Change the settings on the management station so that it is on the same private network as the controllers, which have these default IP addresses in an IPv4 network:

Controller A, port 1: 192.168.128.101

Controller B, port 1: 192.168.128.102

Set the IP address for the management station to something other than the controller IP addresses. For example, for an IPv4 network, use 192.168.128.100 for the management station; for an IPv6 network, use FE80:0000:0000:0000:02A0:B8FF:FE29:1D7C.

Refer to your operating system documentation for instructions on how to change the network settings on the management station and how to verify that the address has changed.

- c. If your network is an IPv4 network, check the subnet mask to verify that it is set to the default setting:

255.255.255.0

- d. From a command prompt on the management station, ping the IP address of the controller connected to the management station to make sure it is accessible.

#### Example

```
> ping 192.168.128.101 <or 192.168.128.102>
Reply from 192.168.128.101 <or 102>: bytes = 32 time<ms TTL = 64
Ping statistics for 192.168.128.101 <or 102>:
Packets: Sent = 4, Received =4, Lost = 0 (0% loss)
Approximate round trip times in milli-seconds:
Minimum = 0 ms, Maximum = 0 ms, Average = 0 ms
```

## Adding a storage array to SANtricity Storage Manager

After you have configured the private network between the management station and the array controllers, you add the controller to SANtricity Storage Manager using the Enterprise Management Window (EMW).

### Steps

1. Open SANtricity Storage Manager from the Windows **Start** menu. The **(EMW)** is displayed.
2. On the **Select Addition Method** screen, select the **Manual** radio button, and then select **OK**.
 

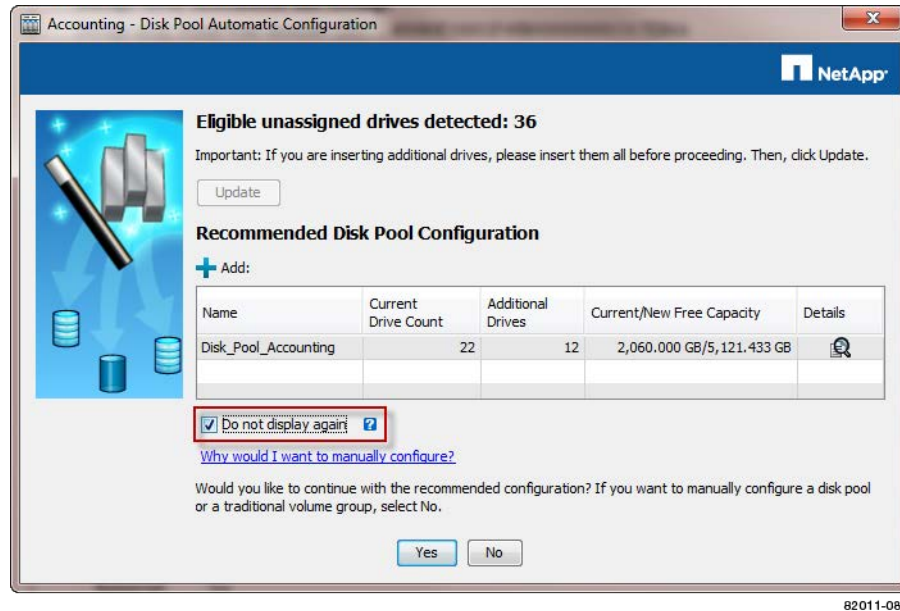
**Note:** When you open SANtricity Storage Manager for the first time, the **Select Addition Method** screen prompts you to select the **Automatic** or **Manual** method to add a new storage array.
3. To add one or more new storage arrays, complete the following steps:
  - a. On the **Add New Storage Array – Manual** screen, make sure that the default **Out-of-band management** radio button is selected. Enter the default IP address of port 1 for the controller connected to the management station (controller A or B). The default addresses are:  
 Controller A, port 1: 192.168.128.101  
 Controller B, port 1: 192.168.128.102

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- b. Select **Add**.  
The Storage Array Added screen is displayed.
- c. On the **Storage Array Added** screen, select **Yes** to add another storage array. Otherwise, select **No**.
- d. In the **Enterprise Management Window (EMW) Devices** tab, double-click the storage array to open the **Array Management Window (AMW)**.

**Note:** When you open the **AMW** for a storage array for the first time, the **Disk Pool Automatic Configuration** wizard is displayed. You can use this wizard to provision a new storage array so that a single disk pool uses all of the available capacity that meets the criteria for a disk pool. Because the automatic wizard does not offer all of the features available with disk pools, you should create disk pools using a different procedure, described in *Creating a disk pool* on page 23.

4. Turn off the **Disk Pool Automatic Configuration** wizard using the following steps:
  - a. On the **Disk Pool Automatic Configuration** dialog box, select the **Do not display again** checkbox.



- b. Select the **No** button to permanently dismiss the automatic configuration wizard.
5. Name the storage array so you can find it more easily in the EMW after you change the IP addresses:
  - a. In the **Setup** tab, select **Name/Rename Storage Arrays**.
  - b. In the **Select storage array:** list, confirm that the storage array you added is selected.
  - c. In the **Storage array name** field, type a name for the storage array.
  - d. Select **OK**.
  - e. On the **Name/Rename Storage Arrays** warning dialog, select **Yes** to dismiss the warning and continue.
6. Configure the network configuration information of the controllers, using information you obtain from your network administrator.
  - a. Select the **Hardware** tab in the Array Management Window (AMW).
  - b. Select the visual representation of one of the controllers in the **Hardware** tab.
  - c. Right-click, and then select **Configure > Management Ports**.
  - d. On the **Change Network Configuration** dialog box, select **Controller A, Port 1** in the **Ethernet port** drop-down list.
  - e. From the **Speed and duplex mode** drop-down list, select **Auto-negotiate**.

- f. Depending on the format of your network configuration information, select the **Enable IPv4** check box, the **Enable IPv6** check box, or both check boxes.
  - g. Depending on the format you have selected, enter the network configuration information in the **IPv4 Settings** tab or the **IPv6 Settings** tab.  
**Note:** You must obtain the network configuration information from your network administrator.
  - h. Select **Controller B, Port 1** in the **Ethernet Port** drop down list, and repeat Steps [6.e](#) through [6.g](#).
  - i. Select **OK**.
  - j. Close the **AMW**.
7. Return to the EMW, highlight the storage array, and then select **Edit > Remove > Storage Array**.
  8. Disconnect the private network and reconnect into your regular LAN.
    - a. Disconnect the management station from the controller and reconnect it into your LAN.
    - b. Change the management station to use the original IP address. Refer to your operating system documentation for instructions on how to change the network settings on the management station and how to verify that the address has changed.
    - c. Connect the controller into your LAN.
  9. Add the storage array back to the **EMW** by completing the following steps:
    - a. Select the **Edit > Add Storage Array** option in the **EMW**.
    - b. On the **Add New Storage Array-Manual** screen, make sure that the default **Out-of-band management** radio button is selected.
    - c. Enter the IP addresses assigned to controller A, port 1, and controller B, port 1. Use the addresses you added in Step [6](#).
    - d. Select **Add**.
    - e. On the **Storage Array Added** screen, select **Yes** to add another storage array. Otherwise, select **No**.
  10. Find the IQNs of the controller host ports.
    - a. Click the **Setup** tab.
    - b. Click the link for **Manage iSCSI Settings**. Scroll through the information to find the IQNs.
    - c. Record the IQNs in the worksheet.

## Installing the multipath software

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If a disruption of one or more physical paths occurs, the multipath software maintains an active path to the underlying network storage. The multipath software presents the operating system with a single virtual device that represents the active physical paths to the storage and manages the failover process that updates the virtual device.

### About this task

The SANtricity install package contains the multipathing (failover) software. The MPIO Device Specific Module (DSM) failover driver is included as part of the E-Series/EF-Series SANtricity Storage Manager installer for Windows. This driver is installed by default for all Microsoft Windows Server products.

If you have not already done so, you can perform a full installation of SANtricity Storage Manager software. If you need to install only the utilities package and the failover package, you can perform a custom installation. For more information regarding installation methods and customizations see [SANtricity Storage Manager 11.25 Software Installation Reference](#).

### Steps

1. Download the SANtricity software build from [NetApp Support](#).
2. Execute the SANtricity installer. Double-click the SMIA\* .exe install package to execute.  
Select **Typical (Full) installation** or **Custom installation**, and choose to install the utilities package and the failover package.

### Related information

[SANtricity Storage Manager 11.25 Multipath Drivers Guide](#)

[SANtricity Storage Manager 11.25 Software Installation Reference](#)

## Configuring the switches

---

You configure the switches according to the vendor's recommendations for iSCSI. These recommendations might include both configuration directives as well as code updates.

Make sure that:

- You have two separate networks for high availability. It is best practice to isolate your iSCSI traffic to separate network segments by using VLANs or two separate networks.
- You have enabled send and receive hardware flow control **end to end**.
- You have disabled priority flow control.
- If appropriate, you have enabled jumbo frames.

**Note:** Port channels/LACP is not supported on the controller's switch ports. Host-side LACP is not recommended; multipathing provides the same, and in some cases better, benefits.

The illustration on the worksheet shows a host connected to an E-Series storage array in two subnets. One subnet is indicated by the blue line; the other subnet is indicated by the red line.

## Configuring iSCSI networking

You can set up your iSCSI network in many ways, depending on your data storage requirements.

Consult your network administrator for tips on selecting the best configuration for your environment.

An effective strategy for configuring the iSCSI network with basic redundancy is to connect each host port and one port from each controller to separate switches and partition each set of host and controller ports on separate network segments using VLANs.

You must enable send and receive hardware flow control **end to end**. You must disable priority flow control.

If you are using jumbo frames within the IP SAN for performance reasons, make sure to configure the array, switches, and hosts to use jumbo frames. Consult your operating system and switch documentation for information on how to enable jumbo frames on the hosts and on the switches. To enable jumbo frames on the array, complete Step 4 on page 17 in [Configuring iSCSI networking—array side](#).

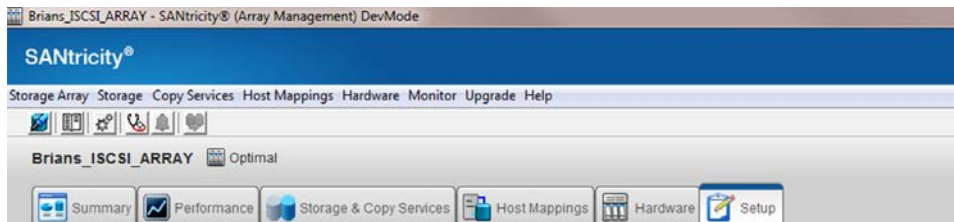
**Note:** Many network switches have to be configured above 9,000 bytes for IP overhead. Consult your switch documentation for more information.

## Configuring iSCSI networking—array side

You use the Array Management Window (AMW) of SANtricity Storage Manager to configure iSCSI networking on the array side.

### Steps

1. From the **Array Management Window (AMW)** select the **Setup** tab.
2. Select **Configure iSCSI Host Ports**.



### Initial Setup Tasks

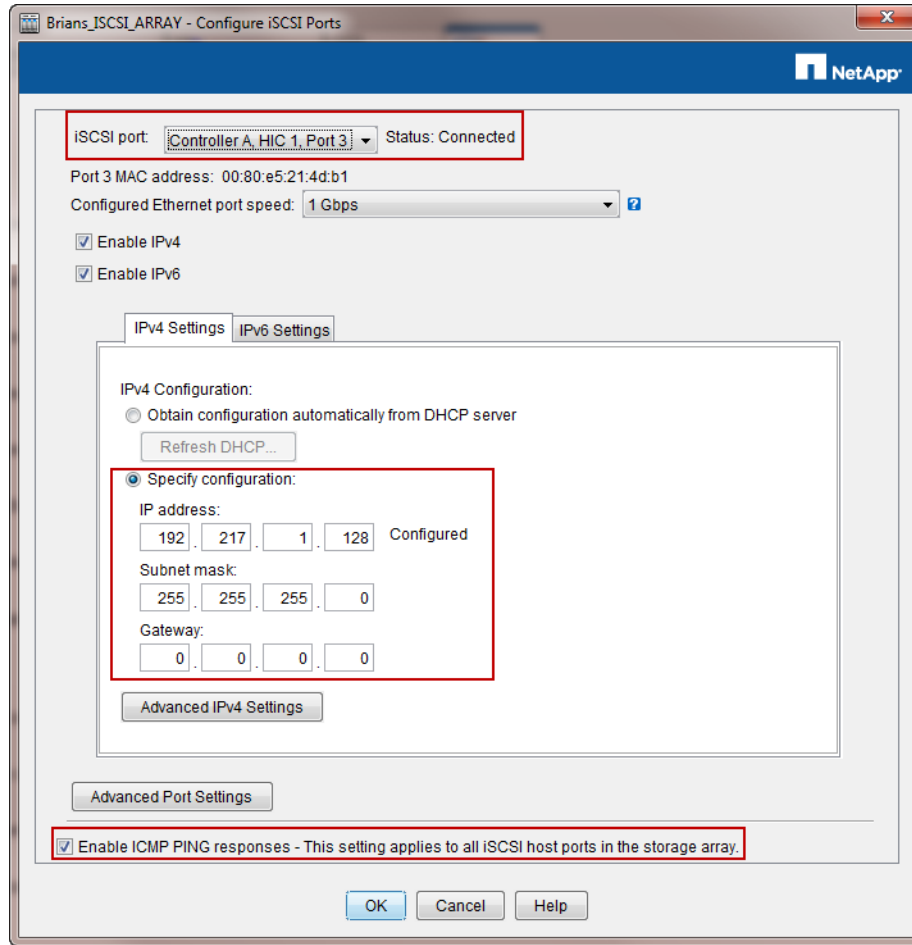
#### Storage Array Configuration

- [Locate Storage Array](#)  
Turn on the indicator lights for the storage array to identify it physically.
- [Rename Storage Array](#)  
Rename the storage array so it can be easily identified in the storage management software.
- [Change Hardware View Order](#)  
Change the order in which the trays are shown in the Hardware View to match the actual physical arrangement.
- [Set a Storage Array Password](#)  
Set a password for the storage array to prevent unauthorized users from making configuration changes.
- [Manage Premium Features](#)  
View available premium features. Some premium features can be enabled on a trial basis, while others can only be enabled with a feature key file.
- [Configure iSCSI Host Ports](#)  
Configure network parameters for the iSCSI host ports on the controller(s) such as IP configuration and other advanced settings.
- [Create Storage](#)  
Provision drives into appropriate storage elements.
- [Save Configuration](#)  
Save configuration parameters in a file to replicate the configuration on another storage array.



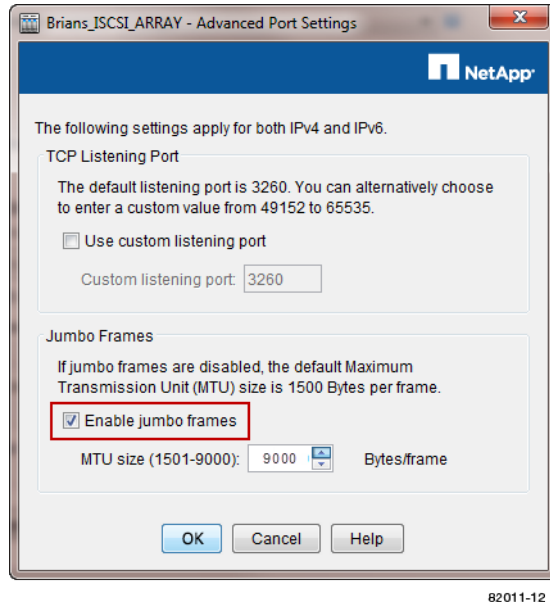
3. Select the iSCSI host port to be configured and configure the IP address information as needed. Add the IP address to the worksheet for use when you configure iSCSI networking on the host side.

**Note:** The **Enable ICMP PING Responses** check box is checked by default and should remain selected.



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4. Reconfigure the E-Series iSCSI host ports to use the same maximum transmission unit (MTU) size as the host and switch.
  - a. From the iSCSI Host Ports dialog box, select **Advanced Host Port Settings**.
  - b. Select the **Enable jumbo frames** checkbox, if appropriate.
  - c. Change the MTU size to the desired number of bytes per frame, and then select **OK**.
  - d. Select **OK** on the remaining windows as necessary to complete this procedure.



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5. Repeat Step 3 and Step 4 to configure additional iSCSI ports on the E-Series controllers.

## Configuring iSCSI networking—host side

You must configure iSCSI networking on the host side so that the Microsoft iSCSI Initiator can establish sessions with the array.

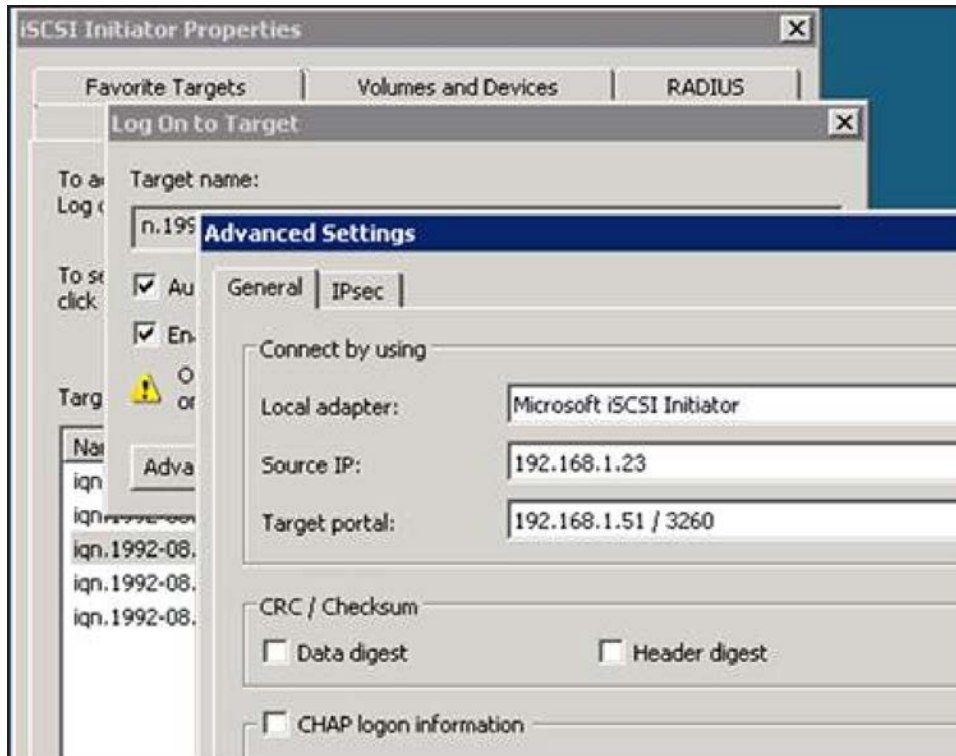
### Before you begin

- Fully configure the switches that will be used to carry iSCSI storage traffic.
- You must have enabled send and receive hardware flow control **end to end** and disabled priority flow control.
- Complete the array side iSCSI configuration.
- These instructions assume that two NIC ports will be used for iSCSI traffic.
- You must know the IP address of each port on the controller.

### Steps

1. Optimal NIC configuration includes disabling unused network adapter protocols. These protocols include, but are not limited to, QoS, File and Print Sharing, and NetBIOS.
2. Execute `> iscsicpl.exe` from a terminal window on the host to open the **iSCSI Initiator Properties** dialog box.
3. On the **Discovery** tab, select **Discover Portal**, and then enter the IP address of one of the iSCSI target ports.
4. On the **Targets** tab, select the first target portal you discovered and then select **Connect**.
5. Select **Enable multi-path**, select **Add this connection to the list of Favorite Targets**, and then select **Advanced**.
6. For **Local adapter**, select **Microsoft iSCSI Initiator**.

7. For **Initiator IP**, select the IP address of a port on the same subnet or VLAN as one of the iSCSI targets.
8. For **Target IP**, select the IP address of a port on the same subnet as the **Initiator IP** selected in the step above.
9. Retain the default values for the remaining check boxes and then select **OK**.
10. Select **OK** again as you return to the **Connect to Target** dialog box.
11. Repeat Step 4 on page 18 through Step 10 on page 19, using each initiator port and each session (logical path) to the storage array that you want to establish.



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## Verifying IP network connections

You verify Internet Protocol (IP) network connections by using ping tests to ensure the host and array are able to communicate.

### Steps

1. Select **Start > All Programs > Accessories > Command Prompt** and use the Windows CLI to run one of the following commands, depending on whether jumbo frames are enabled:

- If jumbo frames are not enabled, run this command:

```
ping -s <hostIP> <targetIP>
```

- If jumbo frames are enabled, run the ping command with a payload size of 8,972 bytes. The IP and ICMP combined headers are 28 bytes, which when added to the payload, equals 9,000 bytes. The `-f` switch sets the `don't fragment (DF)` bit. The `-l` switch allows you to set

the size. These options allow jumbo frames of 9,000 bytes to be successfully transmitted between the iSCSI initiator and the target.

```
ping -l 8972 -f <iSCSI_target_IP_address>
```

In this example, the iSCSI target IP address is 192.0.2.8.

```
C:\>ping -l 8972 -f 192.0.2.8
Pinging 192.0.2.8 with 8972 bytes of data:
Reply from 192.0.2.8: bytes=8972 time=2ms TTL=64
Reply from 192.0.2.8: bytes=8972 time=2ms TTL=64
Reply from 192.0.2.8: bytes=8972 time=2ms TTL=64
Reply from 192.0.2.8: bytes=8972 time=2ms TTL=64
Ping statistics for 192.0.2.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 2ms, Average = 2ms
```

2. Issue a `ping` command from each host's initiator address (the IP address of the host Ethernet port used for iSCSI) to each controller iSCSI port. Perform this action from each host server in the configuration, changing the IP addresses as necessary.

**Note:** If the command fails (for example, returns `Packet needs to be fragmented but DF set`), verify the MTU size (jumbo frame support) for the Ethernet interfaces on the host server, storage controller, and switch ports.

# Installing and configuring Windows Unified Host Utilities 7.0

---

Windows Unified Host Utilities 7.0 includes tools to enable you to connect host computers to NetApp storage systems and set required parameters on host computers. You can also set appropriate disk timeouts for best read/write performance with NetApp storage.

## About this task

See the *Windows Host Utilities 7.0 Installation Guide*, found on the Documentation tab of [NetApp Support](#).

**Note:** This utilities package is not installed using the SANtricity Storage Manager installer.

## Steps

1. Use the [NetApp Interoperability Matrix Tool](#) to determine the appropriate version of Unified Host Utilities 7.0 to install.

The versions are listed in a column within each supported configuration.

2. Download the Unified Host Utilities 7.0 from [NetApp Support](#).

## Related information

[NetApp Interoperability Matrix Tool](#)

[NetApp Support](#)

[Windows Unified Host Utilities 7.0 Installation Guide](#)

## Deciding whether to use a disk pool or a volume group

---

You can create volumes using either a disk pool or a volume group. The best selection depends primarily on your key storage requirements, such as expected I/O workload, performance requirements, and data protection requirements.

If you have a highly sequential workload and need maximum system bandwidth and the ability to tune storage settings, choose a volume group.

If you have a highly random workload and need faster drive rebuilds, simplified storage administration, and thin provisioning, choose a Dynamic Disk Pool (DDP).

After you have made your decision, go to either [Creating a disk pool](#) on page 23 or [Creating a volume group](#) on page 25 to continue.

Use Case	Volume Group	Dynamic Disk Pool
Workload - random	Good	Better
Workload - sequential	Better	Good
Drive rebuild times	Slower	Faster
Performance (optimal mode)	Good Best for large-block, sequential workloads	Good Best for small-block, random workloads
Performance (drive rebuild mode)	Degraded. Up to 40% drop in performance	Better
Multiple drive failure	Less data protection Slow rebuilds, greater risk of data loss	Greater data protection Faster, prioritized rebuilds
Adding drives	Slower Requires Dynamic Capacity Expansion operation	Faster Add to disk pool on the fly
Thin provisioning support	No	Yes
SSDs	Yes	Yes
Simplified administration	No Allocate global hot spares, configure RAID	Yes No hot spare or RAID settings to configure
Tunable performance	Yes	No

## Creating a disk pool

---

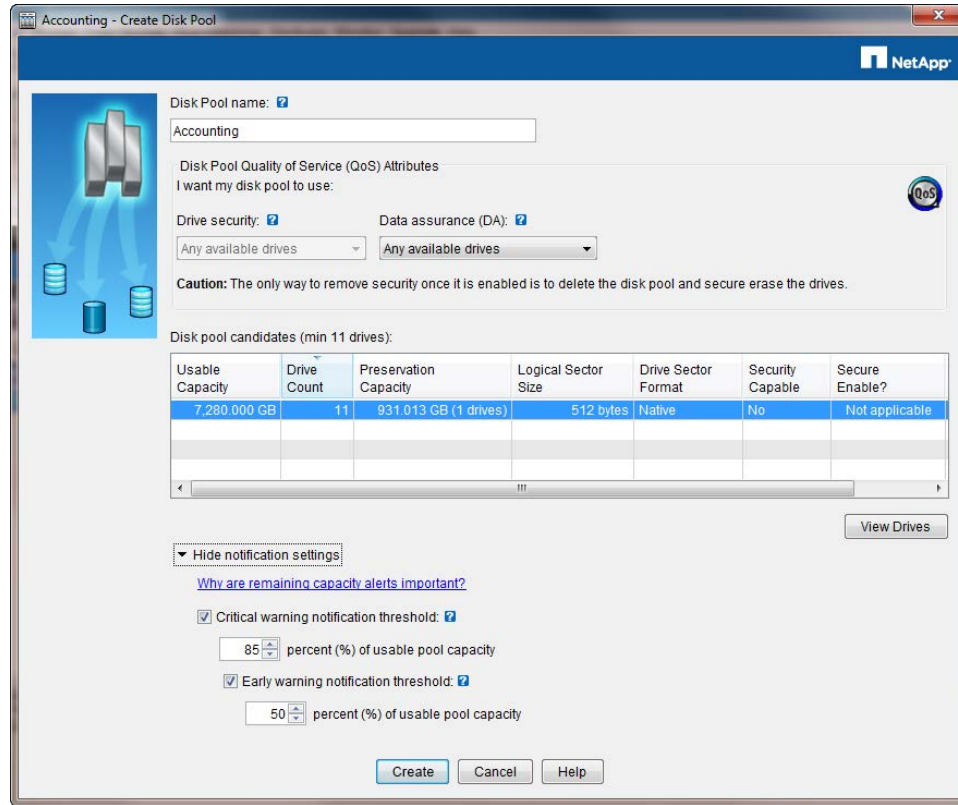
Using SANtricity Storage Manager, you create a disk pool, or a logical group of drives. You then designate a portion of the disk pool as a volume to present to the host.

### About this task

**Important:** If you are using the Drive Security feature, make sure you understand how to implement it. For details, search for the Drive Security topic in the SANtricity Storage Manager Online Help.

### Steps

1. From the **Array Management Window Storage & Copy Services** tab, select **Total Unconfigured Capacity**.
  - Note:** If there is more than one drive type, such as SAS and SSD drives, you cannot create a disk pool from the high-level **Total Unconfigured Capacity** object. Instead, you must select a sub-object under that high-level object.
2. Right-click either the high-level object or a sub-object of **Total Unconfigured Capacity**, and then select **Create Disk Pool**.
3. From the **Create Disk Pool** dialog box, configure the attributes of the disk pool:
  - a. Enter a descriptive name for the disk pool.
  - b. Select whether you want to see any available drives, or just secure-capable drives. Similarly, select whether you want to see any available drives, or just data assurance (DA)-capable drives.
  - c. Select the size of the disk pool from the disk pool candidates.
  - d. Expand the **View Notification Settings**. Select the desired critical and early warning threshold percentages based on the specific environmental requirements for maintaining unprovisioned capacity in the disk pool.
    - Note:** The default percentages are 50 percent for the early warning notification threshold and 85 percent for the critical warning notification threshold. If you are intentionally provisioning most of the storage in the disk pool, such as in a big data or video application environment, consider raising the thresholds from the default levels so that the array does not enter a Needs Attention state so quickly.
    - Note:** Setting both thresholds to 100 percent disables the warning thresholds.



4. Select **Create**.
5. From the **Storage & Copy Services** tab, select the **Disk Pools** object in the Storage Array tree to verify the disk pool was created.
6. Go to [Creating a volume](#) on page 27.



## Creating a volume group

---

Using SANtricity Storage Manager, you create a volume group, or a logical group of drives. You then designate a portion of the volume group as a volume to present to the host.

### About this task

**Important:** If you are using the Drive Security premium feature, make sure you understand how to implement it. For details, search for the Drive Security topic in the SANtricity Storage Manager Online Help.

### Steps

1. Verify that hot spare coverage is adequate for the storage array.
  - a. From the **Array Management Window**, select **Hardware > Hot Spare Coverage**.
  - b. On the **Hot Spare Drive Options** dialog box, select **View/change current hot spare coverage** and select **OK**.
  - c. On the **Hot Spare Coverage** dialog box, view coverage. If you need to select more drives for hot spares, select the **Assign** button and select hot spare drives on the **Assign Hot Spare** dialog box.
 

**Note:** For help determining if coverage is adequate, select the hyperlink “*Tips on providing hot spare coverage*” on the Hot Spare Coverage dialog box.
  - d. Select **Close**.
2. Select the **Storage & Copy Services** tab, right-click **Total Unconfigured Capacity**, and then select **Create Volume Group**.
 

**Note:** If there is more than one drive type, such as SAS and SSD drives, you cannot create a volume group from the high-level **Total Unconfigured Capacity** object. Instead, you must select a sub-object under that high-level object.
3. On the **Introduction** page of the wizard, select **Next**.
4. On the **Volume Group Name & Drive Selection** page of the wizard, perform the following steps:
  - a. Enter a name for the new volume group.
  - b. Select the **Automatic (Recommended)** radio button from the **Drive selection choices** list, and then select **Next**.
5. On the **RAID Level and Capacity** page, perform the following steps:
  - a. Select the desired RAID level for the new volume group from the drop-down list.
 

**Note:** For help determining the best RAID level, select the hyperlinks “*What RAID level is best for my application?*” and “*What is tray loss protection?*” on the RAID Level and Capacity page.
  - b. Select the desired volume group configuration from the list of available configurations and select **Finish**.
  - c. The **volume group** wizard automatically displays a prompt for you to create a volume in the newly created volume group. To create a volume immediately, select **Yes** to continue with the volume creation. Go to [Creating a volume](#) on page 27.

**Related information**

*[SANtricity Storage Manager 11.25 Software Installation Reference](#)*

## Creating a volume

Using SANtricity Storage Manager, you create a volume—a single accessible storage area—on a storage array for the attached host to access. You create a volume from the free capacity of either a disk pool or a volume group.

### Before you begin

You must have determined the expected capacity, usage, data protection, and performance requirements for the volume.

### Steps

1. From the **Array Management Window (AMW) Storage & Copy Services** tab, expand the disk pool or volume group on the array where you want to create the new volume.
2. Right-click **Free Capacity > Create Volume**.

If you are creating a volume on a disk pool, the following dialog box appears.

The screenshot shows a dialog box titled "Accounting - Create Volume: Specify Parameters" with the NetApp logo in the top right corner. On the left, there are two blue cylinder icons representing storage. The main area is divided into two sections: "Volume Parameters" and "Quality of Service (QoS) Attributes".

**Volume Parameters:**

- Volume Parameters:** A section header.
- Disk pool name:** A text field containing "Disk\_Pool\_Accounting".
- Usable capacity:** A text field containing "3,288.000 GB".
- Create thin volume:** An unchecked checkbox with a help icon.
- New volume capacity:** A text field containing "0.000" and a "Units:" dropdown menu set to "GB".
- Volume name:** A text field containing "1".
- Map to host:** A dropdown menu set to "Map Later".

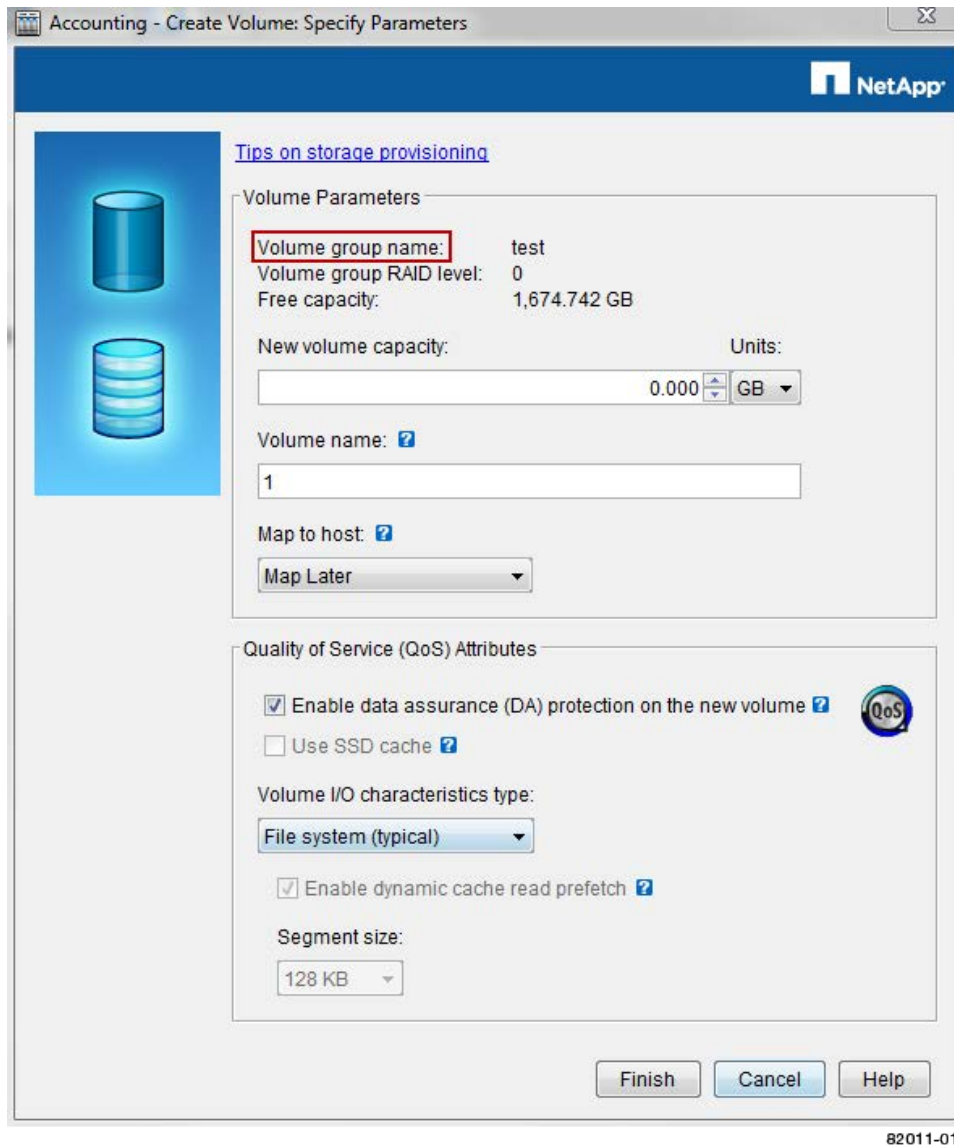
**Quality of Service (QoS) Attributes:**

- Enable data assurance (DA) protection on the new volume:** An unchecked checkbox with a help icon.
- Use SSD cache:** An unchecked checkbox with a help icon.
- Enable dynamic cache read prefetch:** A checked checkbox with a help icon.

At the bottom right, there are three buttons: "Finish", "Cancel", and "Help".

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If you are creating a volume on a volume group, the following dialog box appears.



3. Configure the volume parameters.

Onscreen flyovers provide more information about particular options.

- a. If you are creating the volume on a disk pool and want to create a thin volume, select the **Create thin volume** check box.

**Note:** Thin volumes cannot be created on a volume group. If you are creating the volume on a volume group, this check box does not appear.

- b. From the **Units** drop-down list, select the appropriate unit for the new volume capacity.
  - c. Specify the volume capacity to be taken from the free capacity that is listed.
  - d. Enter the volume name.
  - e. From the **Map to host** drop-down list, select the **Map later** option.
4. Specify the Quality of Service attributes. Use the onscreen flyovers and the SANtricity Online Help to get more information about particular attributes.

**Note:** The **Use SSD cache** check box is not available in the Quality of Service section because you have chosen to map the volume to a host later. See the Array Management Window Online

Help topic “Learn about SSD Cache” to decide if it is appropriate to enable SSD cache later. To enable it, from the **AMW Storage & Copy Services** tab, right-click the volume, and then select **SSD Cache > Enable**.

- a. To enable DA protection, select the **Enable data assurance (DA) protection on the new volume** check box.

This check box appears only if the drives, the controller, and the host bus adapter are all DA-capable.

- b. Finish selecting the Quality of Service Attributes and create the volume. The steps vary depending on whether you are creating the volume from a disk pool (see [Creating a volume from a disk pool](#)) or a volume group (see [Creating a volume from a volume group](#)).

## Creating a volume from a disk pool

After you have started creating a volume from the free capacity of a disk pool, you complete the volume creation by specifying if you want to enable dynamic cache read prefetch.

### About this task

This procedure is a continuation of the “Creating a volume” procedure. Before performing these steps, you must perform the steps listed in [Creating a volume](#) on page 27.

### Steps

1. Select the **Enable dynamic cache read prefetch** check box to enable it.

**Note:** Dynamic cache read prefetch is not available for thin volumes.

2. Select **Finish**.

## Creating a volume from a volume group

After you have started creating a volume from the free capacity of a volume group, you complete the volume creation by specifying how the volume will be used. Setting the correct usage type helps ensure the best performance.

### About this task

This procedure is a continuation of the “Creating a volume” procedure. Before performing these steps, you must perform the steps listed in [Creating a volume](#) on page 27.

### Steps

1. Based on the type of volume usage, select a type from the **Volume I/O characteristics type** drop-down list.
  - Select **File system**, **Database**, or **Multimedia** to have the optimal segment size and cache settings automatically configured for the best performance.
  - For less common volume usages, select **Custom** from the **Volume I/O characteristics type** drop-down list. If appropriate for your environment, select the **Enable dynamic cache read prefetch** check box. Select the appropriate segment size from the **Segment size** list. See the SANtricity Online Help to learn more about performance tuning.

2. Select **Finish**.

You are prompted to create another volume.

3. Select **Yes** to create another volume or **No** to finish creating the volume.

## Defining a host in SANtricity Storage Manager

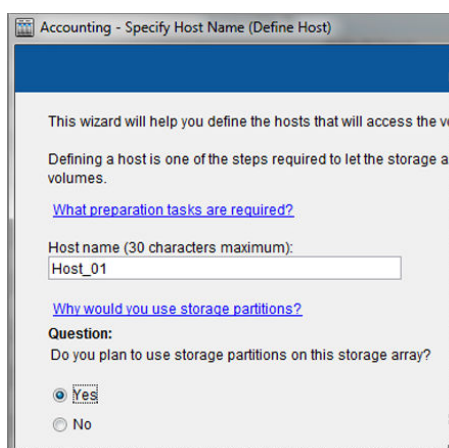
Using SANtricity Storage Manager, you allow the volumes to be shared with the host.

### About this task

You define a new logical host on the storage array so that volumes can be shared with the host.

### Steps

1. From the **Array Management Window (AMW)**, select the **Host Mappings** tab.
2. In the left pane, expand the storage array tree.
3. Right-click **Default Group** and select **Define > Host** to start the **Define Host** wizard.
  - a. Enter a descriptive name for the host to make it easier for administrators to manage the environment over time.
  - b. In the **Question** area of the dialog box, keep the **Yes** selected.

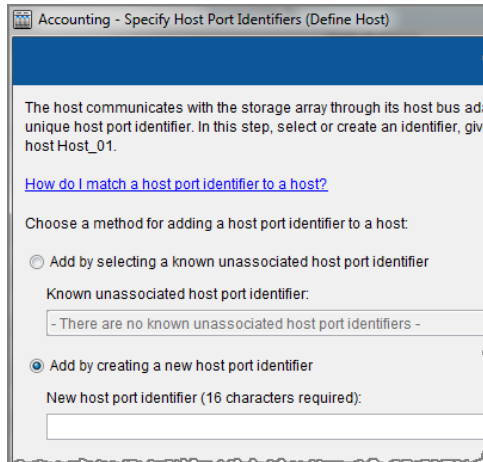


4. Select **Next**.
5. If the controller supports multiple host interface types, select one type from the **Choose a host interface type** drop-down list.
6. Choose a method for adding a host port identifier to the host.

You can add known unassociated host port identifiers by selecting the option **Add by selecting a known unassociated host port identifier**. From the drop-down list, select the identifier for the first port on the host.

**Note:** The host port identifier is the iSCSI Qualified Name (IQN). When the identifier is displayed in the selection list, the storage array can automatically detect the path to the host.

If no identifiers are displayed, there is an issue with the path to the host, and the storage cannot be discovered. Resolve the host issue, then change the host port identifier that was not discovered by selecting the option **Add by creating a new host port identifier**. Enter the new host port identifier.



7. Enter a descriptive alias name for the host port identifier.
8. Select **Add** to add the host port identifier to the host.
9. Repeat Step 6 through Step 8 for each link between the host and the storage array. You can connect and provision two to four paths between any one host and the E-Series storage array. Additional links between host and storage will not show up as different identifiers; they will all exist behind the same IQN.
10. Select **Next**.
11. From the **Host type (operating system)** drop-down list, select host type **Windows**.
12. Select **Next**.
13. Select **No – this host will NOT share access to the same volumes with other hosts**, and then select **Next**.
 

**Note:** These instructions assume a non-clustered configuration.
14. Review the host definition information and confirm that the host name, the host type, and the host port identifiers are correct.
15. Select **Finish** to create the host.
16. Repeat Step 3 through Step 15 to create additional hosts as required.
17. From the **Host Mappings** tab, review the storage array tree to verify that the hosts were created.

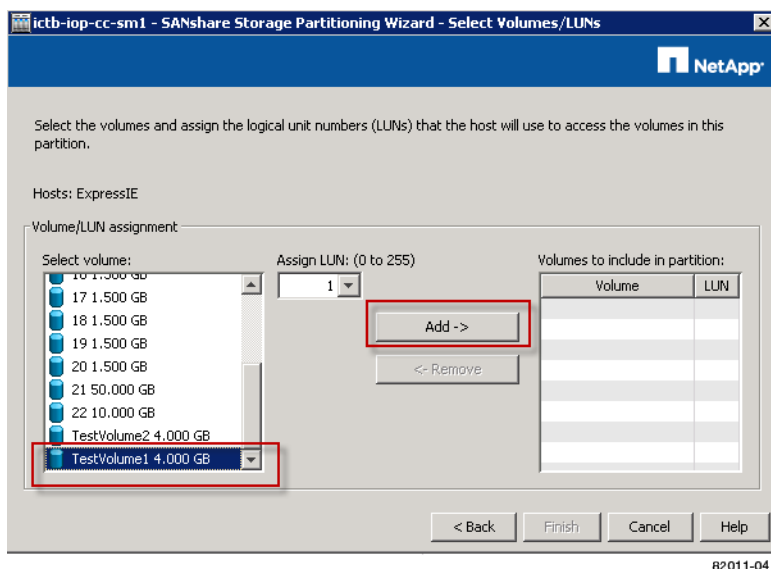


## Mapping a volume to a host

Using SANtricity Storage Manager to create storage partitions, you assign a logical unit number (LUN) to a volume and map the LUN to the host.

### Steps

1. From the **Array Management Window (AMW)**, select the **Host Mappings** tab.
2. Select the storage array tree, right-click the desired host, and then select **Define Storage Partition** to start the **SANshare Storage Partitioning** wizard.
3. On the **Welcome** page of the wizard, select **Next**.
4. Select **Host** to create a dedicated mapping, and then select the host name to be added to the partition.
5. Select **Next**.
6. Select an individual volume, assign a LUN to the volume, and then select **Add** to associate the volume (LUN) with the partition.



7. Repeat Step 6 until all desired volumes are added to the partition.
8. Select **Finish** to create the partition.
9. Review the storage array tree on the **Host Mappings** tab to confirm that the partition was successfully created.

### Example

**Note:** In this example, the volumes `TestVolume1` and `TestVolume2` are mapped to the host `ExpressIE`. Only this host has access to `TestVolume1` and `TestVolume2`. In the left pane of the screen, the storage partition on the host is indicated by the blue slice on the storage cylinder icon.

The screenshot displays the SANtricity management interface. At the top, the title bar reads "SANtricity®". Below it, a navigation menu includes "Storage Array", "Storage", "Copy Services", "Host Mappings", "Hardware", "Monitor", "Upgrade", and "Help". A secondary menu shows icons for various system functions. The main header identifies the selected storage array as "InformationEngineeringBldr" with a red "Needs Attention" indicator. A tabbed interface below the header shows "Summary", "Performance", "Storage & Copy Services", "Host Mappings" (which is active), "Hardware", and "Setup".

On the left side, a tree view under "Find object in tree" shows the hierarchy: "Storage Array InformationEngineeringBldr" (with a red warning icon), "Undefined Mappings", "Default Group", "Unassociated Host Port Identifiers", and "Host ExpressIE" (highlighted in blue).

The main content area, titled "Defined Mappings", contains a table with the following data:

Volume Name	Accessible By	LUN	Volume Capacity
TestVolume1	Host ExpressIE	2	100.000 GB
TestVolume2	Host ExpressIE	3	100.000 GB

## Discovering mapped storage on the host

---

LUNs on your storage system appear as disks to the Windows host. When you add new LUNs, you must manually rescan the associated disks to discover them. The host does not automatically discover new LUNs.

### Before you begin

You must be logged on as an administrator.

### Steps

1. To discover the storage, run the following command from a Windows command prompt.

```
# echo rescan | diskpart
```

2. To verify the addition of new storage, run the following command.

```
# echo list disk | diskpart
```

## Configuring storage on the host

---

A new LUN is offline and has no partition or file system when a Windows host first discovers it. You must bring the volume online and initialize it. Optionally, you can format the LUN with a file system.

### Before you begin

The host must have discovered the LUN.

### About this task

You can initialize the disk as a basic disk with a GPT or MBR partition table. Typically, you format the LUN with a file system such as NTFS.

### Steps

1. From a Windows command prompt, enter the `diskpart` context.

#### Example

```
> diskpart
```

2. View the list of available disks.

#### Example

```
> list disk
```

3. Select the disk to bring online.

#### Example

```
> select disk 1
```

4. Bring the disk online.

#### Example

```
> online disk
```

5. Create a partition.

#### Example

```
> create partition primary
```

**Note:** In Windows Server 2008 and later, you are prompted immediately after creating the partition to format the disk and give it a name. Select **Cancel** on the prompt to continue using these instructions for formatting and naming the partition.

6. Assign a drive letter.

**Example**

```
> assign letter=f
```

7. Format the disk.

**Example**

```
> format FS=NTFS LABEL="New Volume" QUICK
```

8. Exit the diskpart context.

**Example**

```
> exit
```

## Verifying storage access on the host

---

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

### Before you begin

You must have initialized the LUN and formatted it with a file system. The `dsmUtil` utility is case sensitive.

### Steps

1. Create and write to a file on the new LUN.

#### Example

```
> echo test file > f:\test.txt
```

2. Read the file and verify data was written.

#### Example

```
> type f:\test.txt
```

3. To verify that multipath is working, change the volume ownership.
  - a. From the SANtricity Storage Manager Array Management Window (AMW), expand the storage array tree, select the volume, right-click, select **Change > Ownership/Preferred Path**, and then select the other controller.
  - b. Verify that you can still access the files on the LUN.

#### Example

```
> dir f:\
```

4. Find the target ID.

#### Example

```
> C:\Program Files (x86)\DSMDrivers\mppdsm\dsmUtil.exe -a
```

5. View the paths to the LUN and verify that you have the expected number of paths. In the `<target ID>` portion of the command, use the target ID found in Step 4.

#### Example

```
> C:\Program Files (x86)\DSMDrivers\mppdsm\dsmUtil.exe -g <target ID>
```

## Where to find additional information

---

Use the resources listed here if you need additional information. You can also use the Online Help systems for the Enterprise Management Window (EMW) and the Array Management Window (AMW) of SANtricity Storage Manager.

- *SANtricity Storage Manager 11.25 Software Installation Reference* provides reference information about configuration and software installation. Covers less common configurations such as installation on a boot device and Windows Server Core.
- *SANtricity Storage Manager 11.25 Multipath Drivers Guide* describes how to install and operate the multipath drivers.
- *Windows Unified Host Utilities 7.0 Installation Guide* ([https://library.netapp.com/ecm/ecm\\_get\\_file/ECMP1656700](https://library.netapp.com/ecm/ecm_get_file/ECMP1656700)) describes how to install and use the Windows Unified Host Utilities 7.0.
- SANtricity Online Help describes how to use SANtricity Storage Manager to complete configuration and storage management tasks. Available within the product and as a PDF download.
- *NetApp Knowledgebase* (a database of articles) provides troubleshooting information, FAQs, and instructions for a wide range of NetApp products and technologies.

### Related information

*[NetApp E-Series and EF-Series Systems Documentation Center](#)*

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