

Hitachi Storage Advisor v3.3.0

Getting Started Guide

This guide lists the minimum system requirements, and provides the necessary procedures to get Storage Advisor up and running.

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Preface

Hitachi Storage Advisor is an infrastructure management solution that unifies storage management solutions such as storage provisioning, data protection, and storage management; simplifies the management of large scale data centers by providing smarter software services; and is extensible to provide better programmability and better control.

Intended Audience

This document is intended for system administrators, Hitachi Vantara representatives, and authorized service providers who configure and operate the following storage systems with Hitachi Storage Advisor:

- Hitachi Virtual Storage Platform F350, F370, F700, F900
- Virtual Storage Platform F400, F600, F800
- Virtual Storage Platform F1500
- Virtual Storage Platform G350, G370, G700, G900
- Virtual Storage Platform G200, G400, G600, G800
- Virtual Storage Platform G1000
- Virtual Storage Platform G1500

Readers of this document should be familiar with the following:

- RAID storage systems and their basic functions.
- Volume creation and management.
- Pool creation and management.
- Parity group creation and management.

Product version

This document revision applies to Hitachi Storage Advisor version 3.3 or later.

Release notes

Read the release notes before installing and using this product. They may contain requirements or restrictions that are not fully described in this document or updates or corrections to this document.

Release notes are located on Support Connect at <https://knowledge.hitachivantara.com/Documents>.

Document conventions

This document uses the following typographic conventions:

Convention	Description
Bold	<ul style="list-style-type: none"> Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example: Click OK. Indicates emphasized words in list items.
<i>Italic</i>	<ul style="list-style-type: none"> Indicates a document title or emphasized words in text. Indicates a variable, which is a placeholder for actual text provided by the user or for output by the system. Example: <pre>pairdisplay -g group</pre> <p>(For exceptions to this convention for variables, see the entry for angle brackets.)</p>
Monospace	Indicates text that is displayed on screen or entered by the user. Example: <code>pairdisplay -g oradb</code>
< > angle brackets	Indicates variables in the following scenarios: <ul style="list-style-type: none"> Variables are not clearly separated from the surrounding text or from other variables. Example: <pre>Status-<report-name><file-version>.csv</pre> Variables in headings.
[] square brackets	Indicates optional values. Example: [a b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a b } indicates that you must choose either a or b.

Convention	Description
vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a b] indicates that you can choose a, b, or nothing. { a b } indicates that you must choose either a or b.

This document uses the following icons to draw attention to information:

Icon	Label	Description
	Note	Calls attention to important or additional information.
	Tip	Provides helpful information, guidelines, or suggestions for performing tasks more effectively.
	Caution	Warns the user of adverse conditions and/or consequences (for example, disruptive operations, data loss, or a system crash).
	WARNING	Warns the user of a hazardous situation which, if not avoided, could result in death or serious injury.

Conventions for storage capacity values

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 kilobyte (KB)	1,000 (10 ³) bytes
1 megabyte (MB)	1,000 KB or 1,000 ² bytes
1 gigabyte (GB)	1,000 MB or 1,000 ³ bytes
1 terabyte (TB)	1,000 GB or 1,000 ⁴ bytes
1 petabyte (PB)	1,000 TB or 1,000 ⁵ bytes
1 exabyte (EB)	1,000 PB or 1,000 ⁶ bytes

Logical capacity values (for example, logical device capacity, cache memory capacity) are calculated based on the following values:

Logical capacity unit	Value
1 block	512 bytes
1 cylinder	Mainframe: 870 KiB Open-systems <ul style="list-style-type: none"> ▪ OPEN-V: 960 KiB ▪ Others: 720 KiB
1 KiB	1,024 (2 ¹⁰) bytes
1 MiB	1,024 KiB or 1,024 ² bytes
1 GiB	1,024 MiB or 1,024 ³ bytes
1 TiB	1,024 GiB or 1,024 ⁴ bytes
1 PiB	1,024 TiB or 1,024 ⁵ bytes
1 EiB	1,024 PiB or 1,024 ⁶ bytes

Accessing product documentation

Product user documentation is available on Hitachi Vantara Support Connect: <https://knowledge.hitachivantara.com/Documents>. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting help

[Hitachi Vantara Support Connect](#) is the destination for technical support of products and solutions sold by Hitachi Vantara. To contact technical support, log on to Hitachi Vantara Support Connect for contact information: https://support.hitachivantara.com/en_us/contact-us.html.

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Thank you!

Chapter 1: Hitachi Storage Advisor environment

The Storage Advisor environment must meet minimum requirements to support management of various storage systems, servers, and fabric switches.

Minimum system requirements

Verify that the Storage Advisor server meets or exceeds the minimum requirements to take advantage of all the features of Storage Advisor.

Server	Minimum requirements
Hypervisor operating system	VMware® ESXi 5.0 or higher
Docker® version for installation from tar file	v17.12.0-ce
Operating system for installation from tar file	Linux
Access for installation from tar file	Root user
Available disk space	40 GiB
	100 GiB for installation using the application installer. This is due to the additional capacity required for the installer file and Docker requirements for image installation. After installation is complete, the required space is reduced to 40 GiB.
Memory	16 GiB RAM
CPU	4 vCPUs
A client computer that can run a supported browser	At least one of the following: <ul style="list-style-type: none">▪ Internet Explorer 11 (and only certain minor versions of IE: 18537, 163841S) or later▪ Firefox 31.3.0 ESR, 34.0.5, or later▪ Chrome v38.0.2125.122 or later

Verify that Storage Advisor ports do not overlap with those used by other programs in your environment.

Service	AD and AD DS Usage	Protocol Type and Port
CCI		31001/UDP and 31002/UDP
HTTP		80/TCP
HTTPS		443/TCP
Reserved		1099/TCP, 8080/TCP, 8082/TCP, 8083/TCP, 8084/TCP, 8085/TCP, 8090/TCP, 8443/TCP, 51099/TCP, 51100/TCP, 8888, 8843
SNMP		161/UDP, 162 /TCP
LDAP	Directory, Replication, User and Computer authentication, Group Policy, Trusts	389/TCP and 389/UDP
LDAP SSL	Directory, Replication, User and Computer authentication, Group Policy, Trusts	636/TCP
LDAP GC	Directory, Replication, User and Computer authentication, Group Policy, Trusts	3268/TCP
LDAP GC SSL	Directory, Replication, User and Computer authentication, Group Policy, Trusts	3269/TCP
DNS	Names Resolution	53/TCP and 53/UDP
DID		443

Requirements for using program products

In order to use Hitachi Dynamic Tiering for pools and Hitachi Thin Image for snapshots, make sure that the licenses are available and shared memory is installed.

Supported storage systems

Hitachi Storage Advisor supports the storage systems of the Virtual Storage Platform family.

Initial startup and initial setup of any supported storage system must be completed by a Hitachi Vantara representative or an authorized service provider.

Hitachi Storage Advisor supports the following storage systems:

- Hitachi Virtual Storage Platform F350
- Hitachi Virtual Storage Platform F370
- Hitachi Virtual Storage Platform F400
- Hitachi Virtual Storage Platform F600
- Hitachi Virtual Storage Platform F700
- Hitachi Virtual Storage Platform F800
- Hitachi Virtual Storage Platform F900
- Hitachi Virtual Storage Platform F1500
- Hitachi Virtual Storage Platform G200
- Hitachi Virtual Storage Platform G350
- Hitachi Virtual Storage Platform G370
- Hitachi Virtual Storage Platform G400
- Hitachi Virtual Storage Platform G600
- Hitachi Virtual Storage Platform G700
- Hitachi Virtual Storage Platform G800
- Hitachi Virtual Storage Platform G900
- Hitachi Virtual Storage Platform G1000
- Hitachi Virtual Storage Platform G1500
- Hitachi Virtual Storage Platform G400 with optional NAS modules
- Hitachi Virtual Storage Platform G600 with optional NAS modules
- Hitachi Virtual Storage Platform G800 with optional NAS modules

Firmware and microcode versions

Storage Advisor supports the following:

- Hitachi VSP F350, F370, F700, F900 and VSP G350, G370, G700, G900 models with firmware versions as follow:
 - v88-03-2x
- Hitachi VSP F400, F600, F800 and VSP G200, G400, G600, G800 models with firmware versions as follow:
 - v83-05-2x
- Virtual Storage Platform G1000, Virtual Storage Platform G1500, and Virtual Storage Platform F1500 with microcode versions as follow:
 - v80-06-6x

Supported file server

Hitachi Storage Advisor requires minimum file server firmware and system management unit software versions.

Hitachi Storage Advisor supports the following file server configuration:

- **Hitachi NAS platform (HNAS) firmware version:** 13.1
- **System management unit (SMU) software:** version 13.1

Supported fabric switch models

Storage Advisor supports a variety of Brocade[®] and Cisco[®] fabric switches.

System requirements for Brocade switches

Model	Fiber OS version	Type
300	7.0 7.1 7.2 7.3	71
5300	7.0 7.1 7.2 7.3	64
6505	7.0 7.1 7.2 7.3	118
6510	7.0 7.1 7.2 7.3	109
6520	7.0 7.1 7.2 7.3	133
7800	7.0 7.1 7.2 7.3	83

Model	Fiber OS version	Type
DCX 8510-4	7.0 7.1 7.2 7.3	121
DCX 8510-8 with firmware v6.4	7.0 7.1 7.2 7.3	120

System requirements for Cisco switches

Storage Advisor supports the Cisco MDS 9000 Series of switches.

Cisco MDS NX-OS Release 6.2(9) or later is required.

Supported servers

Hitachi Storage Advisor can be used to provision storage to many servers running any one of various operating systems.

- VMware[®]
- Windows[®]
- HP-UX[™]
- Oracle Solaris[™]
- NetBSD[®]
- TRU64 UNIX[®]
- Novell NetWare[®]
- IBM[®] AIX[®]
- Linux[®]
- IRIX[®]

Supported scalability limits

The following table lists the maximum number of resources supported in Storage Advisor.

Resource	Scale
Storage systems	50
Servers	10,000
Volumes	1,500,000 over 50 storage systems

Chapter 2: Installing Storage Advisor

Storage Advisor is deployed on a virtual machine and accessed by a client computer. Review the minimum requirements before installing.

Installing Install Storage Advisor with the application installer

You can install Storage Advisor on Linux, where Docker v17.12.0-ce is already installed.

In order to enable maximum control of the environment, the application installer does not include Docker, an operating system, or a VM.

Before you begin

The following are required:

- Root access to the operating system where Storage Advisor will be installed.
- Docker v17.12.0-ce installed in a Linux environment.



Note: The following are recommended settings for using the application installer:

- If you use the json-file logging driver, set the maximum log size to 50 MiB and the maximum number of files to 3.

```
--log-opt max-size=50m --log-opt max-file=3
```

- Set ExecReload.

```
ExecReload=/bin/kill -s HUP $MAINPID
```

- Set Delegate to yes.

```
Delegate=yes
```

- Set KillMode to process.

```
KillMode=process
```

- Set Restart.

```
Restart=on-failure
```

Refer to the example provided for general information about the `docker.service` file.

- The recommended available space on the server at the time of installation is 100 GiB. This is due to the additional capacity required for the installer file and Docker requirements for image installation. After installation is complete, the required space is reduced to 40 GiB.
- 16 GiB RAM



Note: It is recommended that the location where Storage Advisor is installed not include any other applications.

Procedure

1. On the Linux environment, configure the network interface that will be used to access Storage Advisor.
Storage Advisor supports user interface and API access via an IPv4 address.
2. Copy the tar file `installer.tar.gz` from the installation media to any folder in the Linux environment and unzip it.
3. Navigate to the installer script : `HSA-3.3.xx-all-installer` and execute it.
At the prompts, enter the following:

- a. Enter the username for the installer: **Enter** `sysadmin`
- b. Enter the <users> password: **Enter** `sysadmin`
- c. Enter host's IP: Enter the IP address that will be used to access Storage Advisor. This IP address will also be used for SNMP communications into the storage system.

The installation may take a few minutes. At completion, messages will indicate the following:

- The application was successfully added.
 - The API is ready.
 - Any pre-existing app manager containers have been removed.
4. Set the SNMP IP address in virtual appliance manager tool:
 - a. Open a browser and enter `https://ip-address/vam` in the address bar. The log in credentials are `sysadmin / sysadmin`.
 - b. In the **Network** tab, enter the SNMP IP address for the storage system.

Troubleshooting the installation

If the installation fails, try the following:

- If the installation fails with the (401) error code, the user name and password specified by the installer was incorrect. Retry the installation and ensure that `sysadmin` is entered for both user name and password.
- Delete all Storage Advisor containers and images and start the installation again.
- Check the Docker logs.
- Consult Docker documentation for more information on how to perform these actions.
- Journal entries may have additional information about the error. To view the journal log, connect to the host with the root account and run these commands:
 - `journalctl --no-pager`
 - `journalctl --no-pager -u docker`

If the installation produces any warnings, they may point to the cause of the problem. Correct any issues the installer identifies, delete any Storage Advisor containers and images and start the installation again.

To remove docker images and containers, run these commands with the root account in the given order:

1. `docker stop $(docker ps -aq)`
2. `docker rm -fv $(docker ps -aq)`
3. `docker rmi $(docker images -aq)`



Note: These commands will delete all containers in the Docker instance. Do not run these commands if you are running any workloads other than Storage Advisor in Docker, because they will also be deleted.

If after powering on or after running `ip-change`, you attempt to exec to the container:

```
[root@hid ~]# docker exec -it d00be2ea7a01 /bin/bash
```

and the result is:

```
OCI runtime exec failed: exec failed: container_linux.go:296: starting container process caused "process_linux.go:78: starting setns process caused \"fork/exec /proc/self/exe: no such file or directory\": unknown
```

execute the following:

```
[root@hid ~]# service docker restart
Redirecting to /bin/systemctl restart docker.service
```

Next steps

Change the root password.

If required, you can generate and install a signed SSL certificate.

Example docker.service file for use with the application installer

If you install Storage Advisor with the application installer, refer to the example `docker.service` file contents for location and recommended docker settings for log rotation, Delegate, and KillMode.

This is an example of the location of recommended docker settings for log rotation (if you use the json-file logging driver), Delegate and KillMode. They are set in the `/usr/lib/systemd/system/docker.service` file. This example is for CentOS and Fedora operating systems.

Filepath: /usr/lib/systemd/system/docker.service

```
[Unit]
Description=Docker Application Container Engine
Documentation=http://docs.docker.com
After=network-online.target
Wants=network-online.target
[Service]
Type=notify
ExecStart=/usr/bin/dockerd --bip=192.168.50.0/16 \
    --exec-opt native.cgroupdriver=cgroupfs \
    --storage-opt dm.datadev=/dev/direct-lvm/data \
    --storage-opt dm.metadatadev=/dev/direct-lvm/metadata \
    --insecure-registry rdocker.mcp.com:6000 -H tcp://127.0.0.1:2375 -H
unix:///var/run/docker.sock --log-opt max-size=50m --log-opt max-size=50m --
log-opt max-file=3
ExecReload=/bin/kill -s HUP $MAINPID
Delegate=yes
KillMode=process
Restart=on-failure
LimitNOFILE=1048576
LimitNPROC=infinity
LimitCORE=infinity
TimeoutStartSec=0
StartLimitBurst=3
StartLimitInterval=60s
[Install]
WantedBy=multi-user.target
```

Installing Storage Advisor with the virtual appliance

Use the virtual appliance installation to install in either a static environment or in a DHCP environment.

Install Installing Hitachi Storage Advisor in a DHCP environment

If your environment includes DHCP servers, you can use the Virtual Appliance Manager to set up your Storage Advisor server.

Before you begin

The initial setup of a discovered supported storage system has been completed by an authorized service provider.

Procedure

1. From the installation media, deploy the Storage Advisor OVF to the ESXi host.
2. Start the Storage Advisor virtual machine.

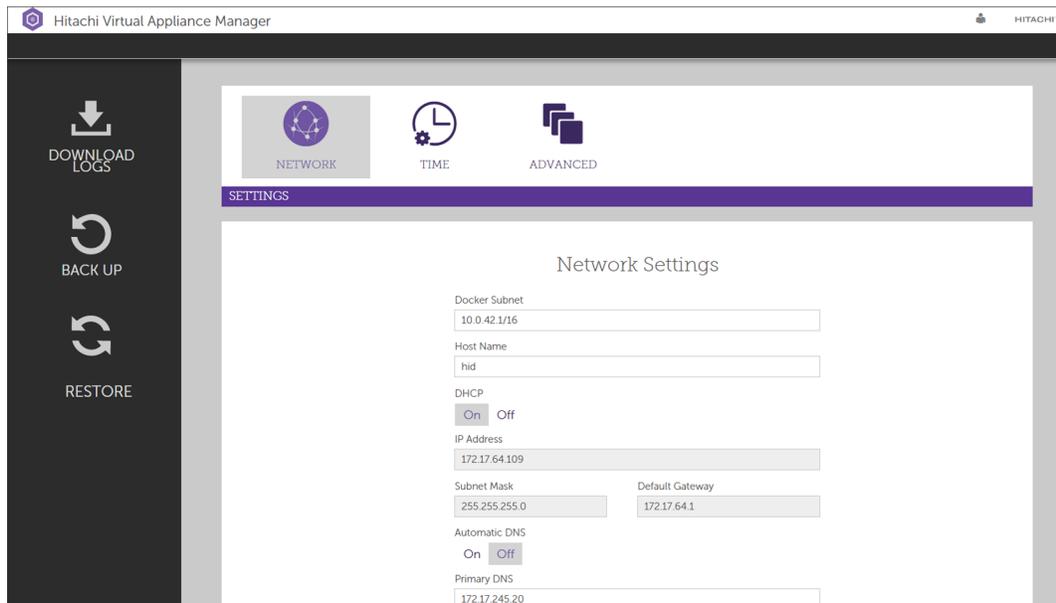
3. In the vSphere® client, wait for the **System status** to change to *Online*.
The status is just below the banner in the virtual machine console.

```
Storage Advisor
System status: Online
Please wait for system to be online before using any services.
```

4. Open a browser and enter `https://ip-address/vam` in the address bar.

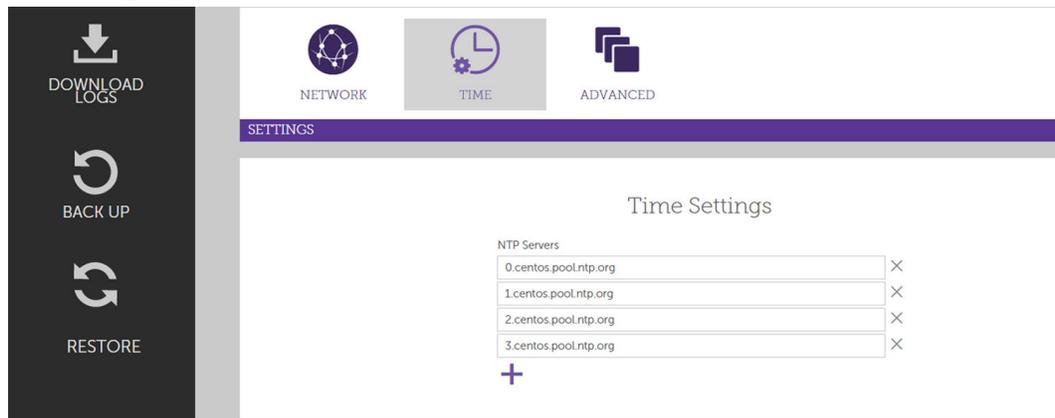
User name: `service`
Password: `Chang3Me!`

5. Change your password.
 - a. Click  and select **Change password**.
 - b. Enter your new password.
6. From the Virtual Appliance Manager menu, click **Network** to configure the network settings.



- a. If your data center is using the IP address scheme `192.168.*.*`, make sure you provide another IP range that is not currently used in your environment. This is the specified range used by Storage Advisor.
 - b. Set the host name for the virtual machine.
 - c. Set **DHCP** to *On*.
 - d. Enter the IP address of the Storage Advisor server.
 - e. Set **Automatic DNS** to *On* or *Off*.
If you set this to *Off*, enter the IP address of at least one DNS server.
 - f. Click **Submit**.
7. (Optional) From the Virtual Appliance Manager menu, click **Time** and add Network Time Protocol (NTP) servers to the virtual machine.

Adding NTP servers verifies that the Storage Advisor servers are synchronized with the storage system environment.



- a. Click **+** to add a field for an NTP Server.
- b. Enter the host name of the NTP server.
- c. Click **Submit**.

Next steps

- Change the root password.
- Log in to Storage Advisor and onboard a storage system.
- Get a digitally signed SSL certificate from a trusted certificate authority (CA) by sending the CA a certificate signing request (CSR). After you obtain the signed certificate, you can import it to the server. By default, the Storage Advisor installation package comes with a self-signed certificate that you can use to initially log in to Storage Advisor.

Installing Install Hitachi Storage Advisor in a static environment

If you do not have a DHCP server, use the command line interface to indicate the static IP address of the Storage Advisor server.

Procedure

1. From the installation media, deploy the Storage Advisor OVF to the ESXi host.
2. Start the Storage Advisor virtual machine.
3. In the vSphere® client, wait for the **System status** to change to *Online*.
The status is just below the banner in the virtual machine console.

```
Storage Advisor
System status: Online
Please wait for system to be online before using any services.
```

4. Press **Alt + F2**.

5. Log in with the service account.

User name: `service`

Password: `Chang3Me!`

6. Enter the command `ip-change`.
The Change IP Address Utility opens.

7. Enter your settings at the prompts.

8. Reboot the VM to ensure that it has the IP address.

9. Open a browser and enter `https://ip-address/vam` in the address bar.

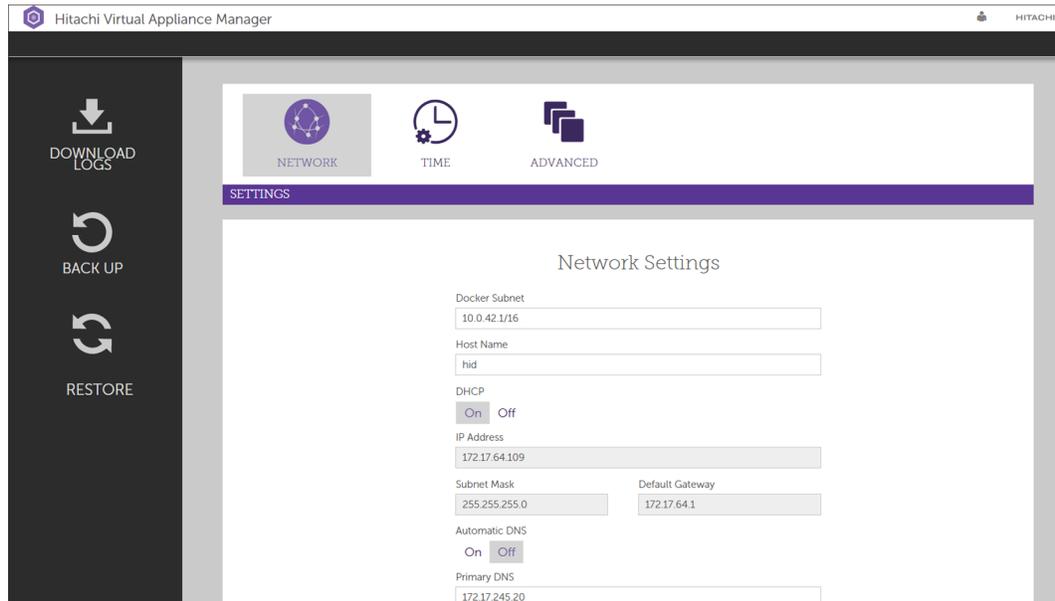
User name: `service`

Password: `Chang3Me!`

10. Change your password.

- a. Click  and select **Change password**.
- b. Enter your new password.

11. From the menu, click **Network** to configure the network settings.



Hitachi Virtual Appliance Manager

NETWORK TIME ADVANCED

SETTINGS

Network Settings

Docker Subnet
10.0.42.1/16

Host Name
hid

DHCP
On Off

IP Address
172.17.64.109

Subnet Mask
255.255.255.0

Default Gateway
172.17.64.1

Automatic DNS
On Off

Primary DNS
172.17.245.20

DOWNLOAD LOGS

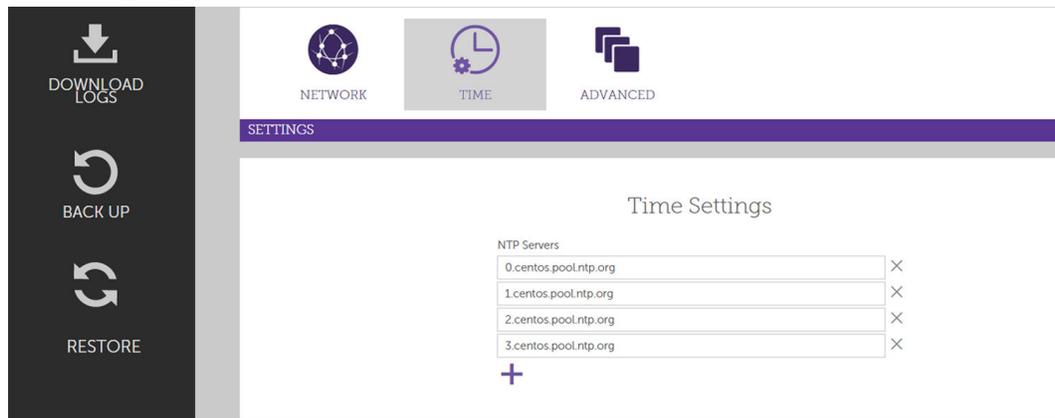
BACK UP

RESTORE

- a. If your data center is using the IP address scheme `192.168.*.*`, make sure you provide another IP range that is not currently used in your environment. This is the specified range used by Storage Advisor.
- b. Set the host name for the virtual machine.
- c. Set **DHCP** to `Off`.
- d. Enter the IP address of the Storage Advisor server.
- e. Set **Automatic DNS** to `On` or `Off`.
If you set this to `Off`, enter the IP address of at least one DNS server.
- f. Click **Submit**.

12. (Optional) From the Virtual Appliance Manager menu, click **Time** and add Network Time Protocol (NTP) servers to the virtual machine.

Adding NTP servers verifies that the Storage Advisor servers are synchronized with the storage system environment.



- a. Click + to add a field for an NTP Server.
- b. Enter the host name of the NTP server.
- c. Click **Submit**.

Next steps

- Change the root password.
- Log in to and onboard a storage system.
- Get a digitally signed SSL certificate from a trusted certificate authority (CA) by sending the CA a certificate signing request (CSR). After you obtain the signed certificate, you can import it to the server. By default, the installation package comes with a self-signed certificate that you can use to initially log in to .

Changing the si token authentication time-out in Storage Advisor

You can change the Si token authentication time-out in Storage Advisor.

Procedure

1. Login to `https://ipAddress/vam` with your service credentials. The default credentials are:
 User name: `service`
 Password: `Chang3Me!`
2. Select **Advanced Option > Service Settings**.
3. Change **si.token.expirationDuration** to `6000`. Duration setting is in seconds.
4. **Submit**.

Changing the root password immediately after installation

Change the root password immediately after installing Storage Advisor.

Procedure

1. Either open an SSH connection to the VM or open the VMware console and press `Alt+F2` to reach the console.
2. Log in as root account using the default password:
`3kO$Pe9dJyjy29HAI2mS`
3. Run the command `passwd root` in the terminal.
4. Enter the new password when prompted.

Logging in to Storage Advisor

Log in and verify that the installation is successful by accessing the Storage Advisor web interface from a browser.

Procedure

1. Open a web browser.
2. Enter the URL for Storage Advisor in the address bar:
`https://ip-address:port-number`
where:
 - *ip-address* is the IP address of the Storage Advisor server.
 - *port-number* is the port number of the Storage Advisor server. The default port number is 443.
3. In the login window, log in to Storage Advisor.

User name: `sysadmin`

Password: `sysadmin`

Logging in when Storage Advisor is not available

For the VSP Fx00 models, VSP Gx00 models, VSP G1000, VSP G1500, and VSP F1500 storage systems, if Storage Advisor is not available and you have an administrator login account with the required permissions, you can log in directly to Device Manager - Storage Navigator.

Before you begin

- You are managing VSP Fx00 models, VSP Gx00 models, VSP G1000, VSP G1500, or VSP F1500 storage systems.
- You must have an administrator login account with the required permissions. For information about creating user accounts in Hitachi Device Manager - Storage Navigator, see the *System Administrator Guide* for your storage system.

Procedure

1. Start a web browser.
2. Enter the URL:
 - For VSP G1000, VSP G1500, or VSP F1500 storage systems, enter: `https://IP-address-or-host-name-of-the-SVP/sanproject/emergency.do`
 - For VSP G200 storage systems, enter: `https://IP-address-or-host-name-of-the-SVP/dev/storage/8320004XXXXX/emergency.do` (where the model number is '8320004' and '4XXXXX' indicates the system serial number)
 - For VSP G400, G600 storage systems and VSP F400, F600 storage systems, enter: `https://IP-address-or-host-name-of-the-SVP/dev/storage/8340004XXXXX/emergency.do` (where the model number is '8340004' and '4XXXXX' indicates the system serial number)
 - For VSP G800 and VSP F800 storage systems, enter: `https://IP-address-or-host-name-of-the-SVP/dev/storage/8360004XXXXX/emergency.do` (where the model number is '8360004' and '4XXXXX' indicates the system serial number)
 - For VSP F350 and VSP G350 storage systems, enter `https://IP-address-or-host-name-of-the-SVP/dev/storage/8820004XXXXX/emergency.do` where the model number is '882000' and '4XXXXX' indicates the system serial number).
 - For VSP F370, VSP F700, VSP F900, VSP G350, VSP G700 and VSP G900 storage systems, enter `https://IP-address-or-host-name-of-the-SVP/dev/storage/8860004XXXXX/emergency.do` where the model number is '886000' and '4XXXXX' indicates the system serial number).
3. The following actions might be required to open the login dialog box, depending on your environment:
 - If a message indicates that the enhanced security configuration is enabled on the computer, select **In the future, do not show this message** and click **OK**.
 - If the SVP is set to support SSL-encrypted communication and security messages appear, make sure the certificate is correct and follow the instructions in the dialog box.
 - If a messages indicates that certain web sites are blocked, make sure you have added the SVP to the trusted sites zone.
4. Enter the user ID and password for the account.
5. Click **Log In**.
6. If the Security Information dialog box appears, click **Yes**.
7. If an Adobe Flash Player local storage area pop-up dialog box appears, click **Allow** to open the Device Manager - Storage Navigator main window. The cache function of Flash Player optimizes the process of Device Manager - Storage Navigator. Denying the request might reduce processing speed.

Result

You are successfully logged in to Device Manager - Storage Navigator.



Note: If the login process fails three times by using the same user ID, Device Manager - Storage Navigator will stop responding for one minute. This is for security purposes and is not a system failure. Wait, and then try again.

Generating and installing a signed SSL certificate

By default, a self-signed certificate is used by the server. SSL certificates are used to verify the user's identity and to enhance security on the server. You can get a digitally signed SSL certificate from a trusted certificate authority (CA) by sending a certificate signing request (CSR). After you obtain the signed certificate, you can import it to the server.

The following is a sample procedure for generating and installing a signed SSL certificate. The process of obtaining a certificate may be different within each organization.

Procedure

1. Open the virtual machine console and log in using root credentials.
2. Note the hostname of the VM (#hostname).
3. Navigate to the nginx container.

```
# docker ps -a | grep -i nginx
```

4. Connect to the nginx container.

```
# docker exec -it "docker-nginx-ID" /bin/bash
```

```
# cd /etc/nginx/certificates
```

5. Provide the Authentication sha1 or sha256, depending upon the required security. Give the Fully Qualified Domain Name for host name .

```
[root@d06bad467da6 certificates]# openssl req -nodes -x509 -newkey  
rsa:2048 -sha256 -keyout /etc/nginx/certificates/server.key -out /etc/  
nginx/certificates/server.csr
```

The system returns the message: Generating a 2048 bit RSA private key

6. Provide the information as prompted. For some fields there is a default value. Enter period ".", to leave a field blank.
 - **Country Name** (two-letter code)
 - **State or Province Name** (two-letter code)
 - **Locality name** (City)
 - **Organization Name** (Company)
 - **Organizational Unit Name** (Section or department)

- **Common Name** (Your name or the server host name)
 - **Email Address**
7. When you receive the CSR file, send it to a certificate authority to obtain an SSL certificate.
If you need help with this step, consult with customer support or an authorized service provider.
 8. Open a browser and enter the Virtual Appliance Manager URL in the address bar. For example, `https://ip-address/vam`
 9. Click **Advanced**.
 10. Click the **Certificate Settings** tab.
 11. Import the certificate into the server.
 - a. Open the signed certificate (received from the certificate authority) in a text editor.
 - b. Open the private key file (generated in step 2) in a text editor.
 - c. Copy the certificate file contents into the **Certificate** text box.



Note: Do not include the delimiters.

- d. Open the private key.

```
[root@d06bad467da6 certificates]# cat server.key
```

- e. Copy the private key file contents into the **Private Key** text box in VAM.
- f. Click **Submit**.

Chapter 3: Managing the Linux environment

Updating your Linux OS environment using Yellowdog Updater, Modified (YUM)

Install and manage new software for your Linux OS environment using Yellowdog Updater, Modified (YUM). YUM is a tool that automatically updates the Linux OS over a network.

Perform the following instructions to use YUM to update your OS environment.

Procedure

1. Edit the YUM configuration file:

If you need only a proxy server, without a user, add the following line to the [main] section of the `/etc/yum.conf`.

```
PROXY=http://your.proxy.server:port
```

If the proxy requires a user name and password, add the following lines to the `yum.conf`.

```
proxy_username=yum-user  
proxy_password=yum-user-password
```

2. Perform software updates.

```
yum update openssl
```

3. Validate the software version.

```
openssl version
```

Result

Your OS environment is updated.

Updating your container using Yellowdog Updater, Modified (YUM)

Update your container using Yellowdog Updater, Modified (YUM).

Perform the following instructions to use YUM to update your container.

Procedure

1. Edit the YUM configuration file:

If you need only a proxy server, without a user, add the following line to the [main] section of the `/etc/yum.conf`.

```
PROXY=http://your.proxy.server:port
```

If the proxy requires a user name and password, add the following lines to the `yum.conf` file.

```
proxy_username=yum-user
proxy_password=yum-user-password
```

2. Search the container that needs to be updated.

```
docker ps -a | grep -i 'container_name'
```

```
docker exec -it container_id bash -IM0
```

3. Save the repository.

```
cd /etc/yum.repos.d
```

```
mv mcp.repo mcp.repo.old
```

```
touch mcp.repo
```

4. Copy the following contents to `CentOS-Base.repo`:

```
CentOS-Base.repo
#
The mirror system uses the connecting IP address of the client and the
update status of each mirror to pick mirrors that are updated to and
geographically close to the client. You should use this for CentOS
updates
unless you are manually picking other mirrors.
#
If the mirrorlist= does not work for you, as a fall back you can try
the
```

```
remarked out baseurl= line instead.  
#  
#  
  
[base]  
name=CentOS-7.2.1511 - Base  
baseurl=http://vault.centos.org/7.2.1511/os/x86_64/  
gpgcheck=1  
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7  
  
#released updates  
[updates]  
name=CentOS-7.2.1511 - Updates  
baseurl=http://vault.centos.org/7.2.1511/updates/x86_64/  
gpgcheck=1  
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
```

5. Perform software updates.

```
yum install bind-utils
```

6. Validate the domain.

```
nslookup
```

```
[root@hid yum.repos.d]# nslookup example.com  
Server: 172.17.24.20  
Address: 172.17.24.20#53  
  
Non-authoritative answer:  
Name: example.com  
Address: 10.7.42.0  
Name: example.com  
Address: 10.7.7.33
```

Result

Your container is updated.

Chapter 4: Upgrading from a previous version of Storage Advisor

Upgrade to Storage Advisor v3.3.2 is only supported directly from Storage Advisor v3.3.

For upgrades from versions prior to v3.3, follow the upgrade steps detailed in the Release Notes for that version to upgrade to v3.3 before proceeding with the steps below.

Version currently installed	Target version	Upgrade path
1.0	3.3	Upgrade not supported; deploy and configure v3.1.2 >3.2 >3.3
1.1.1	3.3	1.1.1 > 1.1.2 > 2.0 > 2.1 > 2.1.1 > 2.2 > 2.2.2 > 2.2.3 > 2.3 > 3.0 > 3.1>3.1.2 >3.2 >3.3
1.1.2	3.3	1.1.2 > 2.0 > 2.1 > 2.1.1 > 2.2 > 2.2.2 > 2.2.3 > 2.3 > 3.0 > 3.1>3.1.2 >3.2 >3.3
2.0	3.3	2.0 > 2.1 > 2.1.1 > 2.2 > 2.2.2 > 2.2.3> 2.3 > 3.0 > 3.1>3.1.2 >3.2 >3.3
2.1	3.3	2.1> 2.1.1 > 2.2 > 2.2.2 > 2.2.3 > 2.3 > 3.0 > 3.1>3.1.2 >3.2 >3.3
2.1.1	3.3	2.1.1 > 2.2 > 2.2.2 > 2.2.3 > 2.3 > 3.0 > 3.1>3.1.2 >3.2 >3.3
2.2	3.3	2.2 > 2.2.2 > 2.2.3 > 2.3 > 3.0 > 3.1>3.1.2 >3.2 >3.3
2.2.2	3.3	2.2.2 > 2.2.3 >2.3 > 3.0 > 3.1>3.1.2 >3.2 >3.3
2.2.3	3.3	2.2.3 > 2.3 > 3.0 > 3.1>3.1.2 >3.2 >3.3

Version currently installed	Target version	Upgrade path
2.3	3.3	2.3 > 3.0 > 3.1 > 3.1.2 > 3.2 > 3.3
3.0	3.3	3.0 > 3.1 > 3.1.2 > 3.2 > 3.3
3.1	3.3	3.1 > 3.1.2 > 3.2 > 3.3
3.1.2	3.3	3.1.2 > 3.2 > 3.3
3.2	3.3.2	3.2 > 3.3 > 3.3.2

To upgrade from Storage Advisor v3.3 to v3.3.2, perform the following steps:

Procedure

1. Choose one of the following from the installation media:
 - Use the Appliance ISO to deploy an OVF. The OVF installation deploys a VM with an operating system, Docker, and Storage Advisor.
 - Use the Installer ISO to enable maximum control of the environment. The installer must be deployed in a Docker-compatible environment and contains only the Storage Advisor application.



Note: If you use the json-file logging driver, set the maximum log size to 50 MiB and the maximum number of files to 5.

2. In the v3.2 installation of Storage Advisor, access the virtual appliance manager at: `https://<ip-address>/vam`
3. Log in with service account credentials. The default credentials have probably been changed, but they are:
 - User name: `sysadmin`
 - Password: `sysadmin`
4. When the virtual appliance manager opens in the browser, click **Backup** to download a backup file of the Storage Advisor system. The file may take a few seconds to start downloading.
5. After the backup file has been downloaded, shut down the v3.3 instance of Storage Advisor.
 - If you used the Storage Advisor Installer model, delete the Storage Advisor Docker containers and images on the system before running the new installer.
 - If you used the Appliance model, the VM containing Storage Advisor should be shut down at this time. You may wish to declare a maintenance window to do this as the Storage Advisor product will be unavailable until the upgrade is complete.

6. Deploy the new version (Storage Advisor v3.3.2), using the method of your choice. Follow the instructions in this publication until the product is initialized and ready to use.
7. In the new instance of Storage Advisor, log into the virtual appliance manager using the default credentials:
 - User name: `sysadmin`
 - Password: `sysadmin`
8. When virtual appliance manager opens in the browser, click **Restore**. You will be prompted to upload the backup file that was downloaded earlier. Choose the file and upload it to the new instance of Storage Advisor.

The Storage Advisor appliance restarts. It may take up to an hour to restore the configuration. After the appliance is up and running, the upgrade is complete and the maintenance window can be lifted. (Optional) If the upgrade has completed satisfactorily, you can delete the VM containing the previous version of Storage Advisor.



Note: Do not cancel the restore operation. Cancellation may corrupt the Storage Advisor v3.3.2 instance. The progress bar may indicate 100% completion even though the operation has not completed.

Chapter 5: Onboarding and configuring a storage system

Onboarding a storage system is the process of associating it with Storage Advisor. After the storage system is onboarded, manage it from the Storage Advisor dashboard.

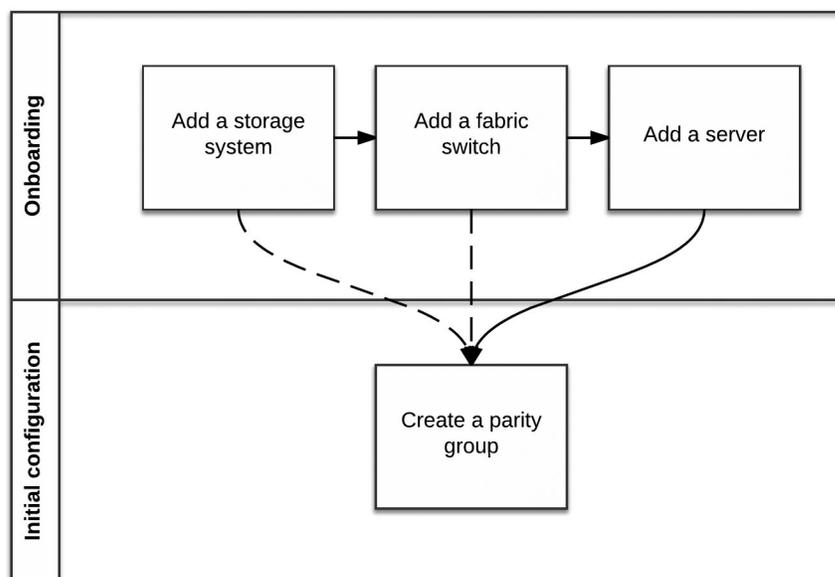
If the storage system includes NAS modules, the file storage is automatically added with the block storage

Storage Advisor requires access to all resources groups on the storage system so that the workflows function correctly. Verify that the service processor user name used to onboard a storage system in Storage Advisor has access to all custom resource groups and meta resource groups

Overview

Onboarding a storage system in Storage Advisor is more than adding a storage system to a list. At least one fabric switch and server must be added for the storage system to be able to provision volumes to the server.

In the following workflow, the recommended path is marked by the solid arrows. The dashed arrows indicate the optional paths. Before a storage system is available for use in the network, all of the tasks in the workflow must be complete.



Adding the first storage system

You must onboard a storage system the first time you start Storage Advisor.

Before you begin

Storage Advisor requires access to all resources groups on the storage system so that the workflows function correctly. Verify that the service processor (SVP) user name used to onboard a storage system in Storage Advisor has access to all custom resource groups and meta resource groups.

If a storage array includes block storage and NAS modules, the file storage is automatically added with the block storage. Then file pools and other file resources can be created in the Intelligent Storage Manager web interface or by using the API.

Intelligent Storage Manager also supports onboarding of 4-node clusters, which is a requirement for GAD Enhanced for NAS.

You can add multiple VSP Gx00 or VSP Fx00 storage systems at once by specifying an SVP IP address that has multiple storage systems. Storage systems with different credentials cannot be added in the same operation.

Procedure

1. On the Storage Advisor dashboard, click the plus sign (+) to add a storage system.
2. Enter values for the following parameters on the **Onboard Storage System** page.
 - **IP Address:** For a storage system with an SVP, enter the IP address of the external service processor for the storage system you want to discover.
 - **User name and password:** Log in as a user that has administrator privileges on this storage system. For example, you can log in as the user `maintenance`.
3. Click **Submit**.



Note: For storage systems with both block and file storage, do not change the default Supervisor credentials.

4. (Optional) Onboard other storage systems.

Result

The Jobs tab is updated with the job called `Create Storage System`. If multiple storage systems are being added, there will be a job for each one.

Wait a while for the storage system to be added. Refresh the Jobs tab to verify that storage system is onboarded.

Next steps

- Verify the storage system initial settings.
- Create parity groups.



Note: Parity groups are created by a service representative. Parity groups for a Hitachi Virtual Storage Platform G1000, VSP G1500, or VSP F1500 storage system are created outside of Storage Advisor.

Adding a fabric switch

You can add a fabric switch after onboarding a storage system. Add, update, and delete fabric switches in the Storage Advisor interface.

After a fabric switch is added, you can choose to auto-create zones during volume provisioning. A fabric switch is required for any operations that use auto-select, such as host group creation and auto-selection of ports while attaching volumes to servers.

Before you begin

- Verify that servers and ports are connected according to the manufacturer's instructions.
- Verify that there is an active zone set with at least one dummy zone available.
- The Storage Advisor server is connected to the same IP network and has access to SNMP broadcast of Fibre Channel switches.
- Verify the required information about the fabric switch: Virtual Fabric ID (required only for Cisco switches), Fabric Switch Type, Fabric Switch IP Address, Port Number, Username, and Password.
- Verify that you have the Admin role for the fabric switch.

Procedure

1. On the Storage Advisor dashboard, select **Fabric Switches** to open the **Fabric Switches** page.
2. Click the plus sign (+) to open the **Add Fabric Switches** page.

VIRTUAL FABRIC ID	FABRIC SWITCH TYPE	FABRIC SWITCH IP ADDRESS	PORT NUMB...	USERNAME	PASSWORD	
Virtual Fabric Id	Fabric Switch Type	Fabric Switch IP Address	22	AB	*****	+
Virtual Fabric Id	Fabric Switch Type	Fabric Switch IP Address	22	LM	*****	X

3. Enter the following information from the configuration of the switch you are adding:
 - **Virtual Fabric ID:** For Cisco switches, the VSAN ID. Not applicable to Brocade switches.
 - **Fabric Switch Type:** Select **Brocade** or **Cisco**.
 - **Fabric Switch IP Address**
 - To add or update a core switch, use the Management IP address of the switch or the Active CP IP address.
 - **Port Number**
 - **Username**
 - **Password**
4. Click **Submit**.

Result

A job is created to add the fabric switch.

Adding servers

Add servers so you can attach volumes.

You can add multiple server parameters from a file, or add one server at a time.

There are two methods of adding servers:

- Manually add information for one server at a time.
- Import a CSV (comma-separated values) file with information for one server in each row.

The CSV file must have the following headings, in the order specified:

- For Fibre: Name, Description, IPAddress, OSType, WWNs (comma separated list of WWNs). All fields are required except Description and IPAddress.
- For iSCSI: Name, Description, IPAddress, OSType, IscsiName (comma separated list of names), ChapUser, ChapSecret. All fields are required except Description and IPAddress, ChapUser and ChapSecret.

Valid OSType values are as follows:

- AIX
- HP_UX
- LINUX
- NETWARE
- OVMS
- SOLARIS
- TRU64
- VMWARE
- VMWARE_EX
- WIN
- WIN_EX

Procedure

1. On the Storage Advisor dashboard, click **Servers**. Then click the plus sign (+) to open the **Add Server** page.

 **Add Servers**

CSV Import

+

Fibre Servers

+

SERVER NAME	DESCRIPTION	IP ADDRESS	OS TYPE	
Host Name	Description	IP Address	HP_UX	✕
WWN	50:00:00:00:00:00:00, 50:00:00:00:00:00:01			

iSCSI Servers

+

SERVER NAME	DESCRIPTION	IP ADDRESS	OS TYPE	
Host Name	Description	IP Address	HP_UX	✕
CHAP USER	CHAP SECRET	ISCSI NAMES		
sysadmin	*****	iqn.1992-01.com.company.db,iqn.1992-01.com.c...		

Cancel
Reset
Submit

2. On the **Add Server** page, do one of the following:

- Click the upper plus sign (+) to browse for the CSV file or drag the file to the plus sign. The values from the file will populate the page. Example:

```
Name,Description,IPAddress,OSType,WWNS
Esxi,ESXI HOST,10.30.90.200,VMWARE_EX,10:00:00:05:33:26:f7:21
Win,WINDOWS
HOST,10.30.91.80,WIN_EX,"10:00:00:05:33:26:f7:37,10:00:00:05:3
3:26:f7:36"
ESXi_Cisco_1,ESXi HOST connected to Cisco
Fabric,,VMWARE_EX,"10:00:00:05:33:26:e0:fc,10:00:00:05:33:26:e
0:fd"
ESXi_Cisco_2,ESXi HOST connected to Cisco
Fabric,,VMWARE_EX,"100000053326df1a,100000053326df1b"
```

- To add both Fibre and iSCSI servers, use the following format:

```
Name,Description,IPAddress,OSType,WWNS,IscsiNames,CHAPUserName
,CHAPUserSecret
linux-iscsi,test dummy host,20.10.10.10,Linux,,,"iqn. linux-
iscsi-1,iqn. linux-iscsi-2,eui.1234567890abCDef",,,,
-windows-iscsi-uni-chap,test dummy
host,20.10.10.20,Win,,,"iqn.-windows-iscsi-uni-
chap",chapUserName,chapUserSecret,,
-windows-iscsi-bi-chap,test dummy host,20.10.10.30,Win,,,"iqn.-
windows-iscsi-bi-
chap",chapUserName,chapUserSecret,chapUserName,chapUserSecret
-vmware-iscsi-longest,test dummy
host,20.10.10.40,VMWARE,,,"iqn.12345678901234567890123456789012
34567890123456789012345678901234567890123456789012345678901234
56789012345678901234567890123456789012345678901234567890123456
78901234567890123456789012345678901234567890123456789012345678
9, eui.3234567890abCDef",,,,
ed801h,Windows,10.197.73.57,WIN,"10:00:00:90:fa:b4:a8:71"
ed800n,ESX Host,10.197.73.7,VMWARE,"10:00:00:90:fa:55:85:5d"
-linux,test dummy
host,10.10.10.10,Linux,10:10:10:10:10:10:10:10
-windows,test dummy
host,10.10.10.20,Win,10:10:10:10:10:10:10:20
-vmware,test dummy
host,10.10.10.30,VMWARE,10:10:10:10:10:10:10:30
```

- Click the plus sign (+) in the table to add a row and enter the required information for Fibre Channel or iSCSI. You can add more servers by clicking the plus sign again.

3. Click **Submit** to add the servers.

Next steps

Create volumes and attach them to the server.

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