

Module 2: Cluster Setup

Exercise 1: Exploring ONTAP Management UIs

In this exercise, you explore the NetApp ONTAP clustershell CLI and NetApp ONTAP System Manager. You use both interfaces throughout this course.

Objectives

This exercise focuses on enabling you to do the following:

- Explore the clustershell CLI
- Navigate clustershell command directories
- Use the set command to adjust preferences
- Use the Tab key to complete commands
- Review command history
- Explore the ONTAP System Manager UI

Case Study

The NetApp storage system has arrived from Dwurple Enterprises with the most recent version of NetApp ONTAP software installed. You need to explore the ONTAP CLI and adjust the settings to your preferences. Next, you need to explore the new ONTAP System Manager UI.


Lab Equipment

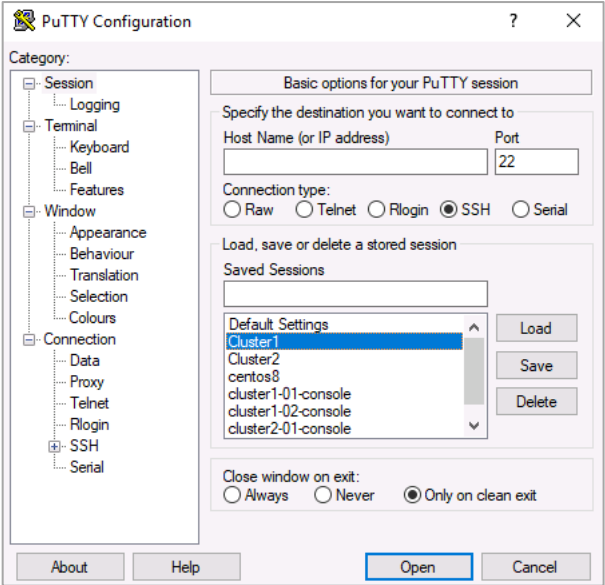



Use the following equipment to complete the exercise:



System	Host Name	IP Addresses	User Name	Password
Windows Server	jumphost	192.168.0.5	DEMO\Administrator	Netapp1!
ONTAP cluster-management LIF (cluster1)	cluster1	192.168.0.101	admin (case-sensitive)	Netapp1!
ONTAP cluster-management LIF (cluster2)	cluster2	192.168.0.102	admin (case-sensitive)	Netapp1!

Task 1: Explore the Clustershell CLI

In this task, you log in to and navigate the clustershell CLI, and you view the manual pages.

Step	Action
1-1	<div>From your Windows desktop, start the PuTTY application.</div> <div></div>




Step	Action
1-2	<p>In the PuTTY Configuration dialog box, verify that the cluster1 saved session is listed, and then double-click Cluster1.</p> 
1-3	<p>Use the following credentials to log in to cluster1:</p> <ul style="list-style-type: none"> log in as: admin Password: Netapp1!
1-4	<p>Remove the timeout threshold for sessions to the cluster:</p> <pre>system timeout modify -timeout 0</pre>
1-5	 <p>Disabling automatic logout weakens security and should never be done outside of training environments.</p>
1-6	<p>Review the commands and command directories at the top level of the command hierarchy:</p> <p>?</p>
1-7	 <p>You do not need to press Enter after typing a question mark.</p> <p>You can resize the PuTTY window to display more than 24 rows.</p>
1-8	 <p>An entry that ends with a right-angle bracket (>) symbol is a command directory rather than a command. The structure resembles a UNIX or DOS shell, in that you cannot run command directory names as you do commands, but you can navigate to command directories. Command directories can contain subdirectories, commands, or both. Command directories are contextual and hierarchical groupings of commands. The command structure is not flat.</p>
1-9	<p>Review the objects in the <code>storage</code> command directory:</p> <pre>storage ?</pre>
1-10	<p>Erase the storage command from the prompt and then open the <code>cluster</code> directory:</p> <pre>cluster</pre>

Step	Action
1-11	 You can use the question mark at any level of the command hierarchy to see which commands and directories are available within that context. You notice that the clustershell prompt changes to indicate your context.
1-12	Review the available commands and directories at this level: ?
1-13	Open the <code>statistics</code> directory: <code>statistics</code> You are now in the <code>cluster statistics</code> context.
1-14	Review the commands and directories that are available at this level: ?
1-15	Go back one level by typing two periods and then pressing Enter : ..
1-16	Verify that you are back at the <code>cluster</code> directory level.
1-17	 From any level, you can type “top” to go directly to the top of the command hierarchy.
1-18	Examine the manual page for the <code>storage</code> command directory: <code>man storage</code>
1-19	Exit the manual page by entering <code>q</code> .
1-20	Examine the manual page for the <code>storage aggregate</code> directory, and compare the output with the output of the <code>man storage</code> command: <code>man storage aggregate</code>
1-21	Exit the manual page by entering <code>q</code> .
1-22	Examine the manual page for the <code>storage aggregate create</code> command: <code>man storage aggregate create</code>
1-23	Exit the manual page by entering <code>q</code> .

Task 2: Navigate Command Directories



Explore command directories and context, and use positional parameters.


Step	Action
2-1	Navigate to the <code>storage aggregate</code> directory level within the clustershell CLI: <code>storage aggr</code>

Step	Action
2-2	From the <code>storage aggregate</code> level, run the following command: <code>modify ?</code>
2-3	 Square brackets ([]) indicate optional command elements. The output of this command shows the parameter <code>-aggregate</code> with brackets around the parameter name but not around the parameter value. The format means that the parameter name is optional, but the value is required. To save keystrokes, you can enter the aggregate name as a positional parameter rather than a named parameter. All other parameters and values are optional, except that if you enter a parameter value, you must also provide a parameter name. (The value cannot be specified based on position.) In this task, the aggregate name is required to determine which aggregate to modify. Although the other parameters are technically optional, you should specify at least one parameter for the command to be meaningful and to modify an attribute of the aggregate.
2-4	Review the possible keyword values for the <code>-state</code> parameter: <code>modify -state ?</code>
2-5	Type <CNTRL> C to clear the command line.
2-6	Review the options for the <code>storage aggregate scrub</code> command: <code>scrub ?</code>
2-7	 As with the <code>modify</code> command, the aggregate name is required, but the parameter name is optional. Also, the action value is required, but the parameter name (<code>action</code>) is optional. The command has two possible forms: <ul style="list-style-type: none"> <code>storage aggregate scrub -aggregate aggr0_n1 -action start</code> <code>storage aggregate scrub aggr0_n1 start</code>
2-8	 Many commands also have additional information fields that are not shown with the default command syntax. You can see a list of these additional fields by using the <code>-fields</code> parameter.
2-9	Try this action with the <code>storage aggregate show</code> command: <code>show -fields ?</code>
2-10	Using the <code>-fields</code> parameter, display the name of node the aggregates are on and whether or not the aggregates are on their home node: <code>show -fields node,is-home</code>
2-11	Return to the top of the command hierarchy: <code>top</code>

Task 3: Use the `set` Command to Adjust Preferences



Use the `set` command to change privilege levels, display all available object attributes with a single command, and set a default storage VM (storage virtual machine, also known as SVM) for a clustershell session.

Step	Action
3-1	Look at the <code>volume</code> directory: <code>volume ?</code> The default privilege level is <code>admin</code> .
3-2	Review the commands that are available in this directory context at this privilege level.
3-3	Switch to the <code>advanced</code> privilege level: <code>set -privilege advanced</code>
3-4	 Because <code>-privilege</code> is an optional positional parameter of the <code>set</code> command, you can also specify the desired privilege level as a positional parameter: <code>set advanced</code>
3-5	While you are in the <code>advanced</code> privilege level, look again at the <code>volume</code> directory: <code>volume ?</code>
3-6	Review the other available commands.
3-7	 Each command and directory that is available for privilege levels other than <code>admin</code> has an asterisk (*) in front of the description.
3-8	Switch back to the <code>admin</code> privilege level: <code>set admin</code>
3-9	Return to the top of the command hierarchy: <code>top</code>
3-10	Look at the <code>set</code> directory: <code>set ?</code>
3-11	Display the list of nodes in the cluster: <code>system node show</code>
3-12	Set the option to show all fields in a query: <code>set -showallfields true</code>
3-13	Display the list of nodes in the cluster again: <code>system node show</code>
3-14	Adjust the width of your PuTTY window to correctly show all the fields in the command output, and then repeat the command that you entered in the previous step.
3-15	Turn off the option to show all fields: <code>set -showallfields false</code>
3-16	Display the list of volumes on the cluster: <code>vol show</code>

Step	Action
3-17	Set the default storage VM for your clustershell session to <code>cl_svm1</code> : <code>set -vserver cl_svm1</code>
3-18	View the list of volumes again: <code>vol show</code>
3-19	 You see only volumes that are associated with <code>cl_svm1</code> .
3-20	Turn off the default storage VM: <code>set -vserver ""</code>
3-21	Verify that the default storage VM is unset. <code>set</code>

Task 4: Use the Tab Key to Complete Commands



In this task, you enter command shortcuts and use Tab completion to simplify command syntax.

Step	Action
4-1	Display the LIFs: <code>network interface show</code>
4-2	Enter the following command: <code>net i show</code>
4-3	 The command fails because the form that you entered is ambiguous. Multiple options in the command hierarchy begin with the letter “i.”
4-4	Enter the command again, using <code>in</code> : <code>net in show</code>
4-5	Type <code>ne</code> (the first two letters of the <code>network</code> command directory), and then press Tab .
4-6	 When you enter an unambiguous substring and press Tab, the clustershell completes the substring.
4-7	Continue the command: <ul style="list-style-type: none"> Type <code>in</code>, and then press Tab. Type <code>re</code>, and then press Tab. <p>You notice that <code>re</code> is ambiguous in this context. The clustershell displays the options for <code>re</code>.</p>




Step	Action
4-8	<p>Complete the command:</p> <ul style="list-style-type: none"> Type ne, and then press Tab. Type in, and then press Tab. <p>Type revert * and then press Enter</p>

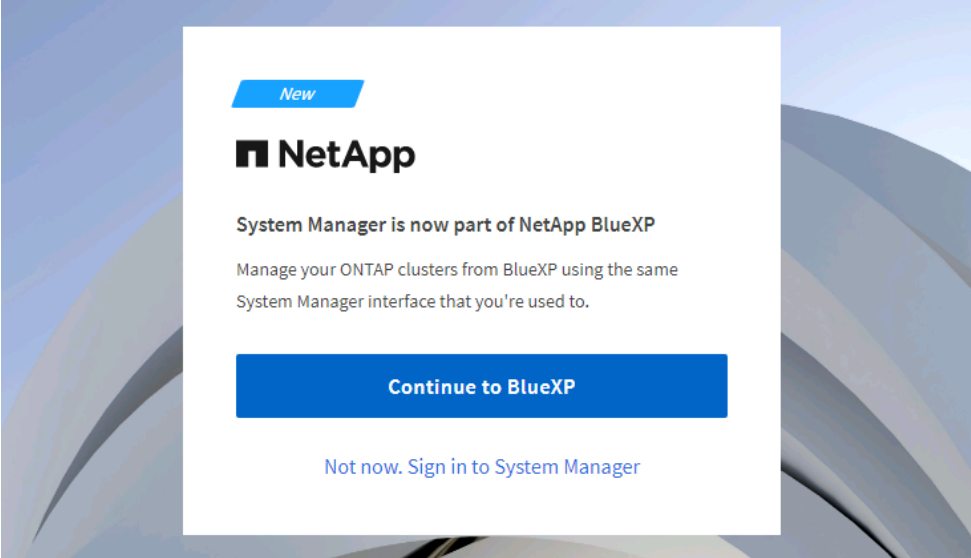
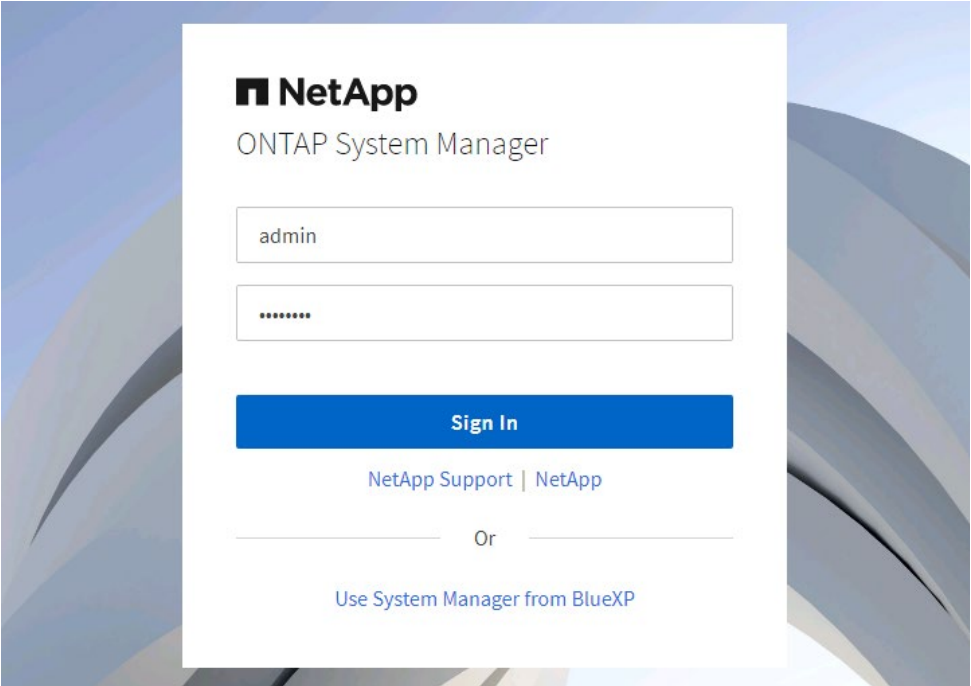
Task 5: Review Command History

Use the `history` command, the `redo` command, and the up arrow to retrieve previous commands.

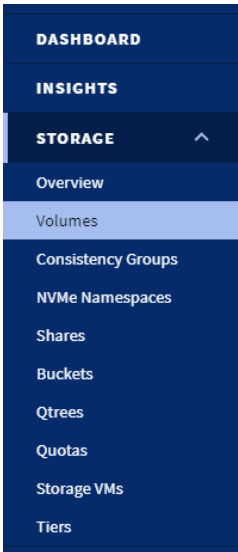
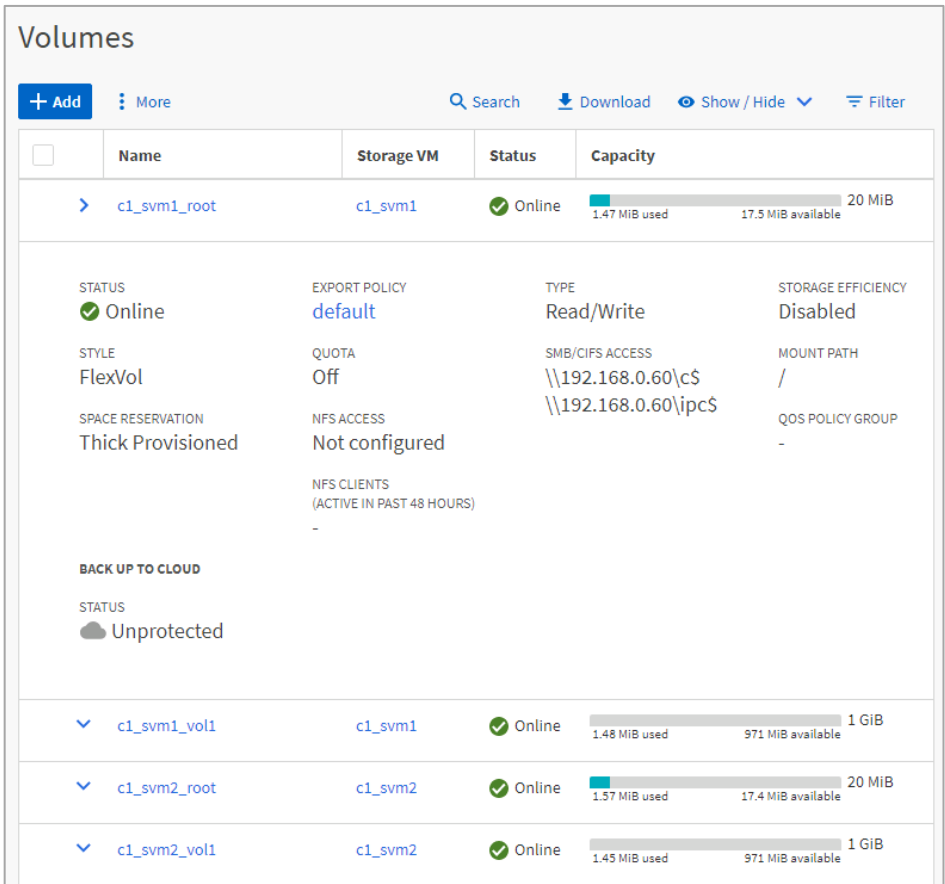
Step	Action
5-1	<p>Enter the following commands:</p> <pre>net int show net port show cluster show</pre>
5-2	From the command line, press the up-arrow key multiple times to recall previous commands.
5-3	Press the down-arrow key to scroll back through the commands.
5-4	<p>Review the command history:</p> <pre>history</pre>
5-5	<p>Rerun the most recent command:</p> <pre>redo</pre>
5-6	 The most recent command is <code>history</code> , which is the final command in the history list.
5-7	<p>Check the history again:</p> <pre>history</pre>
5-8	<p>Rerun the command that was issued three commands ago:</p> <pre>redo -3</pre>
5-9	<p>Find the <code>vol show</code> command in the history list, and run the command by using the command number:</p> <pre>redo <command_number></pre>
5-10	 The number that is associated with the <code>vol show</code> command varies, based on the number of commands that you ran in this session.

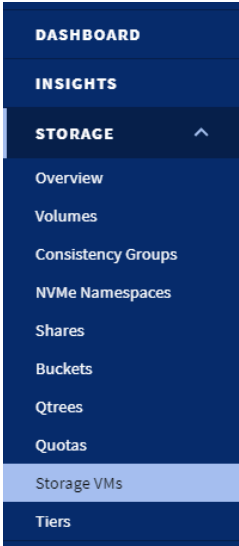
Task 6: Explore the ONTAP System Manager UI

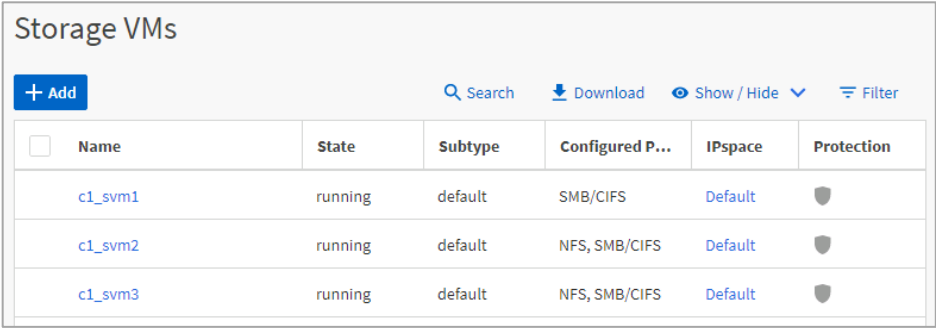
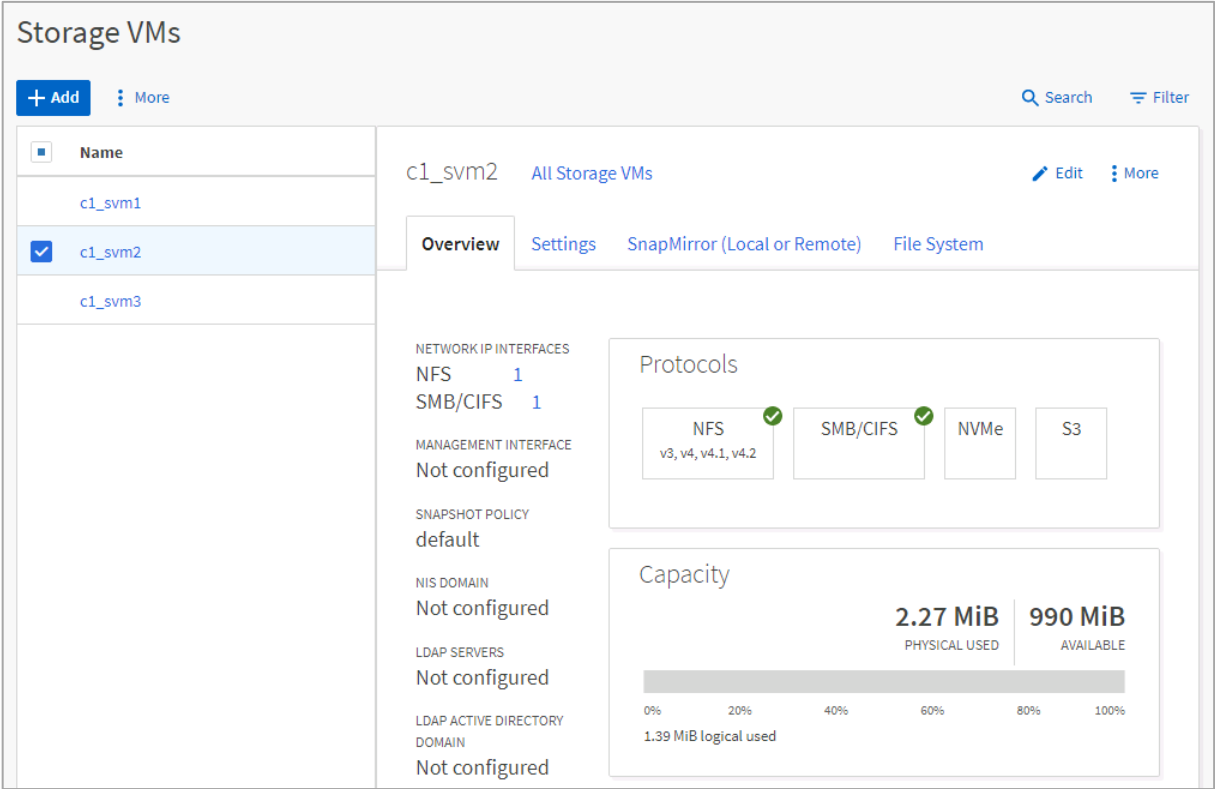
Step	Action										
6-1	<div><div></div><div><p>NetApp ONTAP System Manager is not a separate application. System Manager is a management solution that is built in to the ONTAP software.</p><p>To access System Manager, you open a browser, connect to the cluster management LIF, and authenticate with the cluster admin username and password:</p><table><tr><th>System</th><th>Host Name</th><th>IP Address</th><th>User Name</th><th>Password</th></tr><tr><td>ONTAP cluster management LIF</td><td>cluster1</td><td>192.168.0.101</td><td>admin (case sensitive)</td><td>Netapp1!</td></tr></table></div></div>	System	Host Name	IP Address	User Name	Password	ONTAP cluster management LIF	cluster1	192.168.0.101	admin (case sensitive)	Netapp1!
System	Host Name	IP Address	User Name	Password							
ONTAP cluster management LIF	cluster1	192.168.0.101	admin (case sensitive)	Netapp1!							
6-2	<p>From the Windows Server desktop, access System Manager on cluster1:</p> <div><div><p>1. Open the Chrome web browser.</p><div></div></div><div><p>2. In the address bar, enter the cluster-management LIF IP address:</p><p>https://192.168.0.101</p></div></div>										
6-3	<p>If you are prompted, click Advanced and click Proceed to 192.168.0.101 (Unsafe) to proceed to ONTAP System Manager.</p> <div><div><div><div></div><div><p>Your connection is not private</p><p>Attackers might be trying to steal your information from 192.168.0.101 (for example, passwords, messages, or credit cards). Learn more</p><p>NET::ERR_CERT_AUTHORITY_INVALID</p><div><input type="checkbox"/> Automatically send some system information and page content to Google to help detect dangerous apps and sites. Privacy policy</div><div><div><div>HIDE ADVANCED</div><div>Back to safety</div></div></div><p>This server could not prove that it is 192.168.0.101; its security certificate is not trusted by your computer's operating system. This may be caused by a misconfiguration or an attacker intercepting your connection.</p><p>Proceed to 192.168.0.101 (unsafe)</p></div></div></div></div>										

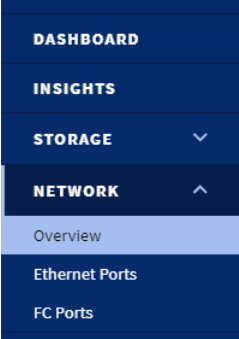
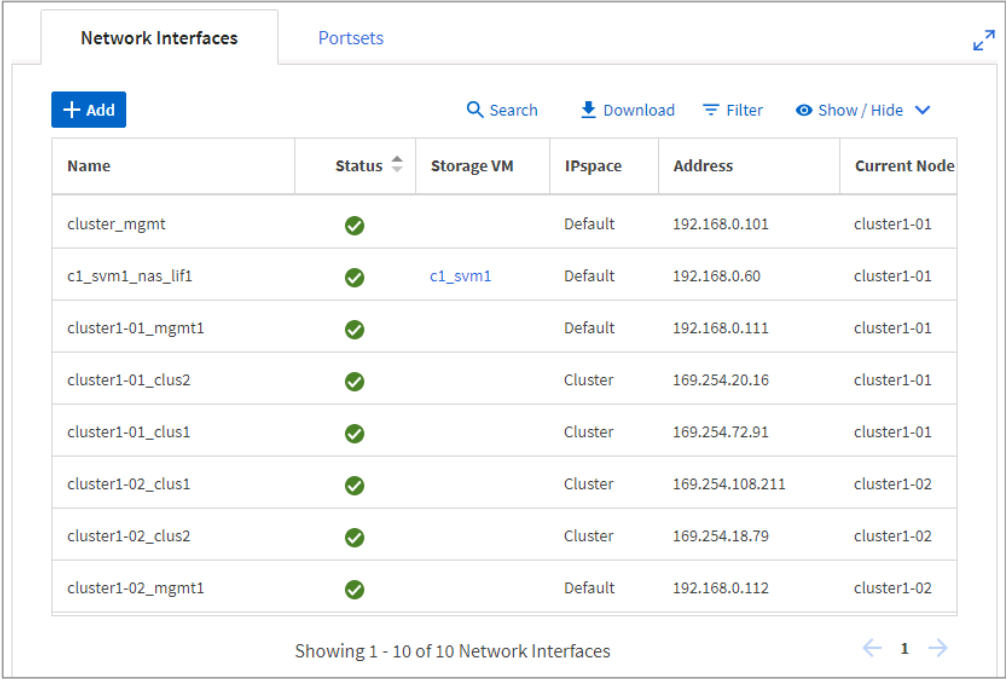
Step	Action
6-4	<p>Click Not now. Sign on to System Manager to bypass NetApp BlueXP and access cluster1 directly.</p>  <p>The screenshot shows a NetApp System Manager login window. At the top, it says 'New' in a blue box. Below the NetApp logo, it states 'System Manager is now part of NetApp BlueXP' and 'Manage your ONTAP clusters from BlueXP using the same System Manager interface that you're used to.' There is a large blue button labeled 'Continue to BlueXP' and a link below it that says 'Not now. Sign in to System Manager'.</p>
6-5	<p>When the System Manager window opens, enter your login credentials:</p> <ul style="list-style-type: none"> • Username: admin • Password: Netapp1!  <p>The screenshot shows the NetApp ONTAP System Manager login screen. It has the NetApp logo and 'ONTAP System Manager' text. There are two input fields: the first contains 'admin' and the second contains asterisks. Below the fields is a blue 'Sign In' button. Underneath the button are links for 'NetApp Support' and 'NetApp'. Below these is an 'Or' separator, and at the bottom is a link that says 'Use System Manager from BlueXP'.</p>

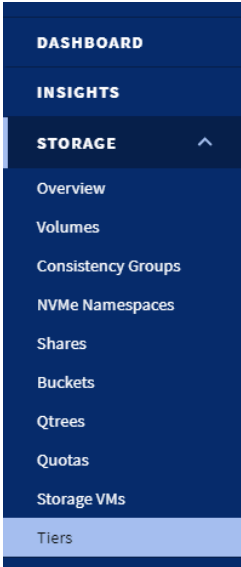
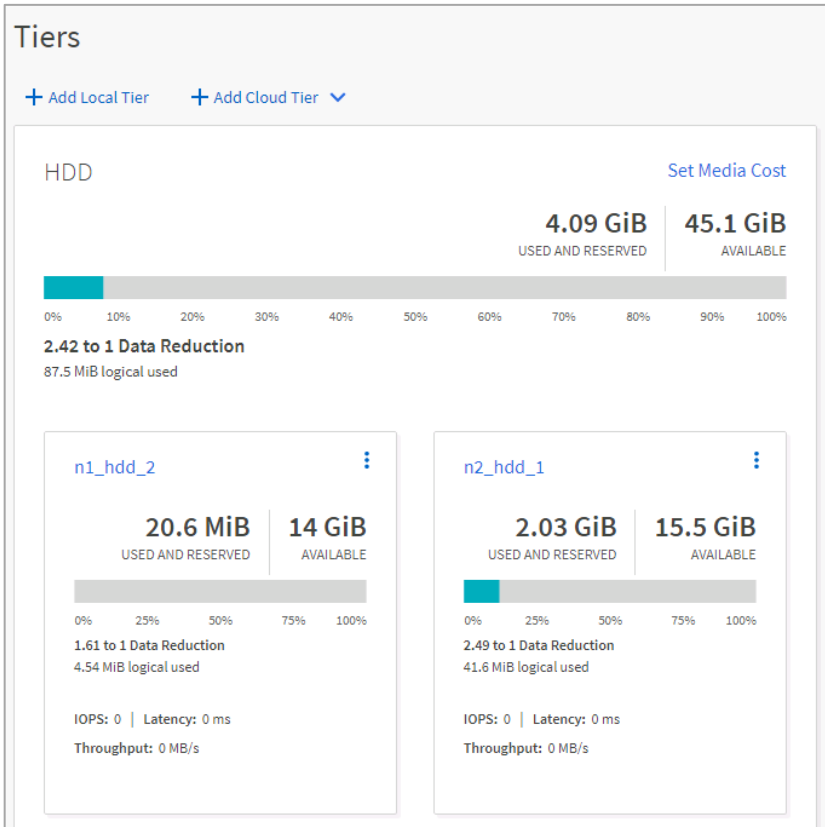
Step	Action
6-6	<p>Review the information on the Dashboard, which is the System Manager landing page:</p> <p>The screenshot shows the ONTAP System Manager interface for 'cluster1' (Version 9.12.1). The left sidebar contains navigation links: DASHBOARD, INSIGHTS, STORAGE, NETWORK, EVENTS & JOBS, PROTECTION, HOSTS, and CLUSTER. The main content area is divided into four panels:</p> <ul style="list-style-type: none"> Health: Shows 'Cluster is healthy' with a green checkmark. Below are two 'SIMBOX' sections, each containing a table of data. Capacity: Displays '4.09 GiB USED AND RESERVED' and '46.9 GiB AVAILABLE'. It includes a progress bar from 0% to 100%. Below, it states '2.43 to 1 Data Reduction' and '68.4 MiB logical used'. A note indicates 'No cloud tier (FabricPool)'. Performance: Features two line graphs for 'Latency' and 'IOPS' over a 5-minute period (22:00 to 22:45). The latency is currently at 0 ms and IOPS at 0. Network: A diagram showing the storage configuration. It includes 'Ports' (Ethernet: 16, NVMe/FC: 16), 'Interfaces' (NFS: 2, S3: 0, SMB/CIFS: 3, NVMe/TCP: 0), and 'Storage VMs' (Volumes: 7, Buckets: 0, Namespaces: 0).
6-7	<p>Use the Dashboard to answer the following questions:</p> <ul style="list-style-type: none"> How many nodes are in the cluster? _____ How many storage VMs are configured? _____ What are the savings from storage efficiency? _____ <p>In the Performance pane, which information is presented? _____</p>

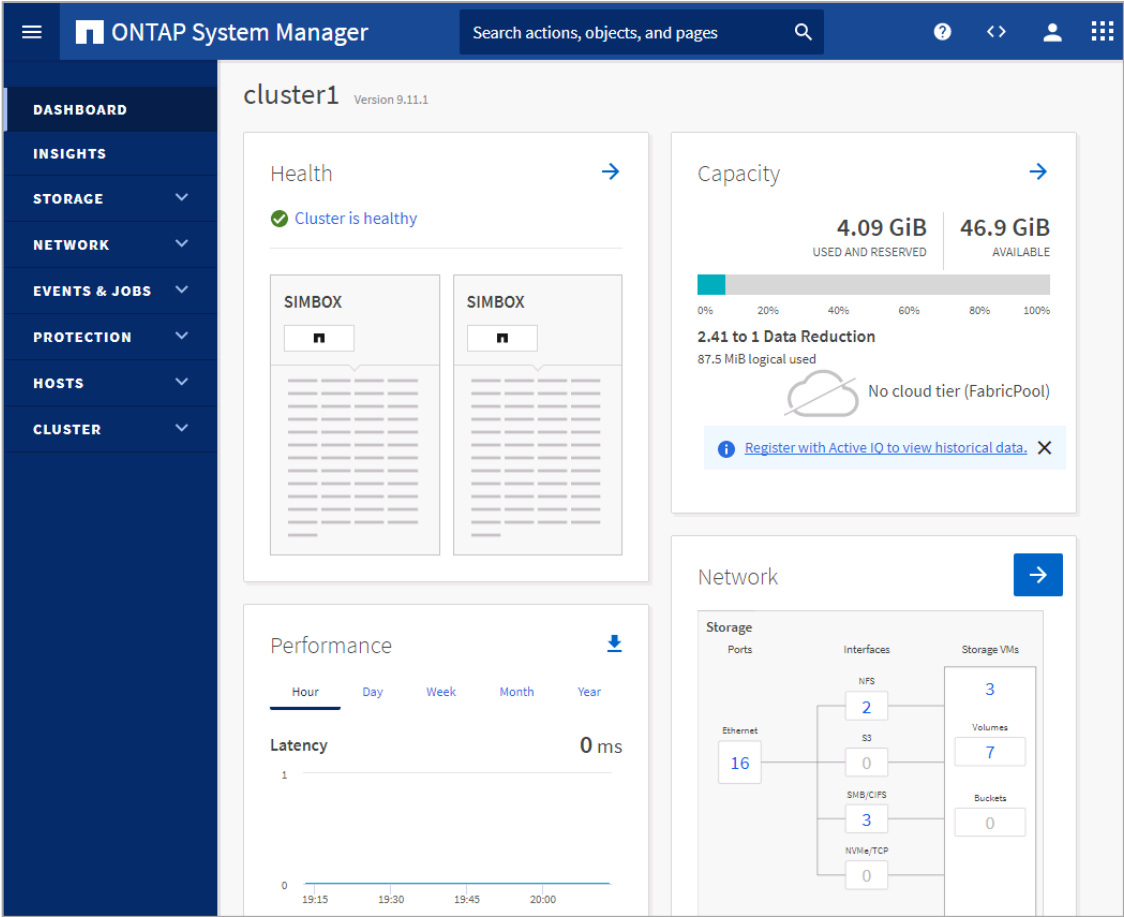
Step	Action
6-8	<p>From the System Manager menu, select Storage > Volumes:</p> 
6-9	<p>Review the Volumes pane and volume information, and then expand each row by clicking the chevron (“V”) in the first column.</p> 

Step	Action
6-10	<p>From the Windows Server desktop, access NetApp ONTAP System Manager on cluster2 by following these steps:</p> <ol style="list-style-type: none"> 1. Open a web browser. 2. In the address bar, enter the cluster-management LIF IP address: https://192.168.0.102/
6-11	If you are prompted, click Advanced and click Proceed to 192.168.0.102 (Unsafe) to proceed to ONTAP System Manager.
6-12	Click Not now. Sign on to System Manager to bypass BlueXP and access cluster2 directly.
6-13	<p>When the System Manager window opens, enter your login credentials:</p> <ul style="list-style-type: none"> • User name: admin • Password: Netapp1!
6-14	Compare the menu bars between the two clusters.
6-15	<p>Answer the following questions:</p> <ul style="list-style-type: none"> • Is there a LUNs tab on the cluster1 Storage menu bar? _____ • If not, why not? _____
6-16	Return to the System Manager session for cluster1 (192.168.0.101).
6-17	<p>From the System Manager menu, select Storage > Storage VMs.</p> 

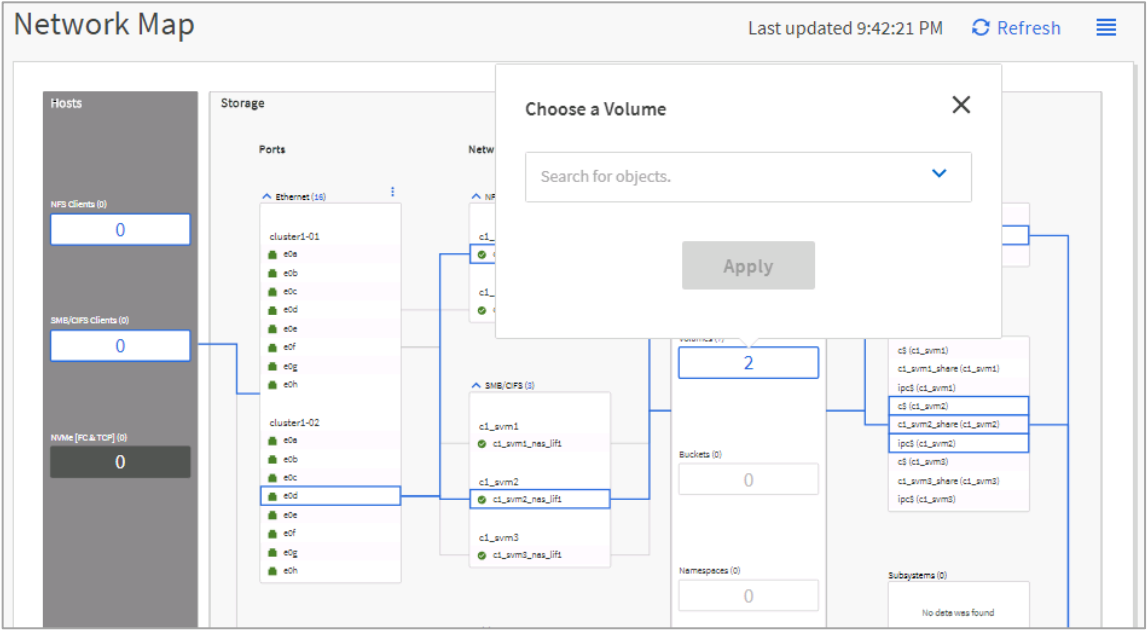
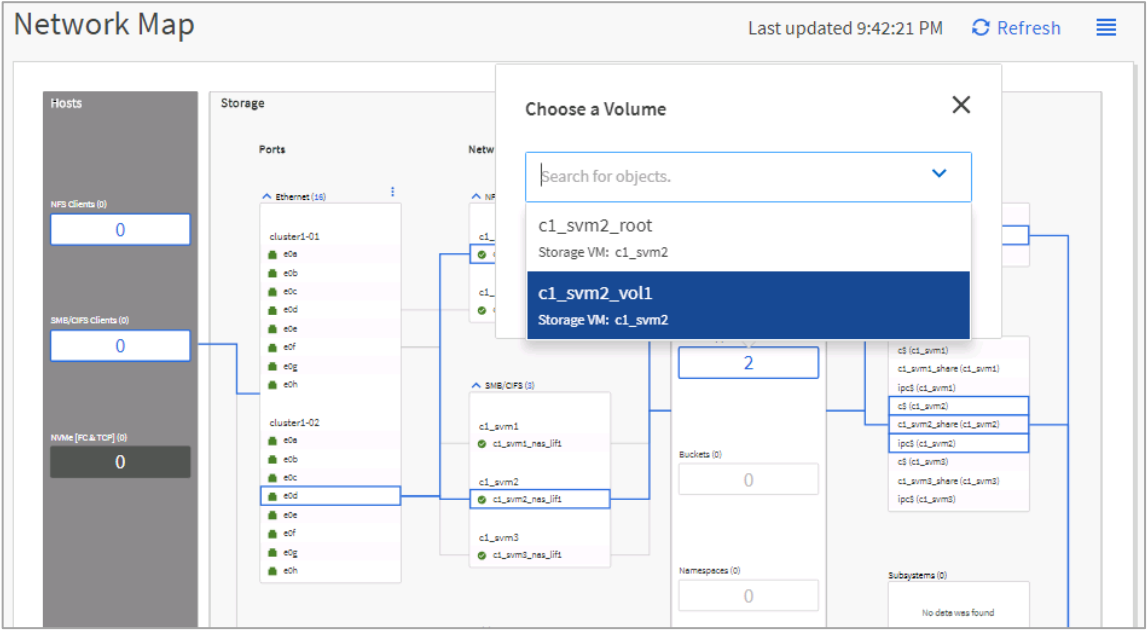
Step	Action
6-18	<p>Review the Storage VMs pane.</p> 
6-19	<p>In the Name column of the Storage VMs page, click c1_svm2.</p> 
6-20	<p>On the Storage VMs page, review each pane and answer the following question: Which protocols are enabled for c1_svm2? _____</p>

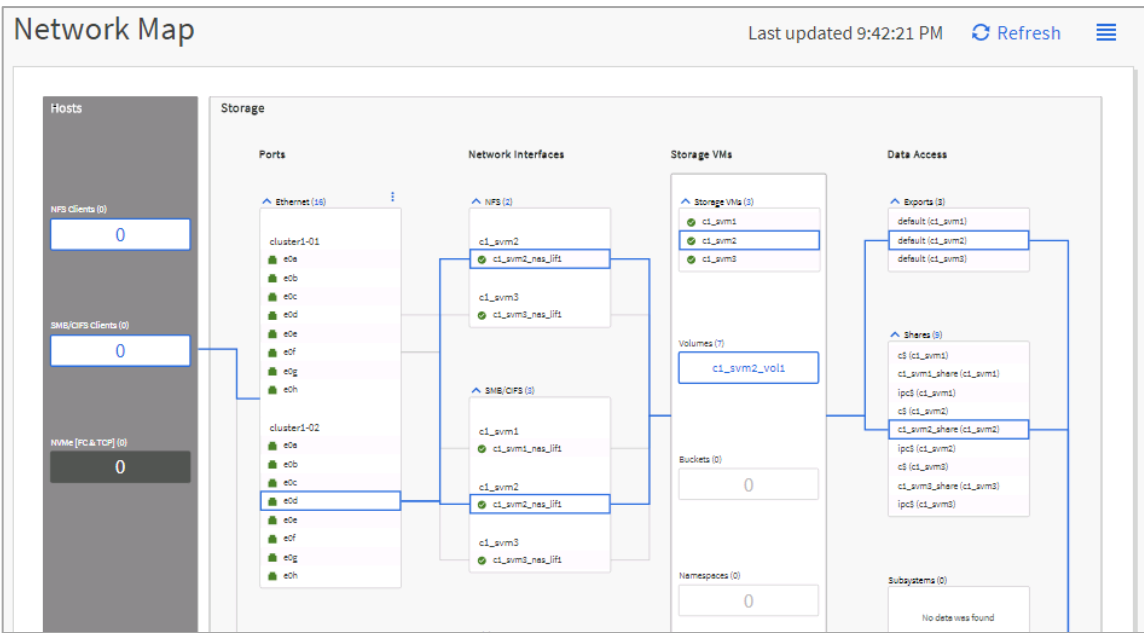
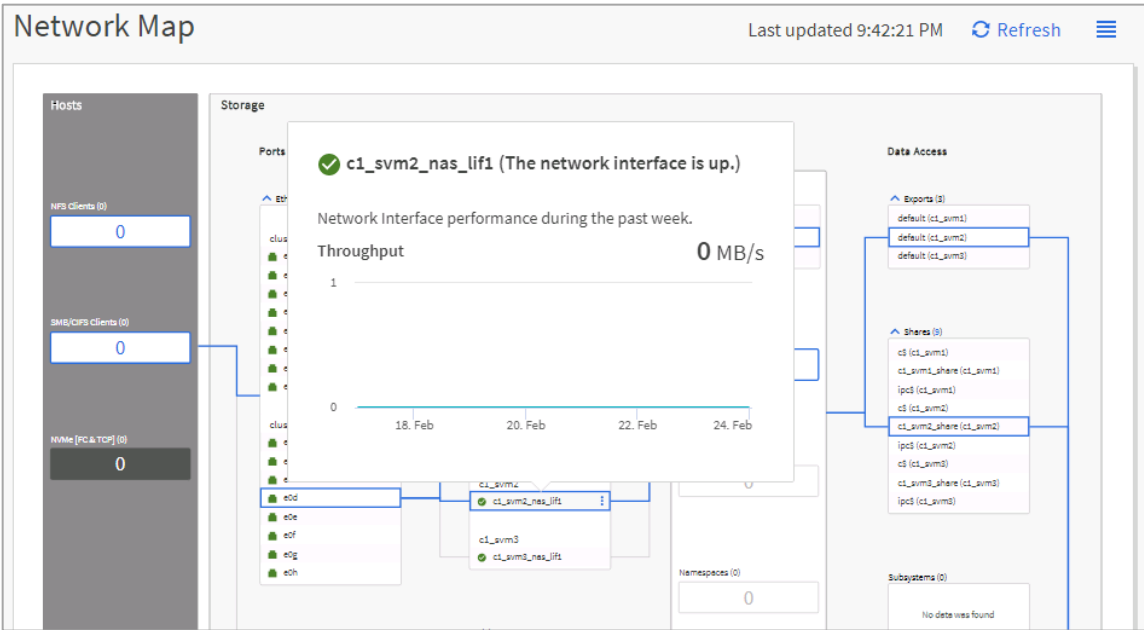
Step	Action
6-21	<p>From the System Manager menu, select Network > Overview.</p> 
6-22	<p>Review the Network Interfaces pane.</p> 
6-23	<p>Answer the following question: Which network interfaces belong to c1_svm2?</p> <p>_____</p>

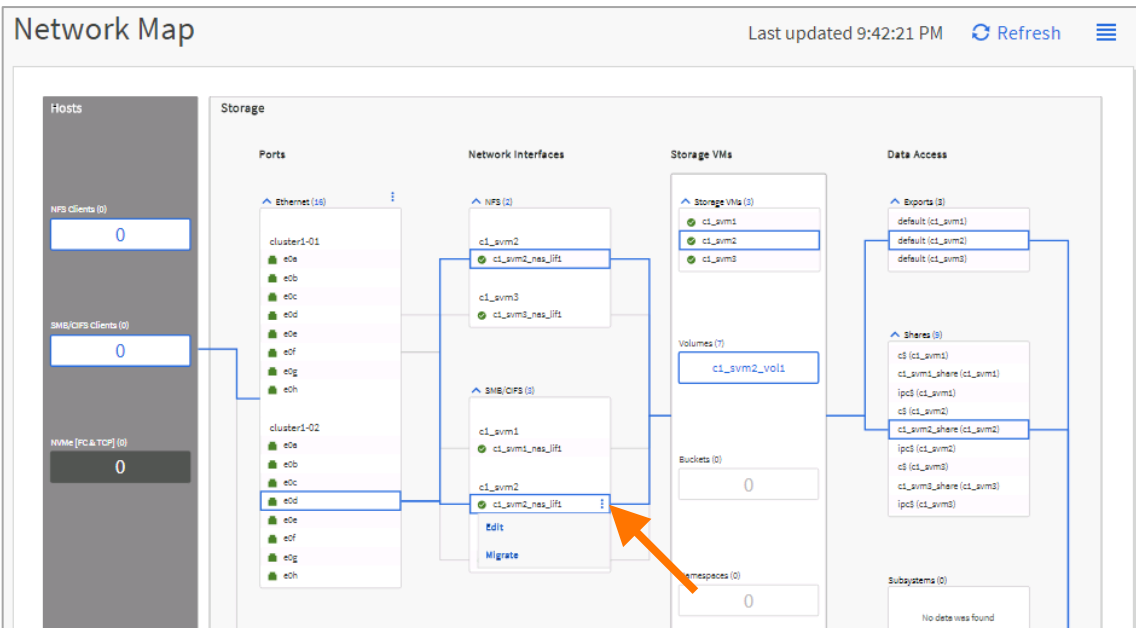
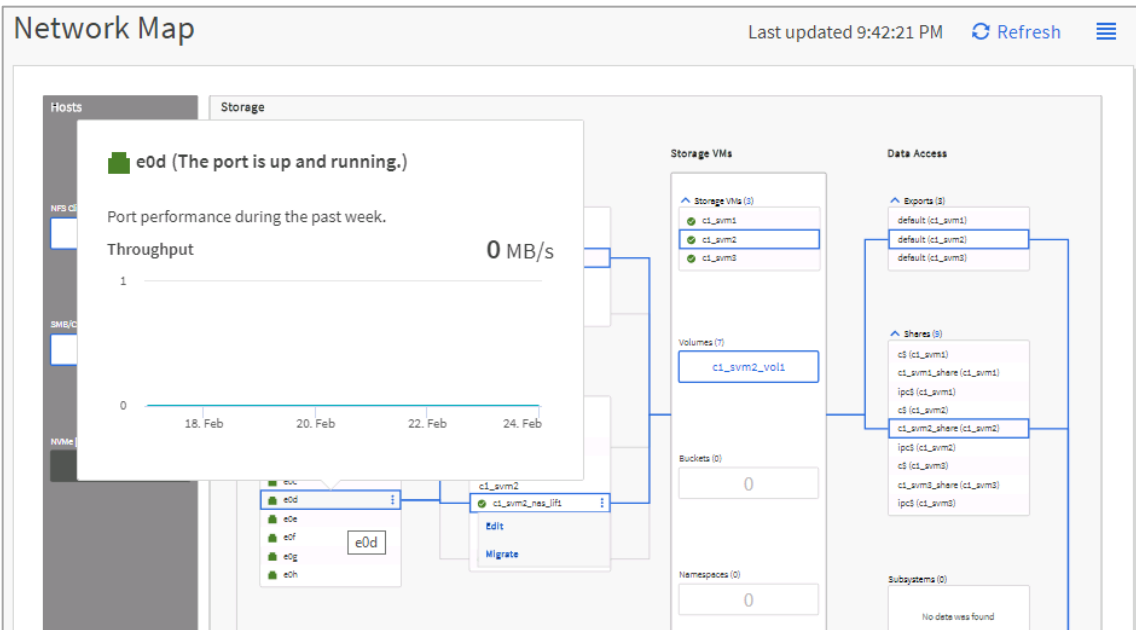
Step	Action
6-24	<div>From the System Manager menu, select Storage > Tiers.</div> <div></div>
6-25	<div>Review the Tiers page.</div> <div></div>
6-26	<div>On the navigation pane, click Dashboard.</div>

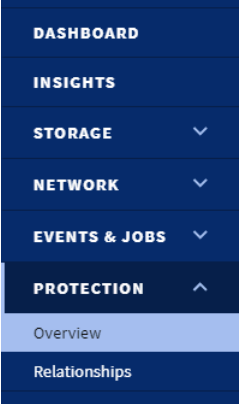
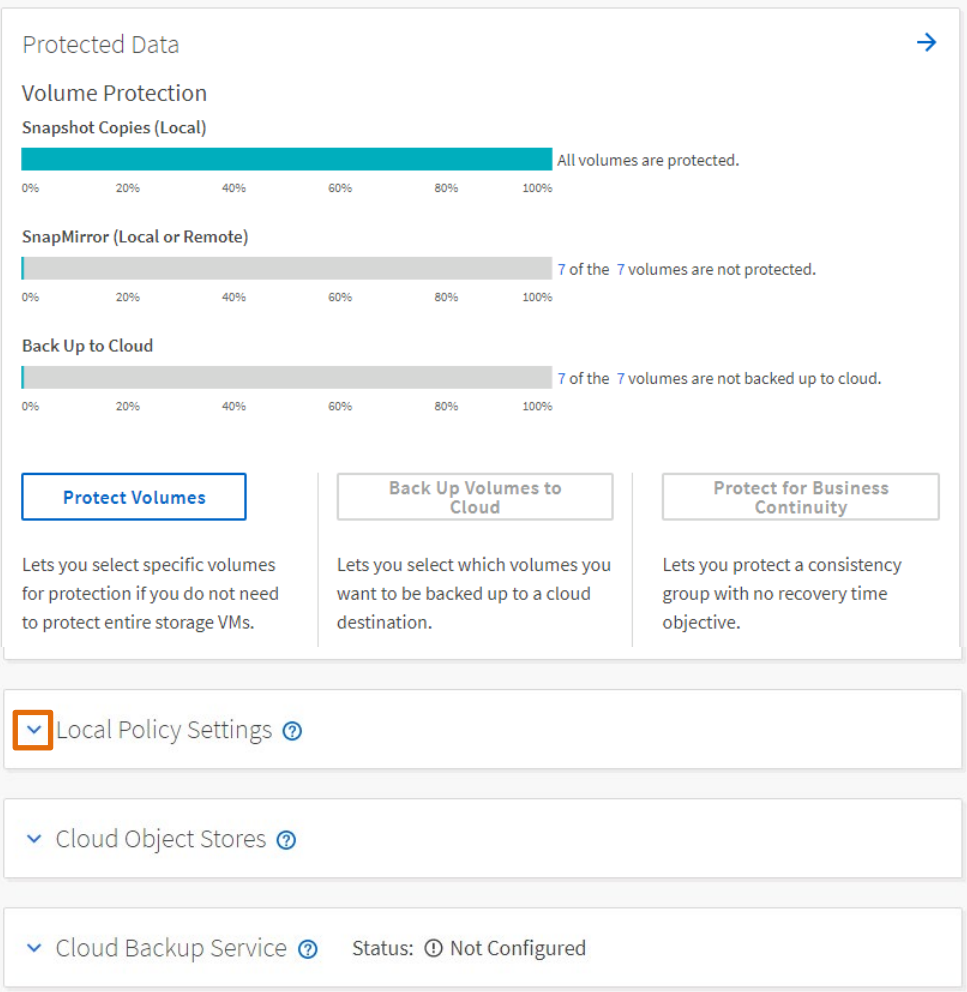
Step	Action
6-27	<p>From the System Manager Dashboard, click the right arrow in the Network pane to navigate to the Network Map page.</p>  <p>The screenshot displays the ONTAP System Manager interface for 'cluster1' (Version 9.11.1). The left sidebar contains navigation links: DASHBOARD, INSIGHTS, STORAGE, NETWORK, EVENTS & JOBS, PROTECTION, HOSTS, and CLUSTER. The main content area is divided into four panels:</p> <ul style="list-style-type: none"> Health: Shows 'Cluster is healthy' with a green checkmark and a right arrow button. Capacity: Displays '4.09 GiB USED AND RESERVED' and '46.9 GiB AVAILABLE'. It includes a progress bar and a '2.41 to 1 Data Reduction' metric. A note indicates 'No cloud tier (FabricPool)' and a link to 'Register with Active IQ to view historical data'. Performance: Shows 'Latency' with a graph and a value of '0 ms'. The graph has a time range from 19:15 to 20:00. Network: Contains a diagram showing 'Storage' (Ports: 16), 'Interfaces' (NFS: 2, S3: 0, SMB/CIFS: 3, NVMe/TCP: 0), and 'Storage VMs' (Volumes: 7, Buckets: 0). A right arrow button is present in the top right corner of the Network pane.

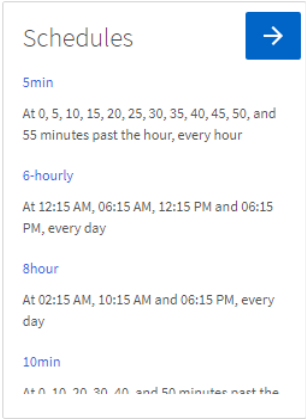
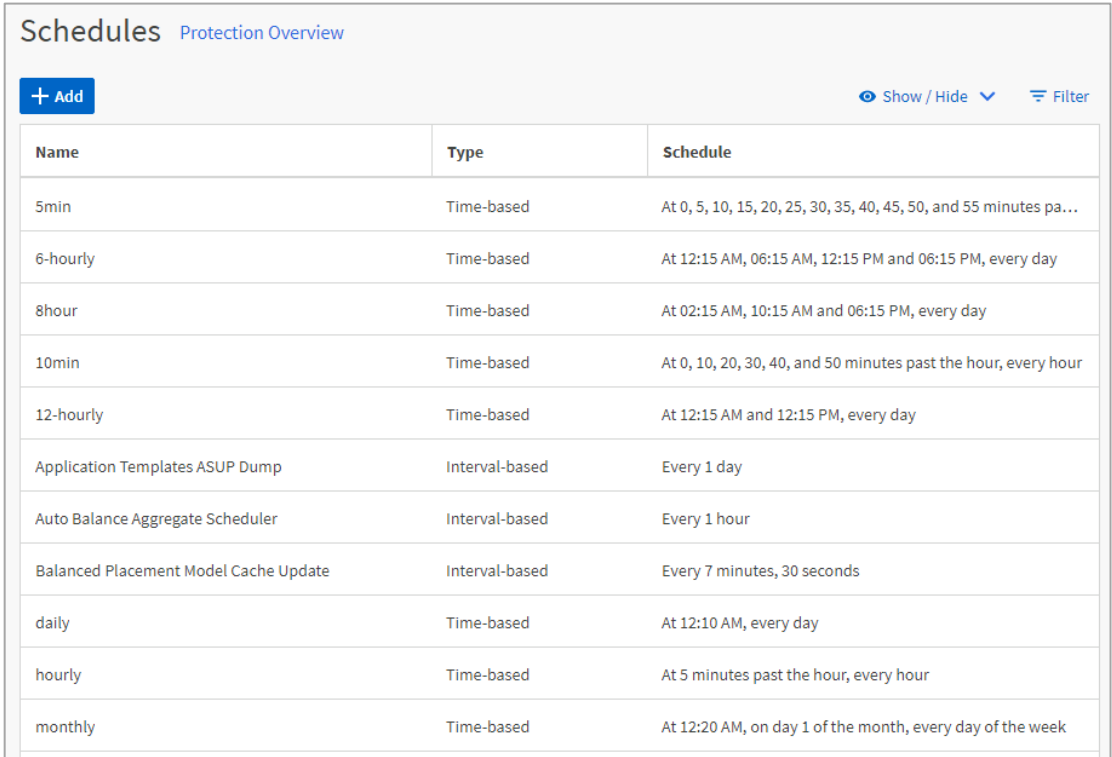
Step	Action
6-28	<p>Review the Network Map page and observe the configured cluster resources.</p>
6-29	<p>In the Network Map page, click the storage VM c1_svm2. Observe that the cluster resources that the storage VM is using are highlighted.</p>

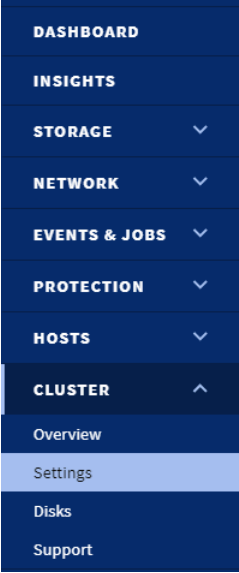
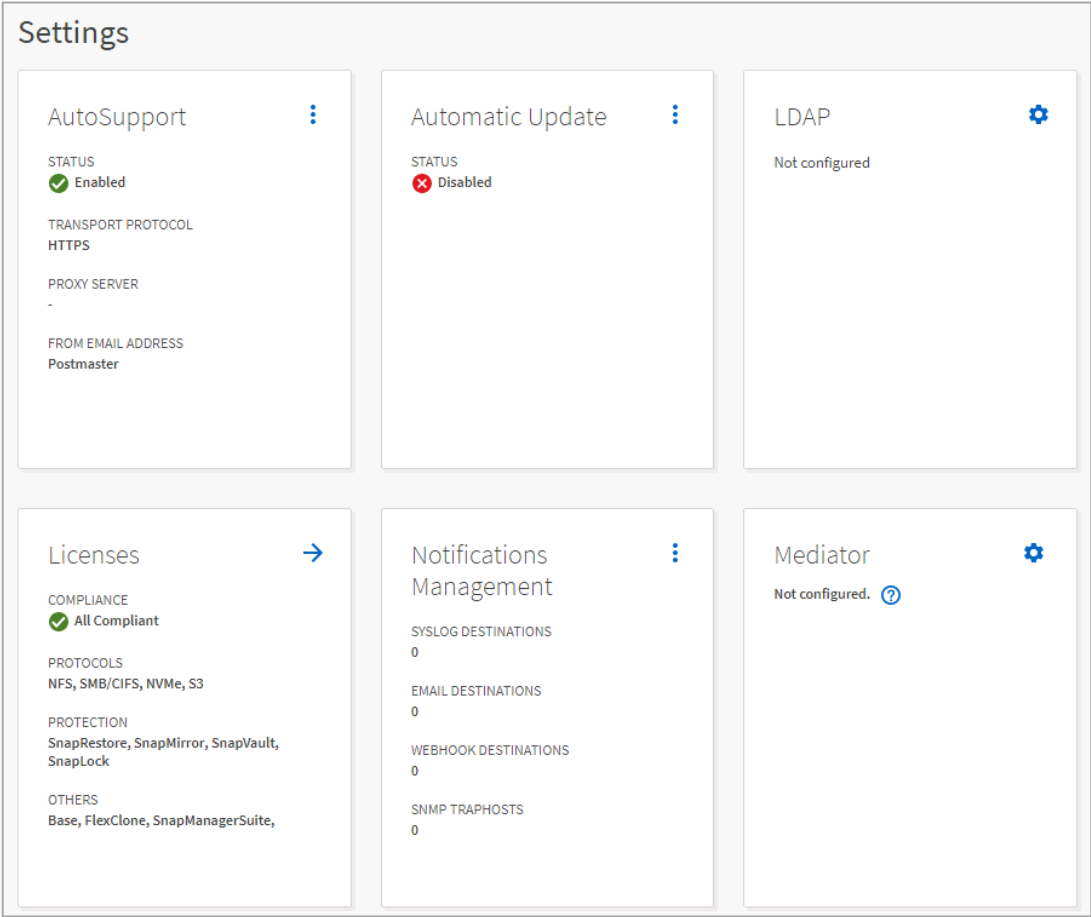
Step	Action
6-30	While c1_svm2 is selected, click the number “2” in the volumes box in the Storage VMs list. 
6-31	Use the menu in the Choose a Volume window to select volume c1_svm2_vol1 . 
6-32	Click Apply .

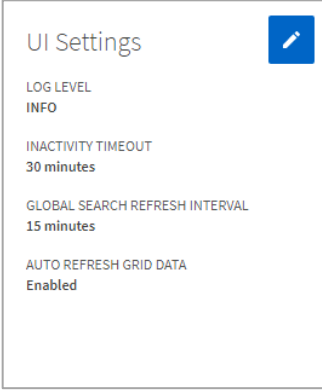
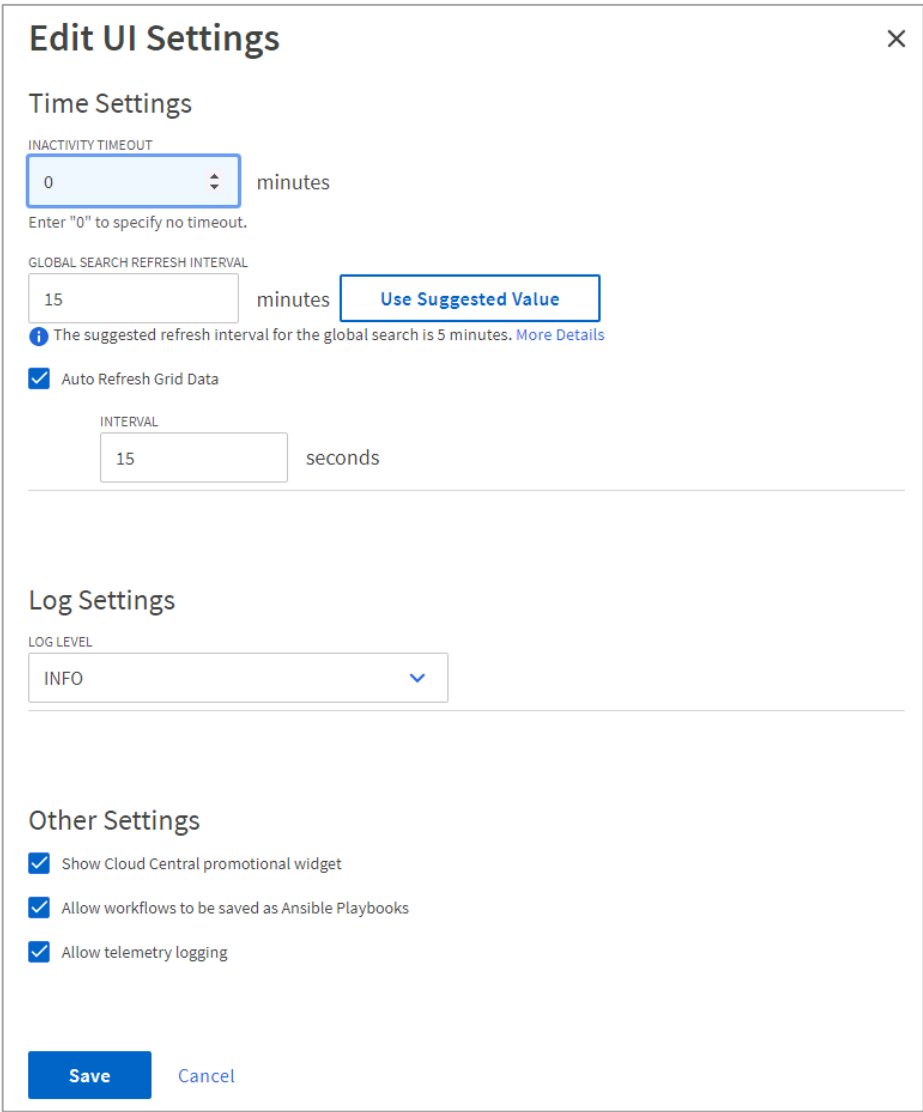

Step	Action
6-33	<p>Observe that the Network Map was updated to highlight only the cluster resources that relate to volume <code>c1_svm2_vol1</code>.</p>  <p>The screenshot shows the 'Network Map' interface. The 'Hosts' section on the left has three categories: 'NFS Clients (0)' with a value of 0, 'SMB/CIFS Clients (0)' with a value of 0, and 'iWMB [FC,AL,TCP] (0)' with a value of 0. The 'Storage' section is divided into 'Ports' and 'Network Interfaces'. Under 'Ports', 'cluster1-01' and 'cluster1-02' are listed with their respective ports (e0e, e0b, e0c, e0d, e0f, e0g, e0h). Under 'Network Interfaces', 'c1_svm2' and 'c1_svm3' are listed with their respective interfaces (c1_svm2_nas_lif1, c1_svm3_nas_lif1). The 'Storage VMs' section shows 'Storage VMs (3)' with 'c1_svm1', 'c1_svm2', and 'c1_svm3'. The 'Data Access' section shows 'Exports (3)' with 'default (c1_svm1)', 'default (c1_svm2)', and 'default (c1_svm3)'. The 'Shares (9)' section shows 'c1_svm1_share (c1_svm1)', 'c1_svm2_share (c1_svm2)', and 'c1_svm3_share (c1_svm3)'. The 'Volumes (7)' section shows 'c1_svm2_vol1'. The 'Buckets (0)' and 'Namespaces (0)' sections show 0. The 'Subsystems (0)' section shows 'No data was found'.</p>
6-34	<p>Position your cursor over SMB/CIFS LIF <code>c1_svm2_nas_lif1</code> and observe the LIF status and throughput.</p>  <p>The screenshot shows the 'Network Map' interface with a tooltip for 'c1_svm2_nas_lif1'. The tooltip displays a green checkmark and the text 'c1_svm2_nas_lif1 (The network interface is up.)'. Below this, it shows 'Network Interface performance during the past week.' and 'Throughput 0 MB/s'. A line graph shows throughput over time from 18. Feb to 24. Feb, with a peak of 1 MB/s. The background shows the same 'Network Map' interface as in the previous screenshot.</p>


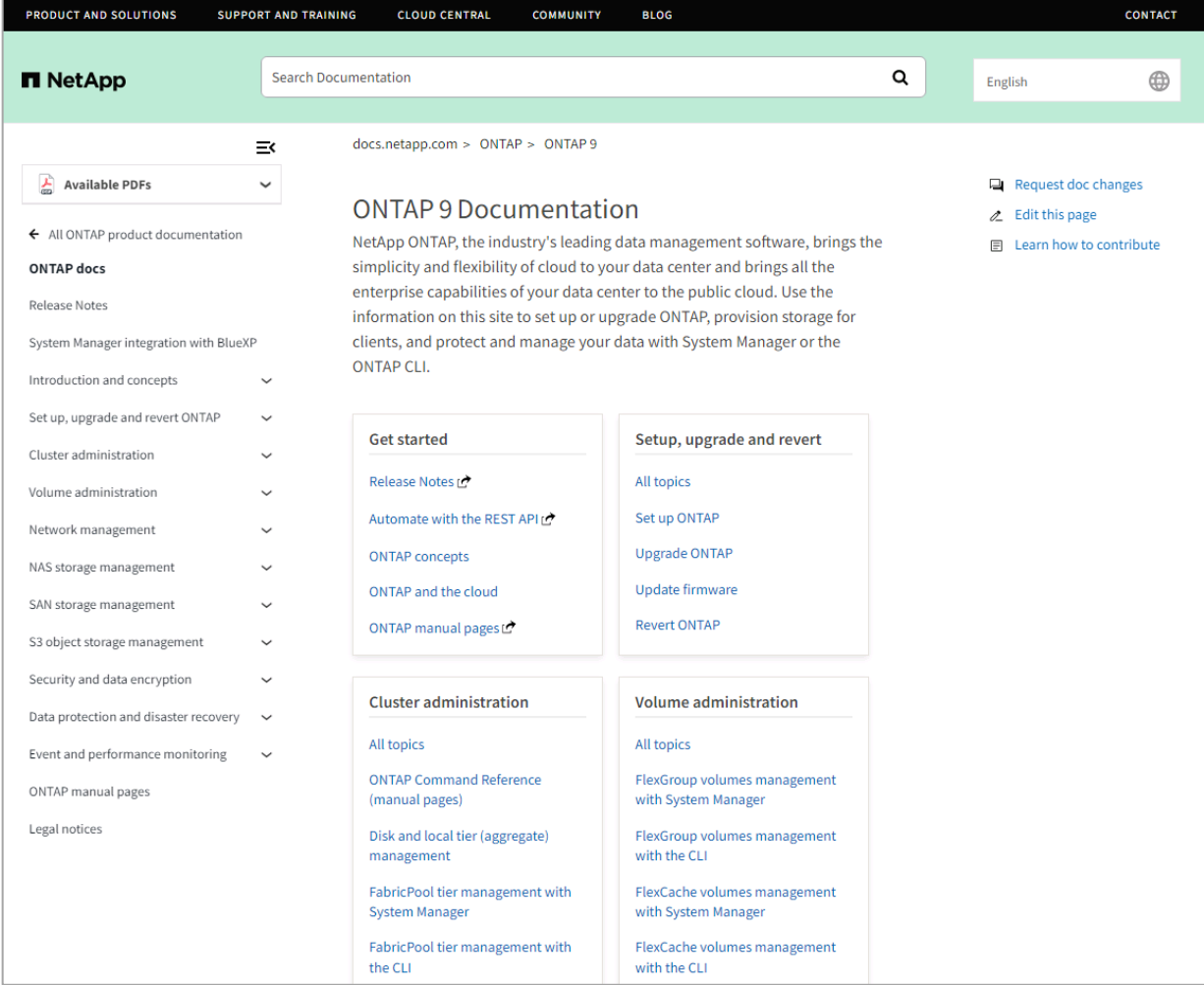
Step	Action
6-35	<p>Click the more menu button for LIF <code>c1_svm2_nas_lif1</code>, and observe that you can edit or migrate the LIF.</p> 
6-36	<p>Position your cursor over network port <code>e0d</code> on node <code>cluster1-02</code>, and observe the port status and throughput.</p> 
6-37	<p>From the System Manager menu, explore the remaining selections under Storage.</p>

Step	Action
6-38	<p>From the System Manager menu, click Protection, and then click Overview.</p>  <p>The screenshot shows a vertical menu with the following items: DASHBOARD, INSIGHTS, STORAGE (with a downward chevron), NETWORK (with a downward chevron), EVENTS & JOBS (with a downward chevron), PROTECTION (with an upward chevron), Overview (highlighted in light blue), and Relationships.</p>
6-39	<p>In the Overview page, expand the Local Policy Settings panel by clicking the chevron.</p>  <p>The screenshot displays the 'Protected Data' overview page. It includes three progress bars: 'Snapshot Copies (Local)' at 100% (All volumes are protected), 'SnapMirror (Local or Remote)' at 0% (7 of the 7 volumes are not protected), and 'Back Up to Cloud' at 0% (7 of the 7 volumes are not backed up to cloud). Below these are three buttons: 'Protect Volumes', 'Back Up Volumes to Cloud', and 'Protect for Business Continuity'. At the bottom, there are three expandable panels: 'Local Policy Settings' (with a chevron icon), 'Cloud Object Stores', and 'Cloud Backup Service' (with a status indicator 'Status: Not Configured').</p>

Step	Action
6-40	<p>Click the right arrow in the Schedules pane to navigate to the Schedules page.</p> 
6-41	<p>Review the Schedules page.</p> 

Step	Action
6-42	<p>From the System Manager menu, select Cluster > Settings.</p>  <p>The screenshot shows a vertical menu with the following items: DASHBOARD, INSIGHTS, STORAGE (with a dropdown arrow), NETWORK (with a dropdown arrow), EVENTS & JOBS (with a dropdown arrow), PROTECTION (with a dropdown arrow), HOSTS (with a dropdown arrow), CLUSTER (with an upward arrow), Overview, Settings (highlighted in light blue), Disks, and Support.</p>
6-43	<p>Explore each of the panes of the Settings page:</p>  <p>The screenshot shows the 'Settings' page with six configuration panes arranged in a 2x3 grid:</p> <ul style="list-style-type: none"> AutoSupport: STATUS is Enabled (green checkmark). TRANSPORT PROTOCOL is HTTPS. PROXY SERVER is -. FROM EMAIL ADDRESS is Postmaster. Automatic Update: STATUS is Disabled (red X). LDAP: Not configured (gear icon). Licenses: COMPLIANCE is All Compliant (green checkmark). PROTOCOLS include NFS, SMB/CIFS, NVMe, S3. PROTECTION includes SnapRestore, SnapMirror, SnapVault, SnapLock. OTHERS include Base, FlexClone, SnapManagerSuite. Notifications Management: SYSLOG DESTINATIONS is 0. EMAIL DESTINATIONS is 0. WEBHOOK DESTINATIONS is 0. SNMP TRAPHOSTS is 0. Mediator: Not configured (gear icon and question mark icon).

Step	Action
6-44	<p>In the UI Settings pane, click the pencil (Edit) icon.</p> 
6-45	<p>Disable automatic logout due to inactivity by setting the inactivity timeout to 0 minutes.</p> 
6-46	 <p>Disabling automatic logout weakens security and should never be done outside of training environments.</p>

Step	Action
6-47	Click Save .
6-48	<p>For help with any System Manager command, on the menu bar, click the Help (“?”) icon:</p> 
6-49	<p>On the menu bar, click Help, and then explore the ONTAP System Manager documentation:</p> 

End of exercise