



Lenovo ThinkSystem DE Series Software Deployment and Configuration Guide

Version 1.1



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1. Overview

This guide provides instruction on how to configure and deploy the Lenovo ThinkSystem DE Storage array. Some of the information contained here also resides in more comprehensive DE Series documents such as the Hardware Installation and Maintenance Guide on the [Lenovo datacenter support site](#).

Prior to ordering and configuring your storage array, be sure to thoroughly check the DE Series interoperability matrix for compatible servers and operating systems, HBAs and drivers, networking equipment and other components in your deployment environment on the [DE Series Product Support Site](#). Click on the 'Knowledge Base & Guides' selection and filter on 'Guides', then further filter on 'Interoperability Matrix'.

2. Hardware Installation

For guidance on rack installation and basic cabling of the storage system to the host server, please refer to the following documents on the [DE Series Product Support Site](#).

- Refer to the DE Series Installation Poster for pre-setup, storage array cabling, and host cabling
- Refer to the DE/DM Series Rack Installation instructions for installing the rail kit.

3. Software Installation Prerequisites

This deployment guide is based on the following assumptions.

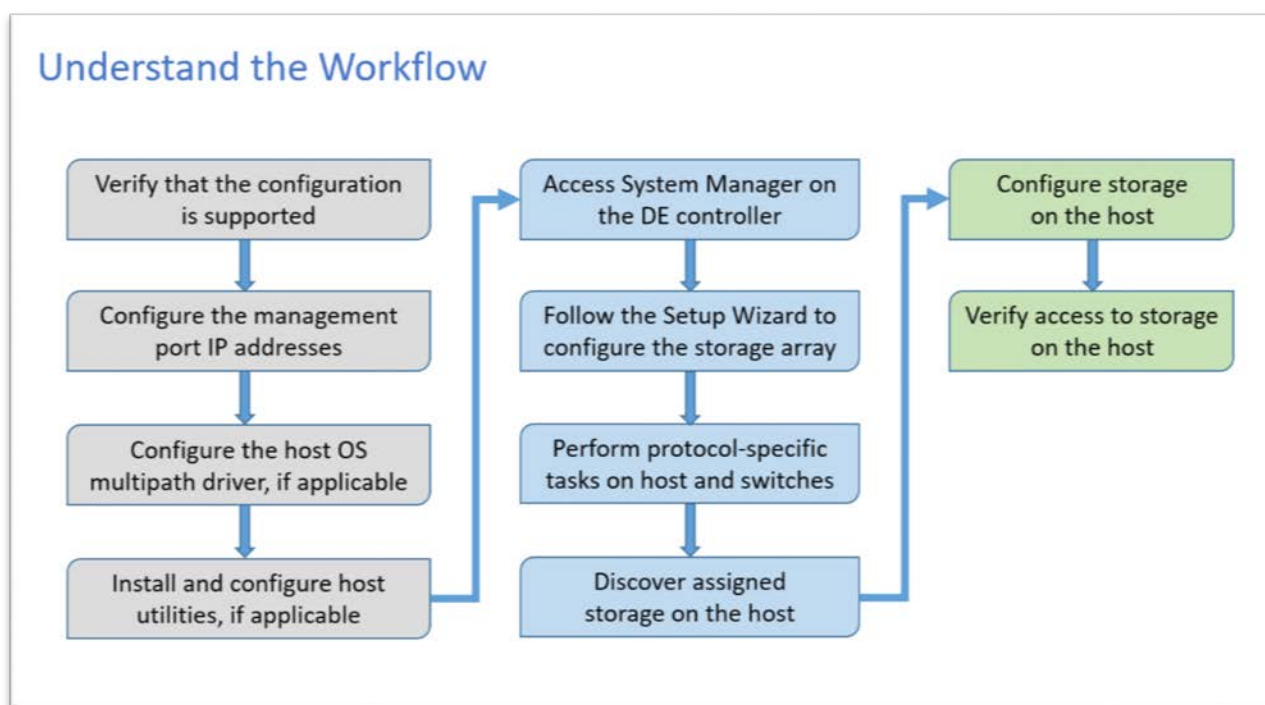
Component	Assumptions
Hardware	<ul style="list-style-type: none">● If rack installation is required, you have used the instructions included with the rack kit to install the rails in the appropriate equipment rack.● You have used the Installation and Setup Instructions included with the controller shelves to install the hardware.● You have connected cables between the optional drive shelves and the array controllers.● You have applied power to the storage array. Note: Expansion shelves should be powered on at least 2 minutes before powering on the controller shelf to which they are attached.● You have installed all other hardware (for example, a client management station, switches) and made the necessary connections.
Host	<ul style="list-style-type: none">● You have made a connection between the storage array and the data host.● You have installed a supported host operating system and required adapter drivers.● You are not using Windows as a virtualized guest.● You are not configuring the data (I/O attached) host to boot from SAN.
Storage management station	<ul style="list-style-type: none">● You are using a 1 Gbps or faster management network on a separate path from the data network.● You are using a separate client station for management rather than the data (I/O attached) host.● You are using out-of-band management, in which a storage management station sends commands to the storage array through the Ethernet connections to the controller.● You have attached the management station to the same subnet as the storage management ports.
IP addressing	You have not yet made an Ethernet connection between the management station and the storage array.
Storage provisioning	<ul style="list-style-type: none">● You will not use shared volumes.● You will create pools rather than volume groups.

Protocol: FC	<ul style="list-style-type: none"> You have made all host-side FC connections and activated switch zoning. You are using Lenovo-supported FC HBAs and switches. You are using FC HBA driver versions as listed in the DE Series interoperability matrix on the DE Series Product Support Site.
Protocol: iSCSI	<ul style="list-style-type: none"> You are using Ethernet switches capable of transporting iSCSI traffic. You have configured the Ethernet switches according to the vendor's recommendation for iSCSI.
Protocol: SAS	<ul style="list-style-type: none"> You are using Lenovo-supported SAS HBAs. You are using SAS HBA driver versions as listed in the DE Series interoperability matrix on the DE Series Product Support Site.

Configuration Workflow

This workflow guides you through the configuration of your storage array and ThinkSystem System Manager to make storage available to a host. Configuration of the solution requires that the host server, storage array, and the network fabric connecting those elements are set up correctly.

A high level sequence of steps:



The following steps elaborate on the above flow diagram for setting up the host server, networking elements, and storage array. Step 3 is divided into separate sections depending on the host OS: Windows and VMWare. OS-specific guides can be found on the [DE Series Product Support Site](#). Subsequent steps for the storage array and network are dependent on the fabric type.

Configure storage array management port IP addresses

In this method for configuring communications between the management station and the storage array, you use Dynamic Host Configuration Protocol (DHCP) to provide IP addresses. Each storage array has two controllers (duplex), and each controller has two storage management ports. Each management port will be assigned an IP address.

Before you begin

You have installed and configured a DHCP server on the same subnet as the storage management ports.

About this task

The following instructions refer to a storage array with two controllers (a duplex configuration).

1. If you have not already done so, connect an Ethernet cable to the management station and to management port 1 on each controller (A and B).
The DHCP server assigns an IP address to port 1 of each controller.



Note: Do not use management port 2 on either controller. Port 2 is reserved for use by Lenovo technical personnel.

Important: If you disconnect and reconnect the Ethernet cable, or if the storage array is power-cycled, DHCP assigns IP addresses again. This process occurs until static IP addresses are configured. It is recommended that you avoid disconnecting the cable or power-cycling the array.

If the storage array cannot get DHCP-assigned IP addresses within 30 seconds, the following default IP addresses are set:

- Controller A, port 1: 169.254.128.101
 - Controller B, port 1: 169.254.128.102
 - Subnet mask: 255.255.0.0
2. Locate the MAC address label on the back of each controller, and then provide your network administrator with the MAC address for port 1 of each controller.
Your network administrator needs the MAC addresses to determine the IP address for each controller. You will need the IP addresses to connect to your storage system through your browser.

Windows – Setting up the Host Server OS and Multipath

To ensure reliable operation, verify that the Windows configuration is supported (host server, adapters, operating system version, drivers, and cables from server to controller host ports) in DE interoperability matrix.

- Step 1. Go to the [DE Series Product Support Site](#).
- Step 2. Click on the 'Knowledge Base & Guides' tab, then filter on 'Guides' and further filter on 'Interoperability Matrix'.
- Step 3. Look for the latest Interoperability Matrix document, and click to download or view the file.

In this file, you may search for the product family that applies, as well as other criteria for the configuration such as Operating System, ThinkSystem SAN OS, and Host Multipath driver.

- Step 4. As necessary, make the updates for your operating system and protocol as listed in the table.

Operating system updates	Protocol	Protocol-related updates
You might need to install out-of-box drivers to ensure proper functionality and supportability.	FC	Host bus adapter (HBA) driver, firmware, and bootcode

Each HBA vendor has specific methods for updating boot code and firmware. Refer to the support section of the vendor's website to obtain the instructions and software necessary to update the HBA boot code and firmware.	iSCSI	Network interface card (NIC) driver, firmware and bootcode
	SAS	Host bus adapter (HBA) driver, firmware, and bootcode

Configure the Windows multipath software

Multipath software provides a redundant path to the storage array in case one of the physical paths is disrupted. Before you can use multipathing, you need to install the SANtricity Windows DSM package. This package contains the multipath software for Windows.

Windows installations use the native MPIO Device Specific Module (DSM) driver for failover. When you install and enable the SANtricity Windows DSM package, you do not need to take further action to use multipath.

The following instructions are provided for the administrator of the DE Series storage array to set up multipath for Windows.

- If MPIO is not installed, add the MPIO feature to Windows from the Server Manager and then restart the system.
- If SAN booting, install with single path, then install ThinkSystem Storage Manager and restart before presenting the rest of the paths to the host.
- If not SAN booting, install ThinkSystem Storage Manager before presenting LUNs to the host.

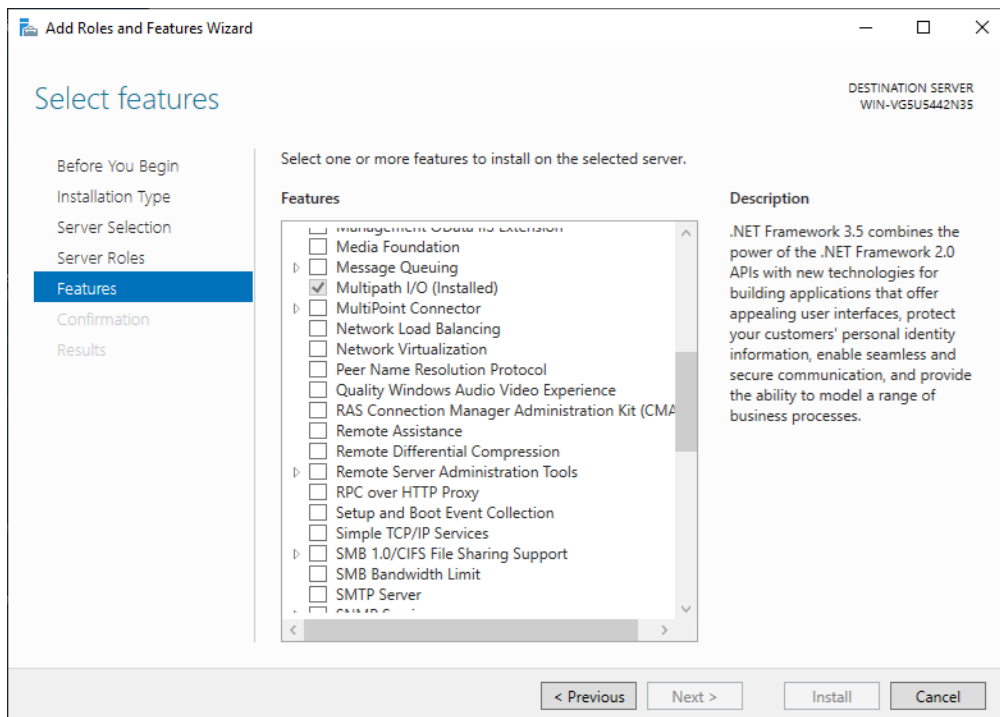
Verify and discover Multi-Path setup for Windows

To verify and discover storage tasks on Windows, check to validate that the Lenovo MPIO driver is installed by using the Windows Server Manager utility.

Step 1. Ensure the Multipath I/O option is selected in 'Roles and Features'

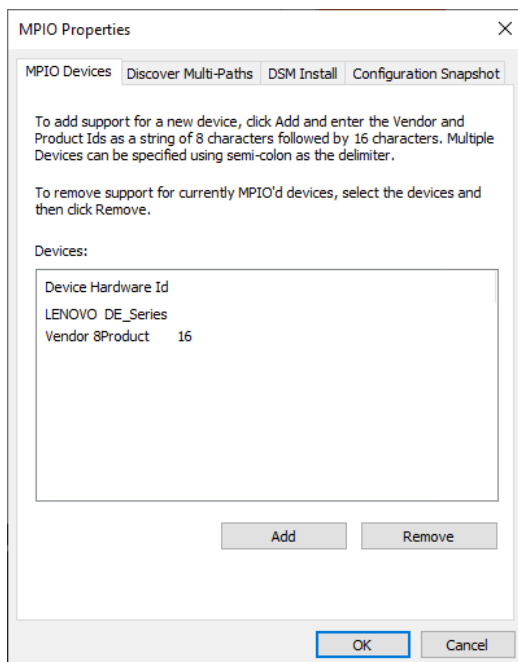
Server Manager > Manage > Add Roles and Features

Click 'Next' until the Features bar is highlighted, and ensure the 'Mulitpath I/O' checkbox is checked.



Step 2. Verify that “LENOVO DE_Series” shows up on the ‘MPIO Devices’ list.

Server Manager > Tools > MPIO



The Multipath I/O driver can also be check via a DOS command line via ‘mpclaim’ and ‘dsmutil’.

```
> C:\Program Files\DSMDrivers\ltsdsm> mpclaim -s od
```

You should see the following output. You should see the Lenovo DSM listed.


```
PS C:\Program Files\DSMDrivers\ltsdsm> mpclaim -s -d

For more information about a particular disk, use 'mpclaim -s -d #' where # is the MPIO disk number.

MPIO Disk   System Disk  LB Policy   DSM Name
-----
MPIO Disk2  Disk 4       LQD         Lenovo Device Specific Module for Multi-Path
MPIO Disk1  Disk 3       LQD         Lenovo Device Specific Module for Multi-Path
MPIO Disk0  Disk 2       LQD         Lenovo Device Specific Module for Multi-Path
```

```
> C:\Program Files\DSMDrivers\ltsdsm> dsmutil -a
```

You should see the following output. The 'Name' of your storage array will vary.

```
PS C:\Program Files\DSMDrivers\ltsdsm> .\dsmutil -a

Hostname      = WIN-VG5U5442N35
Domainname    = N/A
Time          = GMT Fri Jan 17 16:26:10 2020
DSM Name      = LTSDSM
DSM Version   = 02.01.1354.0005

-----
Info of Array Module's seen by this Host.
-----
ID            WWN            Interface(s)  Name
-----
0 600A09800DB1A7C0000000058B3354F  iSCSI         DE4000H_1
-----
```

Refer to the **DE Series Hardware Installation and Maintenance Guide** for additional guidance on proper setup of the Windows DSM package.

VMWare – Setting up the Host Server OS and Multipath

To ensure reliable operation, verify that the VMWare configuration is supported (host server, adapters, operating system version, drivers, and cables from server to controller host ports).

- Step 1. Go to the [DE Series Product Support Site](#).
- Step 2. Click on the 'Knowledge Base & Guides' tab, then filter on 'Guides' and further filter on 'Interoperability Matrix'.
- Step 3. Look for the latest Interoperability Matrix document, and click to download or view the file. In this file, you may search for the product family that applies, as well as other criteria for the configuration such as Operating System, ThinkSystem SAN OS, and Host Multipath driver.
- Step 4. As necessary, make the updates for your operating system and protocol as listed in the table.

Operating system updates	Protocol	Protocol-related updates
<ul style="list-style-type: none"> ● You might need to install out-of- box drivers to ensure proper functionality and supportability. You can install HBA drivers using the ESXi shell or a remote SSH connection to the ESXi host. To access the host using either of those methods, you must enable the ESXi shell and SSH access. For more information about the ESXi shell, refer to the VMware Knowledge Base regarding using the ESXi shell in ESXi 5.x or 6.x. For installation commands, refer to the instructions that accompany the HBA drivers. ● Each HBA vendor has specific methods for updating boot code and firmware. Some of these methods could include the use of a vCenter plugin or the installation of CIM provider on the ESXi host. Refer to the support section of the vendor's website to obtain the instructions and software necessary to update the HBA boot code or firmware. Refer to the <i>VMware Compatibility Guide</i> or the HBA vendor's website to obtain the correct boot code or firmware. 	FC	Host bus adapter (HBA) driver, firmware, and bootcode
	iSCSI	Network interface card (NIC) driver, firmware and bootcode
	SAS	Host bus adapter (HBA) driver, firmware, and bootcode

Multi-Path setup for VMware

Multipath software provides a redundant path to the storage array in case one of the physical paths is disrupted. The multipath software presents the operating system with a single virtual device that represents the active physical paths to the storage. The multipath software also manages the failover process that updates the virtual device. For VMware, you use the inbox Native Multipathing Plug-in (NMP).

VMware provides plug-ins, known as Storage Array Type Plug-ins (SATP), to handle the failover implementations of specific vendors' storage arrays. The SATP you should use is VMW_SATP_ALUA.

The following instructions are provided for the administrator of the DE Series storage array to set up multipath for VMWare.

After the installation, manually create claim rule with the following command. Then restart the client machine:

```
#esxcli storage nmp satp rule add -s VMW_SATP_ALUA -V LENOVO -M DE_Series -c tpgs_on -P VMW_PSP_RR -e "Lenovo DE-Series arrays with ALUA support"
```

For iSCSI SANboot, ensure any vmkernel that participates in SANboot has a MAC address that matches the physical adapter. The default adapter created during the installation will match by default.

Use the following command to create additional vmkernel to specify the MAC address:

```
# esxcli network ip interface add -i [vmkernel name] -M "[MAC address]" -p  
"[Portgroup name]" -m [MTUSIZE]
```

Verify DE Series VMWare Claim Rules

Verify that LENOVO/DE_Series has been added to Claim Rules

```
#esxcli storage nmp satp rule list | grep LENOVO
```

Verify that ALUA/RR has been added to the devices (LUNs)

```
# esxcli storage nmp device list
```

Access System Manager and follow Setup Wizard

System Manager is the storage array management application that resides on the controller for the array. It only manages the drives in the controller enclosure and any additional drives residing in an attached expansion shelf.

Setup Wizard can be used to guide you through the configuration of your storage array.

Important Note: Setup Wizard only launches on initial setup of the storage array. If you exit Setup Wizard without completing all of the steps, the settings you chose will not be stored, and Setup Wizard cannot be restarted.

Before you begin

- You have ensured that the device from which you will access System Manager contains one of the following browsers:

Browser	Minimum version
Google Chrome	47
Microsoft Internet Explorer	11
Microsoft Edge	EdgeHTML 12
Mozilla Firefox	31
Safari	9

- You are using out-of-band management.

About this task

If you are an iSCSI user, make sure you have closed the Setup wizard while configuring iSCSI.

The wizard automatically relaunches when you open System Manager or refresh your browser and at least one of the following conditions is met:

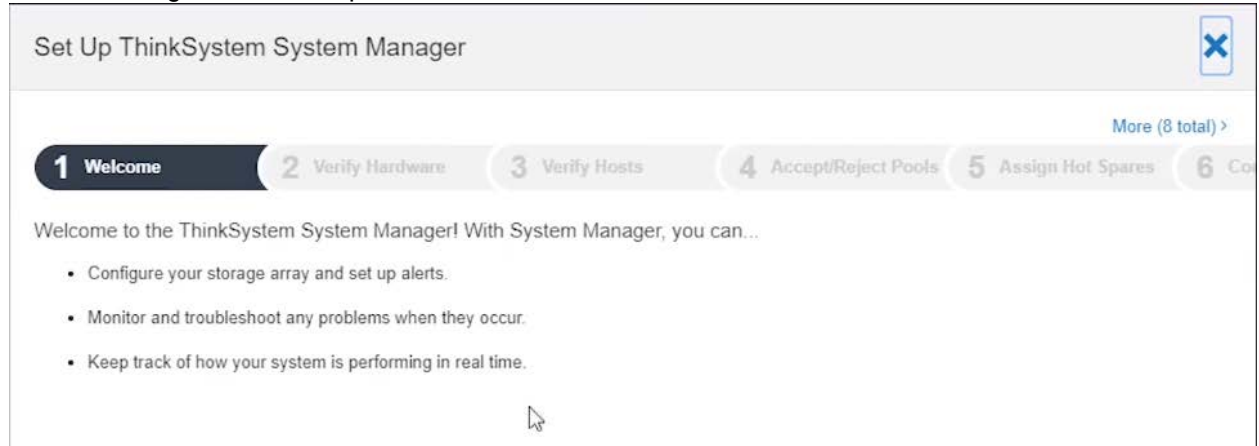
- No pools and volume groups are detected.
- No workloads are detected.
- No notifications are configured.

If the Setup wizard does not automatically appear, contact technical support.

Steps

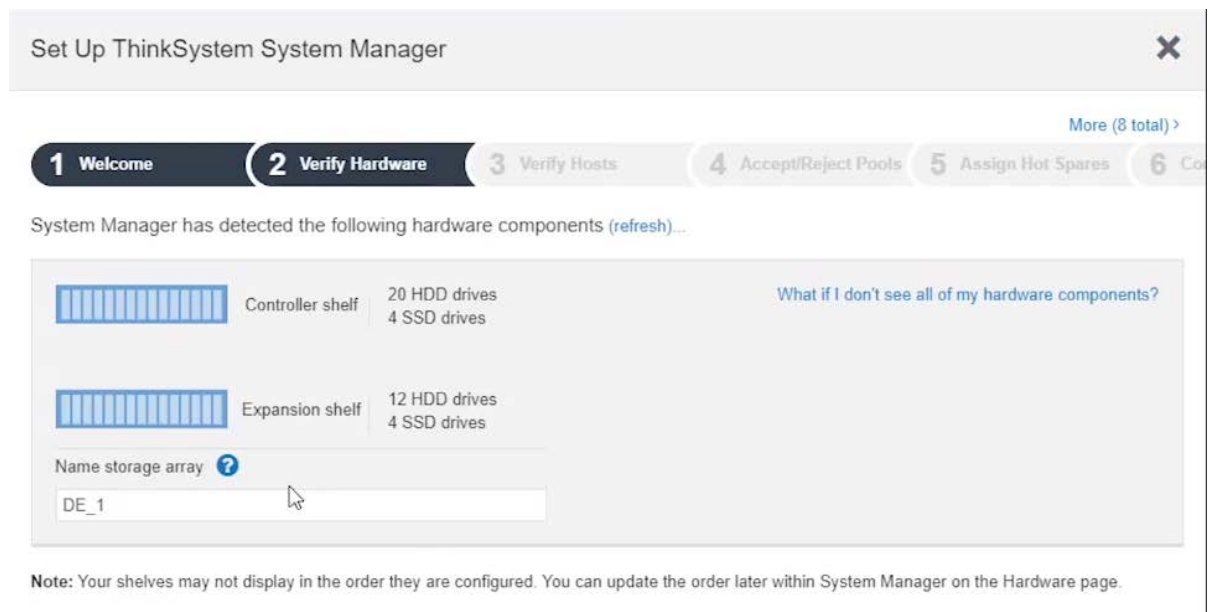
- Step 1. From your browser, enter the following URL <https://<DomainNameOrIPAddress>>, where IPAddress is the address for one of the storage array controllers.
The first time System Manager is opened on an array that has not been configured, the Set Administrator Password prompt appears. Role-based access management configures four local roles: admin, support, security, and monitor. The latter three roles have random passwords that cannot be guessed. After you set a password for the admin role you can change all of the passwords using the admin credentials. See System Manager online help for more information on the four local user roles.
- Step 2. Enter the System Manager password for the admin role in the Set Administrator Password and Confirm Password fields, and then select the Set Password button.

Step 3. When you open System Manager and no pools, volumes groups, workloads, or notifications have been configured, the Setup Wizard launches.

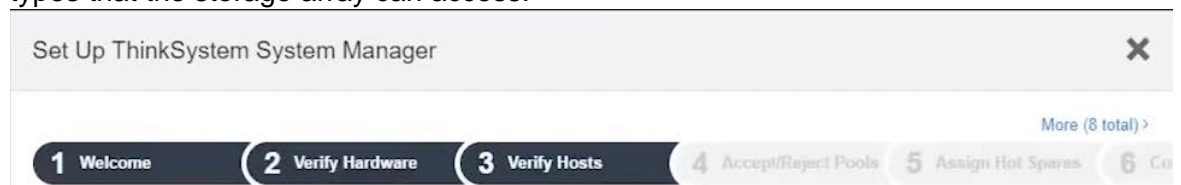


Step 4. Use the Setup Wizard to perform the following tasks:

- a. **Verify hardware (controllers and drives)** – Verify the number of controllers and drives in the storage array. Assign a name to the array (e.g, 'DE_1').



- b. **Verify hosts and operating systems** – Verify the host and operating system types that the storage array can access.




- c. **Accept pools** – Accept the recommended pool configuration for the express installation method. A pool is a logical group of drives.

Set Up ThinkSystem System Manager ✕

< Previous More (7 total) >

2 Verify Hardware | **3 Verify Hosts** | **4 Accept/Reject Pools** | 5 Configure Alerts | 6 Enable AutoSupport | 7 Review

Based on the storage array's available drives, we recommend the following pool configuration...


Pool_1 | 32 Drives | Secure-capable No ? | DA Yes ?

Do you want to accept the recommended pool configuration?

[How do I know if I should accept the recommended pool configuration?](#)

Yes, I want to accept the recommended pool configuration
 No, I will create my own configuration after set up

- d. **Configure alerts** – Allow System Manager to receive automatic notifications when a problem occurs with the storage array.

Set Up ThinkSystem System Manager ✕

< Previous More (7 total) >

3 Verify Hosts | **4 Accept/Reject Pools** | **5 Configure Alerts** | 6 Enable AutoSupport | 7 Review

Note: If you don't know your mail server information at this time or you only want to configure SNMP and/or syslog alerts, then select "Do this later" at the bottom of the screen.

[How do I configure SNMP or syslog alerts?](#)

Configure mail server ?

Mail server address ?

Important: You must configure a DNS server on both controllers in order to use a fully qualified domain name. You can perform this configuration on the Hardware page.

Email sender address ?

Include contact information in email

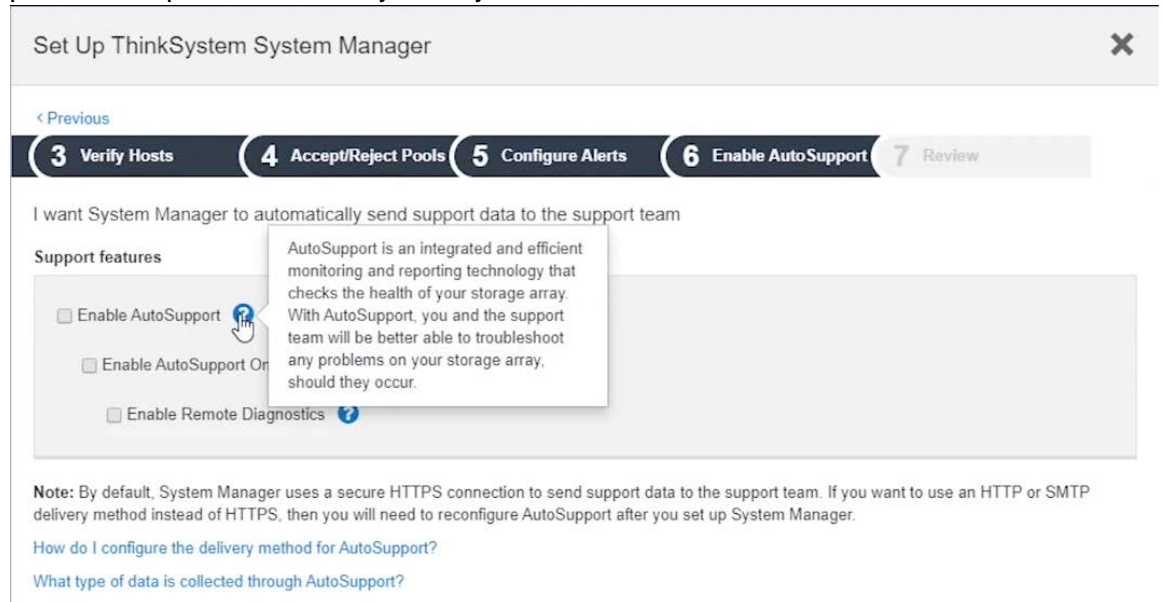
Configure recipient email address

Email Address

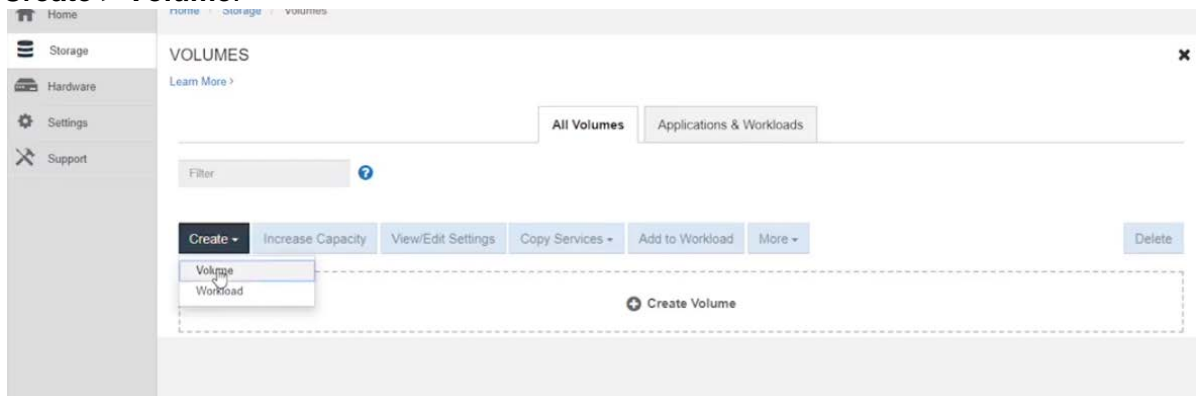
[+ Add email](#)

- e. **Enable AutoSupport** – Automatically monitor the health of your storage array and have dispatches sent to technical support. Note: AutoSupport default state is disabled. You are strongly encouraged to enable AutoSupport and complete the setup so that error logs are collected and automatically sent to Lenovo support.

Note that the default setting for AutoSupport is unchecked for protection of your privacy. It is highly recommended that you enable AutoSupport for the best possible response to issues you may encounter.



Step 5. If you have not already created a volume, create one by going to **Storage > Volumes > Create > Volume**.

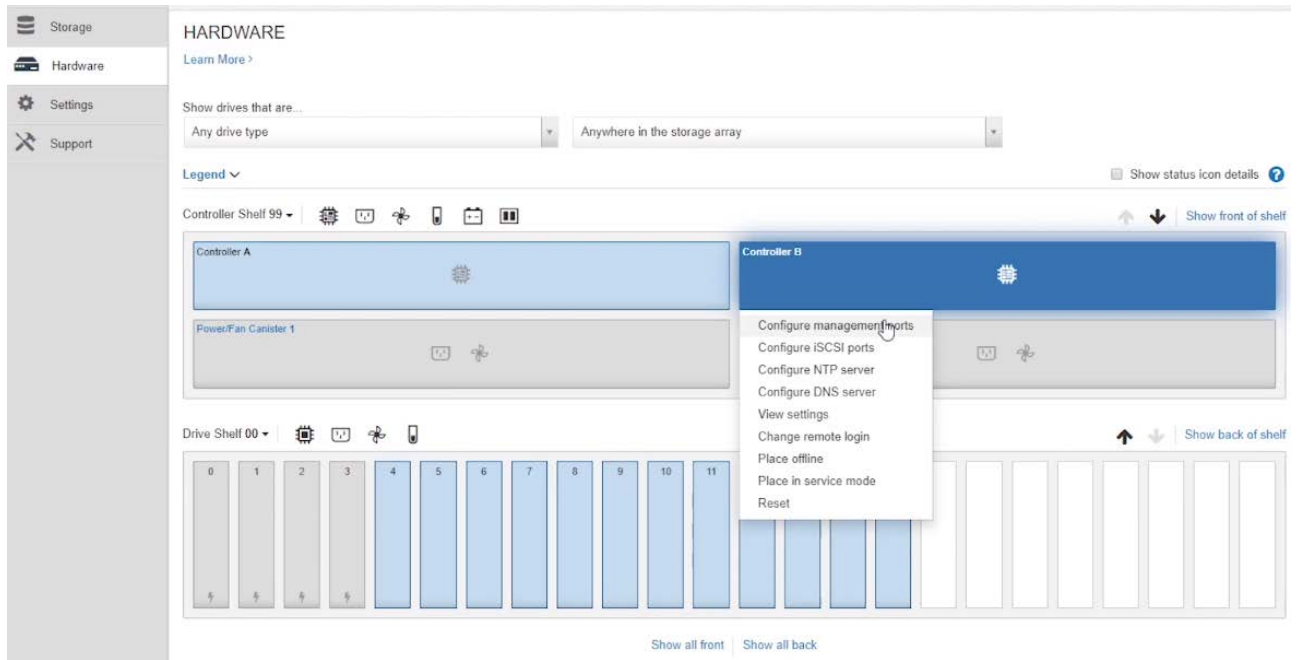


For more information, see the online help for System Manager.

Configuring Management Port IP Address

You can change the default IP of your controller management port to align with your datacenter IP address range.

Select 'Hardware' -> 'Show back of shelf' -> 'Controller B' -> 'Configure management ports'

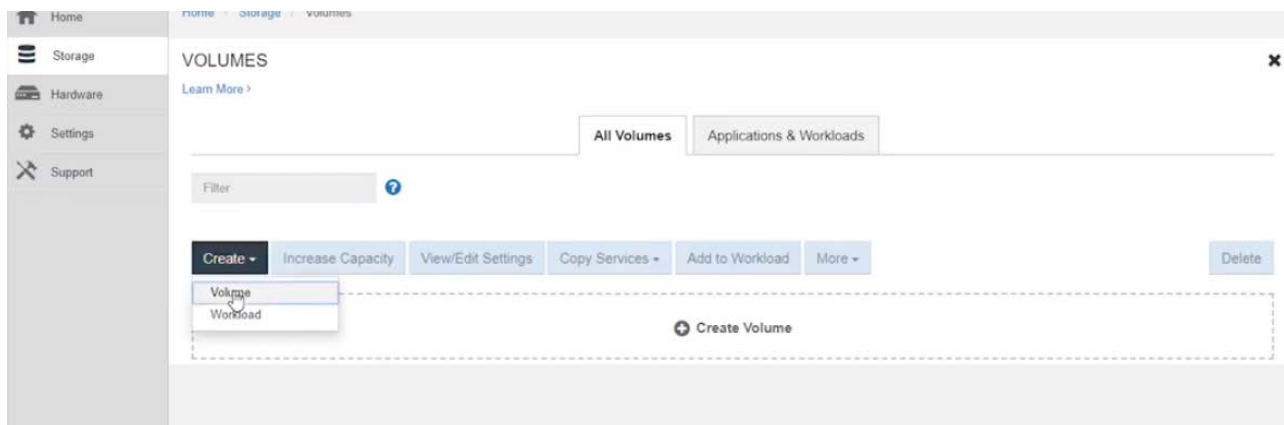


Configuring the Switches

Refer to the DE Series Hardware Installation and Maintenance Guide for details on setting up your Fibre Channel or Ethernet network switches.

Create Volumes on the Storage Array

If you have not already created a volume, create one by going to **Storage > Volumes > Create > Volume**.



If a host exists, it will show up on the 'Select a host' pulldown list.

Create Volumes

1 Select Host 2 Select Workload 3 Add/Edit Volumes 4 Review

Make my created volumes visible to the following host or host cluster...

Select a host or host cluster. ?

Assign host later

Assign host later

Host SR650_ISCSI

Next, create a workload.

Create Volumes

1 Select Host 2 Select Workload 3 Add/Edit Volumes 4 Review

Select a workload for the created volumes...

How does my workload impact volume creation?

Create volumes for an existing workload

Select

Create a new workload

Example of a successful volume creation:

Create Volumes

1 Select Host 2 Select Workload 3 Add/Edit Volumes 4 Review

Name	Pool/ Volume Group	Assigned To	Associated Workload	Volume Type	Reported Capacity (GiB)	Segment Size (KiB)
Test	Pool_1	Host SR650_ISCSI	vmware_vmfs_workload_1	Datastore	1000.00	Not Applicable

Verify storage access on the host

Before using the volume, you must 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.

Steps

Step 6. Create and write to a file on the new LUN.

Example

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

Step 7. Read the file and verify data was written.

Example

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

Step 8. To verify that multipath is working, change the volume ownership.

- From the System Manager GUI, go to **Storage > Volumes**, and then select **More > Change ownership**.
- On the **Change Volume Ownership** dialog box, use the **Preferred Owner** pull-down to select the other controller for one of the volumes in the list, and then confirm the operation.
- Verify that you can still access the files on the LUN.

Example

```
> dir f:\
```

Step 9. Find the target ID.

Example

```
> C:\Program Files\DSMDrivers\ltsdsm\dsmutil -a
```

Step 10. 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 that you found in the previous step.

Example

```
> C:\Program Files\DSMDrivers\ltsdsm\dsmutil -g <target ID>
```

4. Conclusion

Using this deployment guide, you should now have a functional storage array attached to your host server.

Registering your Lenovo ThinkSystem DE product

For Lenovo to proactively contact you for support after AutoSupport ticket creation, you must first register your ThinkSystem DE Storage product by following the steps below:

1. If you are a new user, register and activate your Lenovo account at: <https://account.lenovo.com>
2. Sign in with your Lenovo ID and password.
3. Go to www.lenovo.com/registration to register your product.
4. To register a device, select **Register Devices(s)**.
5. Enter the serial number of the device.
6. Enter the requested detailed information and click Complete Registration.
7. Check the registration confirmation e-mail in your mailbox.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumberlist> for your region support details.

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