



## Hosts

### SANtricity 11.5

NetApp  
October 22, 2024

# Table of Contents

- Hosts ..... 1
- Concepts ..... 1
- How tos ..... 5
- FAQs ..... 15

# Hosts

## Concepts

### Host terminology

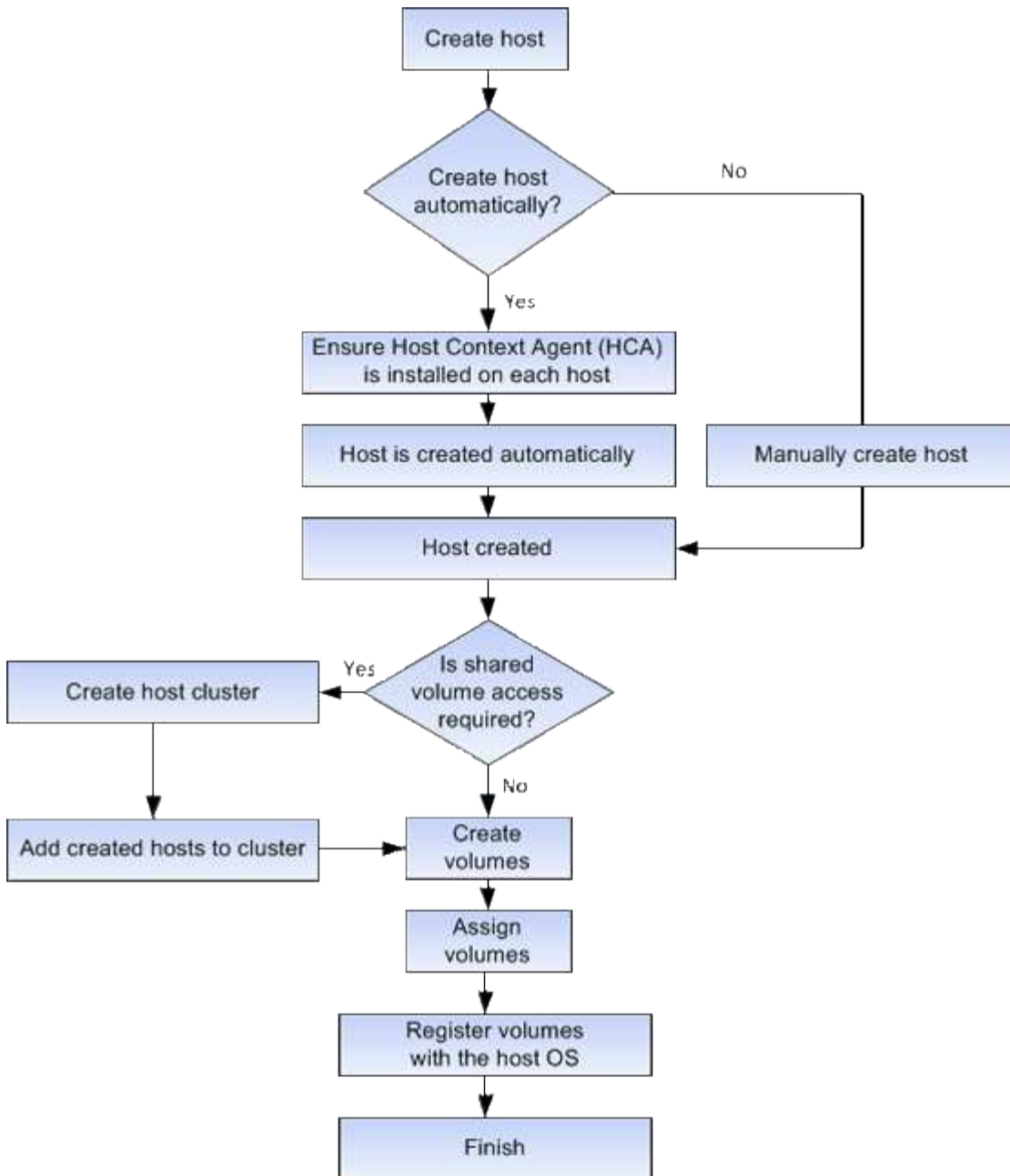
Learn how the host terms apply to your storage array.

Component	Definition
Host	A host is a server that sends I/O to a volume on a storage array.
Host name	The host name should equate to the system name of the host.
Host cluster	A host cluster is a group of hosts. You create a host cluster to make it easy to assign the same volumes to multiple hosts.
Host interface protocol	A host interface protocol is the connection (such as Fibre Channel, iSCSI, etc.) between the controllers and the hosts.
HBA or Network Interface Card (NIC)	A host bus adapter (HBA) is a board that resides in a host and contains one or more host ports.
Host port	A host port is a port on a host bus adapter (HBA) that provides the physical connection to a controller and is used for I/O operations.
Host port identifier	<p>A host port identifier is a unique world-wide name associated with each host port on a host bus adapter (HBA).</p> <ul style="list-style-type: none"><li>• Internet Small Computer System Interface (iSCSI) host port identifiers must have between 1 and 233 characters. iSCSI host port identifiers display in standard IQN format (e.g., <code>iqn.xxx.com.xxx:8b3ad</code>).</li><li>• Non-iSCSI host port identifiers such as Fibre Channel and Serial Attached SCSI (SAS) display as colon-delimited after every two characters (e.g., <code>xx:yy:zz</code>). Fibre Channel host port identifiers must have 16 characters.</li></ul>

Component	Definition
Host operating system type	The host operating system type is a configuration setting that defines how the controllers in the storage array react to I/O depending on the operating system (or variant) of the host. This is also sometimes called <i>host type</i> for short.
Controller host port	A controller host port is a port on the controller that provides the physical connection to a host and is used for I/O operations.
LUN	<p>A logical unit number (LUN) is the number assigned to the address space that a host uses to access a volume. The volume is presented to the host as capacity in the form of a LUN.</p> <p>Each host has its own LUN address space. Therefore, the same LUN can be used by different hosts to access different volumes.</p>

## Workflow for host creation and volume assignment

The following figure illustrates how to configure host access.



## Automatic versus manual host creation

Creating a host is one of the steps required to let the storage array know which hosts are attached to it and to allow I/O access to the volumes. You can create a host automatically or manually.

### Automatic creation

Automatic host creation is initiated by the Host Context Agent (HCA). The HCA is a utility that you must install on each host attached to the storage array. Each host that has the HCA installed pushes its configuration information to the storage array controllers through the I/O path. Based on the host information, the controllers automatically create the host and the associated host ports and set the host type. If needed, you can make any additional changes to the host configuration using System Manager.

After the HCA performs its automatic detection, the host automatically appears in the Hosts page with the

following attributes:

- The host name derived from the system name of the host.
- The host identifier ports that are associated with the host.
- The Host Operating System Type of the host.

Hosts are created as stand-alone hosts; the HCA does not automatically create or add to host clusters.

## Manual creation

You might want to manually create a host for one of the following reasons:

1. You chose not to install the HCA utility on your hosts.
2. You want to ensure that the host port identifiers that were detected by the storage array controllers are associated correctly with the hosts.

During manual host creation, you associate host port identifiers by selecting them from a list or manually entering them. After you create a host, you can assign volumes to it or add it to a host cluster if you plan to share access to volumes.

## How volumes are assigned to hosts and host clusters

For a host or host cluster to send I/O to a volume, you must assign the volume to the host or host cluster.

You can select a host or host cluster when you create a volume or you can assign a volume to a host or host cluster later. A host cluster is a group of hosts. You create a host cluster to make it easy to assign the same volumes to multiple hosts.

Assigning volumes to hosts is flexible, allowing you to meet your particular storage needs.

- **Stand-alone host, not part of a host cluster** — You can assign a volume to an individual host. The volume can be accessed only by the one host.
- **Host cluster** — You can assign a volume to a host cluster. The volume can be accessed by all the hosts in the host cluster.
- **Host within a host cluster** — You can assign a volume to an individual host that is part of a host cluster. Even though the host is part of a host cluster, the volume can be accessed only by the individual host and not by any other hosts in the host cluster.

When volumes are created, logical unit numbers (LUNs) are assigned automatically. The LUN serves as the "address" between the host and the controller during I/O operations. You can change LUNs after the volume is created.

## Access volumes

An access volume is a factory-configured volume on the storage array that is used for communication with the storage array and the host through the host I/O connection. The access volume requires a Logical Unit Number (LUN).

The access volume is used in two instances:

- **Automatic host creation** — The access volume is used by the Host Context Agent (HCA) utility to push host information (name, ports, host type) to System Manager for automatic host creation.
- **In-band management** — The access volume is used for an in-band connection to manage the storage array. This can only be done if you are managing the storage array with the command line interface (CLI).

An access volume is automatically created the first time you assign a volume to a host. For example, if you assign Volume\_1 and Volume\_2 to a host, when you view results of that assignment, you see three volumes (Volume\_1, Volume\_2, and Access).

If you are not automatically creating hosts or managing a storage array in-band with the CLI, you do not need the access volume, and you can free up the LUN by deleting the access volume. This action removes the volume-to-LUN assignment as well as any in-band management connections to the host.

## Maximum number of LUNs

The storage array has a maximum number of logical unit numbers (LUNs) that can be used for each host.

The maximum number depends on the operating system of the host. The storage array tracks the number of LUNs used. If you try to assign a volume to a host that exceeds the maximum number of LUNs, the host cannot access the volume.

# How tos

## Configure host access

### Create host automatically

You can allow the Host Context Agent (HCA) to automatically detect the hosts, and then verify that the information is correct. Creating a host is one of the steps required to let the storage array know which hosts are attached to it and to allow I/O access to the volumes.

### Before you begin

The Host Context Agent (HCA) is installed and running on every host connected to the storage array. Hosts with the HCA installed and connected to the storage array are created automatically. To install the HCA, install SANtricity Storage Manager on the host and select the Host option. The HCA is not available on all supported operating systems. If it is not available, you must create the host manually.

### Steps

1. Select **Storage > Hosts**.

The table lists the automatically-created hosts.

2. Verify that the information provided by the HCA is correct (name, host type, host port identifiers).

If you need to change any of the information, select the host, and then click **View/Edit Settings**.

3. (Optional) If you want the automatically-created host to be in a cluster, create a host cluster and add the host or hosts.

### Results

After a host is created automatically, the system displays the following items in the Hosts tile table:

- The host name derived from the system name of the host.
- The host identifier ports that are associated with the host.
- The Host Operating System Type of the host.

### **Create host manually**

For hosts that cannot be automatically discovered, you can manually create a host. Creating a host is one of the steps required to let the storage array know which hosts are attached to it and to allow I/O access to the volumes.

#### **About this task**

Keep these guidelines in mind when you create a host:

- You must define the host identifier ports that are associated with the host.
- Make sure that you provide the same name as the host's assigned system name.
- This operation does not succeed if the name you choose is already in use.
- The length of the name cannot exceed 30 characters.

#### **Steps**

1. Select **Storage > Hosts**.
2. Click **Create > Host**.

The Create Host dialog box appears.

3. Select the settings for the host as appropriate.



## Field details

Setting	Description
Name	Type a name for the new host.
Host operating system type	Select the operating system that is running on the new host from the drop-down list.
Host interface type	(Optional) If you have more than one type of host interface supported on your storage array, select the host interface type that you want to use.
Host ports	<p>Do one of the following:</p> <ul style="list-style-type: none"><li>• <b>Select I/O Interface</b></li></ul> <p>Generally, the host ports should have logged in and be available from the drop-down list. You can select the host port identifiers from the list.</p> <ul style="list-style-type: none"><li>• <b>Manual add</b></li></ul> <p>If a host port identifier is not displayed in the list, it means that the host port has not logged in. An HBA utility or the iSCSI initiator utility may be used to find the host port identifiers and associate them with the host.</p> <p>You can manually enter the host port identifiers or copy/paste them from the utility (one at a time) into the <b>Host ports</b> field.</p> <p>You must select one host port identifier at a time to associate it with the host, but you can continue to select as many identifiers that are associated with the host. Each identifier is displayed in the <b>Host ports</b> field. If necessary, you also can remove an identifier by selecting the <b>X</b> next to it.</p>

Setting	Description
CHAP initiator	<p>(Optional) If you selected or manually entered a host port with an iSCSI IQN, and if you want to require a host that tries to access the storage array to authenticate using Challenge Handshake Authentication Protocol (CHAP), select the <b>CHAP initiator</b> checkbox. For each iSCSI host port you selected or manually entered, do the following:</p> <ul style="list-style-type: none"> <li>• Enter the same CHAP secret that was set on each iSCSI host initiator for CHAP authentication. If you are using mutual CHAP authentication (two-way authentication that enables a host to validate itself to the storage array and for a storage array to validate itself to the host), you also must set the CHAP secret for the storage array at initial setup or by changing settings.</li> <li>• Leave the field blank if you do not require host authentication. Currently, the only iSCSI authentication method used by System Manager is CHAP.</li> </ul>

4. Click **Create**.

### Results

After the host is successfully created, the system creates a default name for each host port configured for the host (user label).

The default alias is `<Hostname_Port Number>`. For example, the default alias for the first port created for host `IPT` is `IPT_1`.

### Create host cluster

You create a host cluster when two or more hosts require I/O access to the same volumes.

### About this task

Keep these guidelines in mind when you create a host cluster:

- This operation does not start unless there are two or more hosts available to create the cluster.
- Hosts in host clusters can have different operating systems (heterogeneous).
- To create a Data Assurance (DA)-enabled volume, the host connection you are planning to use must support DA.

If any of the host connections on the controllers in your storage array do not support DA, the associated hosts cannot access data on DA-enabled volumes. DA is **not** supported by iSCSI over TCP/IP, or by the SRP over InfiniBand.

- This operation does not succeed if the name you choose is already in use.
- The length of the name cannot exceed 30 characters.

### Steps

1. Select **Storage > Hosts**.
2. Select **Create > Host Cluster**.

The Create Host Cluster dialog box appears.

3. Select the settings for the host cluster as appropriate.

### Field details

Setting	Description
Name	Type the name for the new host cluster.
Hosts	Select two or more hosts from the drop-down list. Only those hosts that are not already part of a host cluster appear in the list.

4. Click **Create**.

If the selected hosts are attached to interface types that have different Data Assurance (DA) capabilities, a dialog appears with the message that DA will be unavailable on the host cluster. This unavailability prevents DA-enabled volumes from being added to the host cluster. Select **Yes** to continue or **No** to cancel.

DA increases data integrity across the entire storage system. DA enables the storage array to check for errors that might occur when data is moved between the hosts and the drives. Using DA for the new volume ensures that any errors are detected.

### Results

The new host cluster appears in the table with the assigned hosts in the rows beneath.

### Assign volumes

You must assign a volume to a host or a host cluster so it can be used for I/O operations. This assignment grants a host or host cluster access to one or more volumes in a storage array.

### Before you begin

Keep these guidelines in mind when you assign volumes:

- You can assign a volume to only one host or host cluster at a time.
- Assigned volumes are shared between controllers in the storage array.
- The same logical unit number (LUN) cannot be used twice by a host or a host cluster to access a volume. You must use a unique LUN.

Assigning a volume fails under these conditions:

- All volumes are assigned.
- The volume is already assigned to another host or host cluster.

The ability to assign a volume is unavailable under these conditions:

- No valid hosts or host clusters exist.
- No host port identifiers have been defined for the host.
- All volume assignments have been defined.

### About this task

All unassigned volumes are displayed, but functions for hosts with or without Data Assurance (DA) apply as follows:

- For a DA-capable host, you can select volumes that are either DA-enabled or not DA-enabled.
- For a host that is not DA-capable, if you select a volume that is DA-enabled, a warning states that the system must automatically turn off DA on the volume before assigning the volume to the host.

### Steps

1. Select **Storage > Hosts**.
2. Select the host or host cluster to which you want to assign volumes, and then click **Assign Volumes**.

A dialog box appears that lists all the volumes that can be assigned. You can sort any of the columns or type something in the **Filter** box to make it easier to find particular volumes.

3. Select the check box next to each volume that you want to assign or select the check box in the table header to select all volumes.
4. Click **Assign** to complete the operation.

### Results

After successfully assigning a volume or volumes to a host or a host cluster, the system performs the following actions:

- The assigned volume receives the next available LUN number. The host uses the LUN number to access the volume.
- The user-supplied volume name appears in volume listings associated to the host. If applicable, the factory-configured access volume also appears in volume listings associated to the host.

## Manage hosts and host clusters

### Change the settings for a host

You can change the name, host operating system type, and associated host clusters for a host.

### Steps

1. Select **Storage > Hosts**.
2. Select the host that you want to edit, and then click **View/Edit Settings**.

A dialog box appears that shows the current host settings.

3. If it is not already selected, click the **Properties** tab.
4. Change the settings as appropriate.

#### Field Details

Setting	Description
Name	You can change the user-supplied name of the host. Specifying a name for the host is required.
Associated host cluster	You can choose one of the following options: <ul style="list-style-type: none"><li>• <b>None</b> — The host remains a standalone host. If the host was associated to a host cluster, the system removes the host from the cluster.</li><li>• <b>&lt;Host Cluster&gt;</b> — The system associates the host to the selected cluster.</li></ul>
Host operating system type	You can change the type of operating system running on the host you defined.

5. Click **Save**.

#### Change the settings for a host cluster

You can change the host cluster name, or add or remove hosts in a host cluster.

#### Steps

1. Select **Storage > Hosts**.
2. Select the host cluster you want to edit, and then click **View/Edit Settings**.

A dialog box appears that shows the current host cluster settings.

3. Change the settings for the host cluster as appropriate.

## Field Details

Setting	Description
Name	You can specify the user-supplied name of the host cluster. Specifying a name for a cluster is required.
Associated Hosts	To add a host, click the <b>Associated Hosts</b> box, and then select a host name from the drop-down list. You cannot manually enter a host name.  To delete a host, click the <b>X</b> next to the host name.

4. Click **Save**.

## Unassign volumes

Unassign volumes from hosts or host clusters if you no longer need I/O access to that volume from the host or host cluster.

### About this task

Keep these guidelines in mind when you unassign a volume:

- If you are removing the last assigned volume from a host cluster, and the host cluster also has hosts with specific assigned volumes, make sure that you remove or move those assignments before removing the last assignment for the host cluster.
- If a host cluster, a host, or a host port is assigned to a volume that is registered to the operating system, you must clear this registration before you can remove these nodes.

### Steps

1. Select **Storage > Hosts**.
2. Select the host or host cluster that you want to edit, and then click **Unassign Volumes**.

A dialog box appears that shows all the volumes that are currently assigned.

3. Select the check box next to each volume that you want to unassign or select the check box in the table header to select all volumes.
4. Click **Unassign**.

### Results

- The volumes that were unassigned are available for a new assignment.
- Until the changes are configured on the host, the volume is still recognized by the host operating system.

## Change host port identifiers for a host

Change the host port identifiers when you want to change the user label on a host port identifier, add a new host port identifier to the host, or delete a host port identifier from the

host.

### About this task

When changing host port identifiers, keep the following guidelines in mind:

- **Add** — When you add a host port, you are associating the host port identifier to the host you created to connect to your storage array. You can manually enter port information using a host bus adapter (HBA) utility.
- **Edit** — You can edit the host ports to move (associate) a host port to a different host. You might have moved the host bus adapter or iSCSI initiator to a different host, so you must move (associate) the host port to the new host.
- **Delete** — You can delete host ports to remove (unassociate) host ports from a host.

### Steps

1. Select **Storage > Hosts**.
2. Select the host to which the ports will be associated, and then click **View/Edit Settings**.


If you want to add ports to a host in a host cluster, expand the host cluster and select the desired host. You cannot add ports at the host cluster level.

A dialog box appears that shows the current host settings.

3. Click the **Host Ports** tab.

The dialog box shows the current host port identifiers.

4. Change the host port identifier settings as appropriate.

Setting	Description
Host Port	<p>You can choose one of the following options:</p> <ul style="list-style-type: none"> <li>• <b>Add</b> — Use Add to associate a new host port identifier to the host. The length of the host port identifier name is determined by the host interface technology. Fibre Channel and Infiniband host port identifier names must have 16 characters. iSCSI host port identifier names have a maximum of 223 characters. The port must be unique. A port number that has already been configured is not allowed.</li> <li>• <b>Delete</b> — Use Delete to remove (unassociate) a host port identifier. The <b>Delete</b> option does not physically remove the host port. This option removes the association between the host port and the host. Unless you remove the host bus adapter or the iSCSI initiator, the host port is still recognized by the controller.</li> </ul> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">  <p>If you delete a host port identifier, it is no longer associated with this host. Also, the host loses access to any of its assigned volumes through this host port identifier.</p> </div>
Label	<p>To change the port label name, click the <b>Edit</b> icon (pencil). The port label name must be unique. A label name that has already been configured is not allowed.</p>
CHAP Secret	<p>Appears only for iSCSI hosts. You can set or change the CHAP secret for the initiators (iSCSI hosts).</p> <p>System Manager uses the Challenge Handshake Authentication Protocol (CHAP) method, which validates the identity of targets and initiators during the initial link. Authentication is based on a shared security key called a CHAP secret.</p>

5. Click **Save**.

### Delete host or host cluster

You can delete a host or host cluster.

#### About this task

Keep these guidelines in mind when you delete a host or a host cluster:



- Any specific volume assignments are deleted, and the associated volumes are available for a new assignment.
- If the host is part of a host cluster that has its own specific assignments, the host cluster is unaffected. However, if the host is part of a host cluster that does not have any other assignments, the host cluster and any other associated hosts or host port identifiers inherit any default assignments.
- Any host port identifiers that were associated with the host become undefined.

## Steps

1. Select **Storage > Hosts**.
2. Select the host or host cluster that you want to delete, and then click **Delete**.

The confirmation dialog box appears.

3. Confirm that you want to perform the operation, and then click **Delete**.

## Results

If you deleted a host, the system performs the following actions:

- Deletes the host and, if applicable, removes it from the host cluster.
- Removes access to any assigned volumes.
- Returns the associated volumes to an unassigned state.
- Returns any host port identifiers associated with the host to an unassociated state.

If you deleted a host cluster, the system performs the following actions:

- Deletes the host cluster and its associated hosts (if any).
- Removes access to any assigned volumes.
- Returns the associated volumes to an unassigned state.
- Returns any host port identifiers associated with the hosts to an unassociated state.

# FAQs

## What are hosts and host clusters?

A host is a server that sends I/O to a volume on a storage array. A host cluster is a group of hosts. You create a host cluster to make it easy to assign the same volumes to multiple hosts.

You define a host separately. It can either be an independent entity or be added to a host cluster. You can assign volumes to an individual host, or a host can be part of a host cluster that shares access to one or more volumes with other hosts in the host cluster.

The host cluster is a logical entity that you create in SANtricity System Manager. You must add hosts to the host cluster before you can assign volumes.

## Why would I need to create a host cluster?

You need to create a host cluster if you want to have two or more hosts share access to

the same set of volumes. Normally, the individual hosts have clustering software installed on them to coordinate volume access.

## How do I know which host operating system type is correct?

The Host Operating System Type field contains the operating system of the host. You can select the recommended host type from the drop-down list or allow the Host Context Agent (HCA) to configure the host and appropriate host operating system type.

Host Operating System type	Operating System (OS) and multipath driver
AIX MPIO	The Advanced Interactive Executive (AIX) OS and the native MPIO driver
AVT_4M	Silicon Graphics, Inc. (SGI) proprietary multipath driver; refer to the SGI installation documentation for more information
Factory Default	This is reserved for the initial startup of the storage array and should be changed to match the host operating system and multipath driver being used for the particular host
HP-UX	The HP-UX OS with native multipath driver
Linux (ATTO)	The Linux OS and the ATTO Technology, Inc. driver (must use ATTO FC HBAs)
Linux (DM-MP)	The Linux OS and the native DM-MP driver
Linux (Pathmanager)	The Linux OS and the SGI proprietary multipath driver; refer to the SGI installation documentation for more information
Mac OS	The Mac OS and the ATTO Technology, Inc. driver
ONTAP	FlexArray
Solaris (version 11 or later)	The Solaris 11 or later OS and the native MPxIO driver
Solaris (version 10 or earlier)	The Solaris 10 or earlier OS and the native MPxIO driver
SVC	IBM SAN Volume Controller
VMware	The ESXi OS

Host Operating System type	Operating System (OS) and multipath driver
Windows or Windows Clustered	The Windows Server OS and Windows MPIO with a DSM driver
Windows (ATTO)	The Windows OS and the ATTO Technology, Inc. driver

After the HCA is installed and the storage is attached to the host, the HCA sends the host topology to the storage controllers through the I/O path. Based on the host topology, the storage controllers automatically define the host and the associated host ports, and then set the host type.



If the HCA does not select the recommended host type, you must manually set the host type in System Manager.

## What are HBAs and adapter ports?

A host bus adapter (HBA) is a board that resides in a host and contains one or more host ports. A host port is a port on a host bus adapter (HBA) that provides the physical connection to a controller and is used for I/O operations.

The adapter ports on the HBA are called host ports. Most HBAs have either one or two host ports. The HBA has a unique World Wide Identifier (WWID), and each HBA host port has a unique WWID. The host port identifiers are used to associate the appropriate HBA with the physical host when you are either manually creating the host through SANtricity System Manager or automatically creating the host using the host context agent.

## How do I match the host ports to a host?

If you are manually creating a host, you first must use the appropriate host bus adapter (HBA) utility available on the host to determine the host port identifiers associated with each HBA installed in the host.

When you have this information, select the host port identifiers that have logged into the storage array from the list provided in the Create Host dialog of System Manager.



Make sure you select the appropriate host port identifiers for the host you are creating. If you associate the wrong host port identifiers, you might cause unintended access from another host to this data.

If you are automatically creating hosts using the host context agent (HCA) installed on each host, the HCA should automatically associate the host port identifiers with each host and configure them appropriately.

## How do I create CHAP secrets?

If you set up Challenge Handshake Authentication Protocol (CHAP) authentication on any iSCSI host connected to the storage array, you must re-enter that initiator CHAP secret for each iSCSI host. To do this, you can use System Manager either as part of the Create Host operation or through the View/Edit Settings option.

If you are using CHAP mutual authentication, you also must define a target CHAP secret for the storage array in the Settings page and re-enter that target CHAP secret on each iSCSI host.

## What is the default cluster?

The default cluster is a system-defined entity that allows any unassociated host bus adapter (HBA) host port identifier that has logged into the storage array to gain access to any volumes assigned to the default cluster. An unassociated host port identifier is a host port that while physically installed in a host and logged into the storage array is not logically associated with a particular host.



If you want your hosts to have specific access to certain volumes in the storage array, you must *not* use the default cluster. Instead, you must associate the host port identifiers with their corresponding hosts. This can be done either manually using System Manager during the Create Host operation or automatically using the host context agent (HCA) installed on each host. Then, you assign volumes either to an individual host or to a host cluster.

You should *only* use the default cluster in special situations where your external storage environment is conducive to allowing all the hosts and all the logged-in host port identifiers connected to the storage array have access to all of the volumes (all-access mode) without specifically making the hosts known to the storage array or System Manager.

Initially, you can assign volumes only to the default cluster through the command line interface (CLI). However, after you assign at least one volume to the default cluster, this entity (called Default Cluster) is displayed in System Manager, and you can then use System Manager to manage this entity.

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