

NETAPP UNIVERSITY

# ONTAP Data Protection Administration

Exercise Guide  
Content Version 1.0



NETAPP UNIVERSITY

## ONTAP Data Protection Administration

### Exercise Guide

Course ID: STRSW-ILT-DATAPROT-REV07  
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## MODULE 0: GETTING STARTED

### EXERCISE 0: WELCOME TO ONTAP DATA PROTECTION ADMINISTRATION

In this exercise, you familiarize yourself with your equipment, synchronize system time, assign a Network Time Protocol (NTP) time server, and ensure that licenses have been installed.

#### OBJECTIVES

This exercise focuses on enabling you to do the following:

- Ensure connectivity to an ONTAP cluster.
- Synchronize system time between the ONTAP clusters and the Windows domain controller.
- Assign a network time server IP address for the ONTAP clusters.
- Ensure that required licenses are installed on the ONTAP clusters.

#### STUDY-AID ICONS

These four icons are used throughout the exercise to identify steps that require your special attention.

##### Warning



You should follow all of the exercise steps, but misconfiguring steps labeled with this icon might cause later steps to not work properly. Check this step carefully before continuing to the next step.

##### Attention



Steps or comments labeled with this icon should be reviewed carefully to save time, learn a best practice, or avoid errors.

##### Information



Comments labeled with this icon provide additional information about the topic or procedure.

##### Knowledge



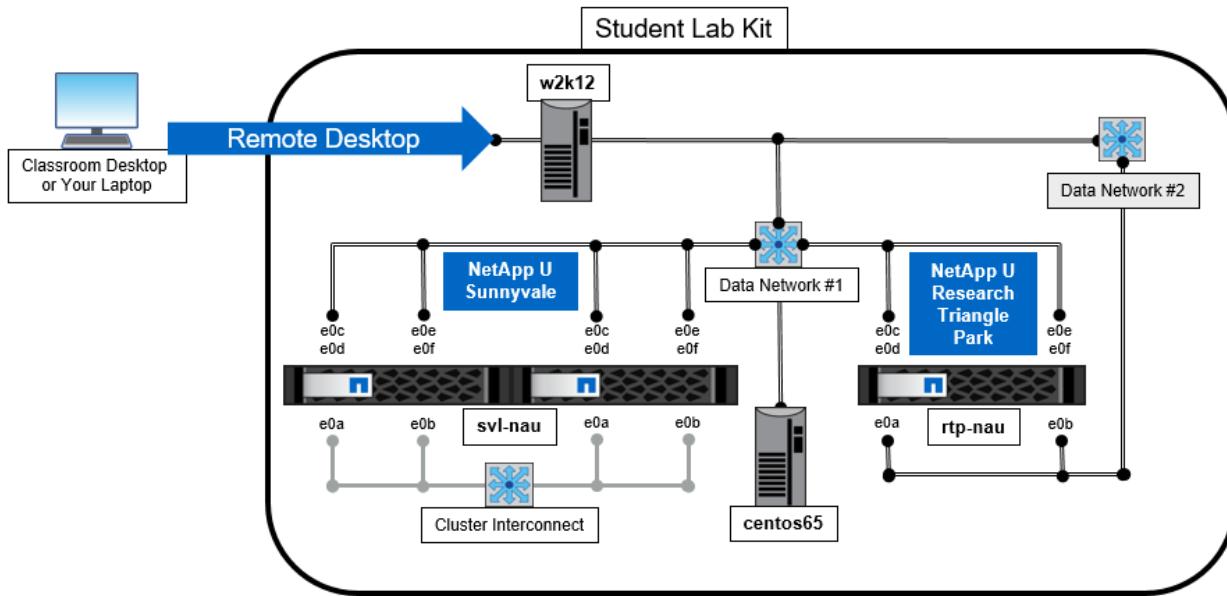
Comments labeled with this icon provide reference material that gives additional context that you may find useful.

## EXERCISE EQUIPMENT DIAGRAM

Your lab contains the following virtual machines:

- Windows 2012 Server with Domain Controller and DNS Server Manager
- ONTAP svl-nau, a 2-node cluster; ONTAP rtp-nau, a 1-node cluster
- A CentOS 6.4 Linux server

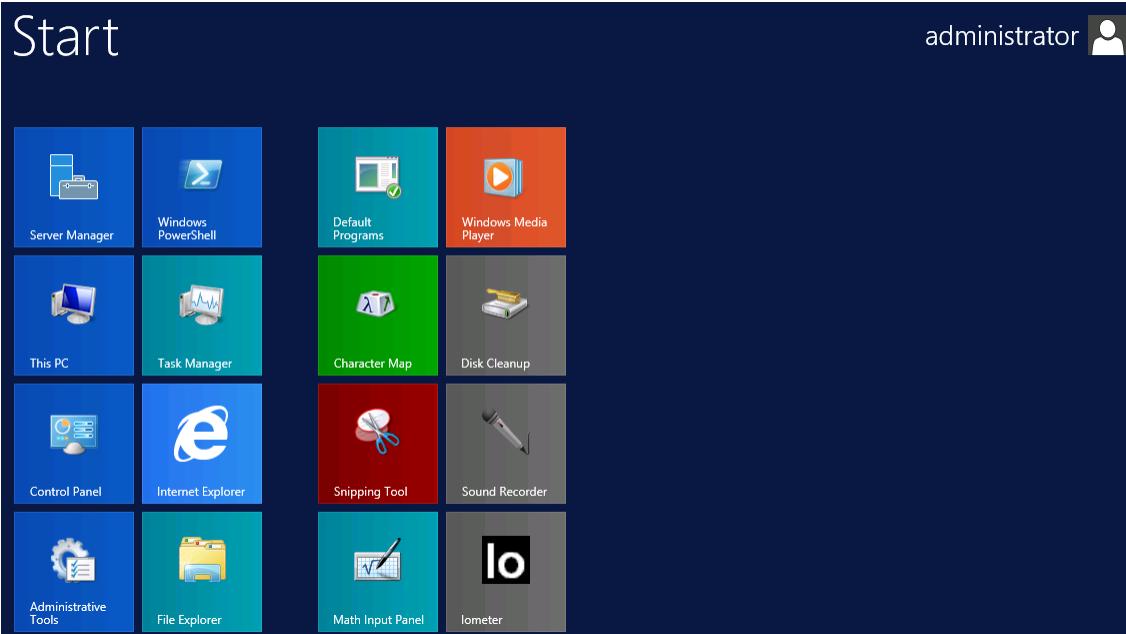
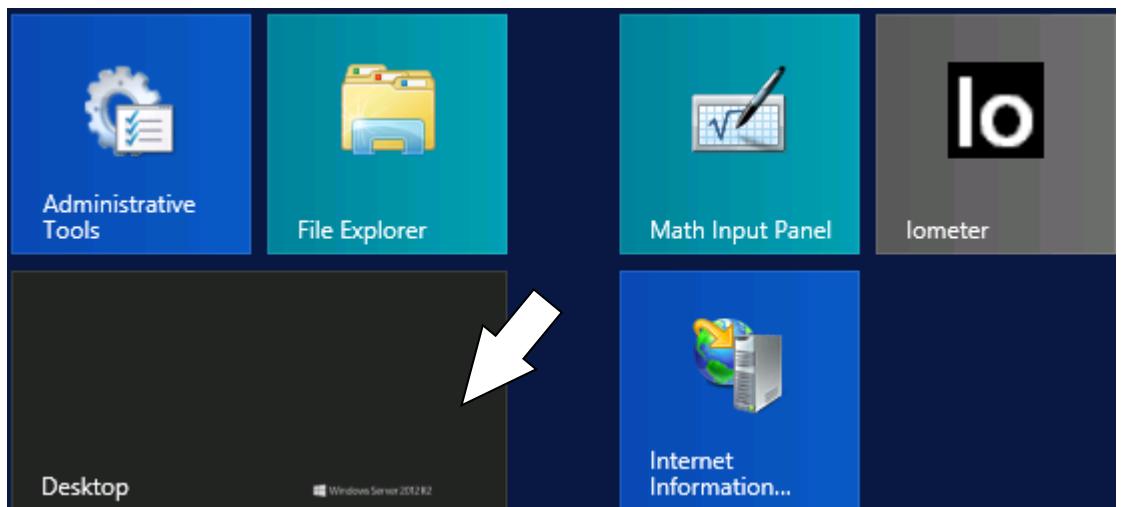
When you use the connection information that was assigned to you by your instructor, you are first connected via Remote Desktop to a Windows 2012 Server. From this Windows desktop, you connect to the other servers in your exercise environment.

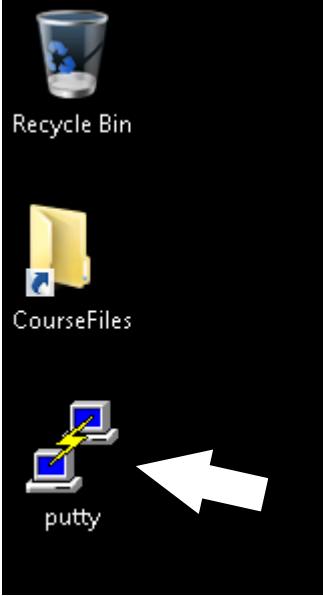
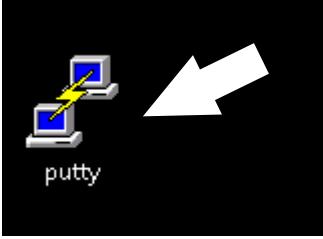


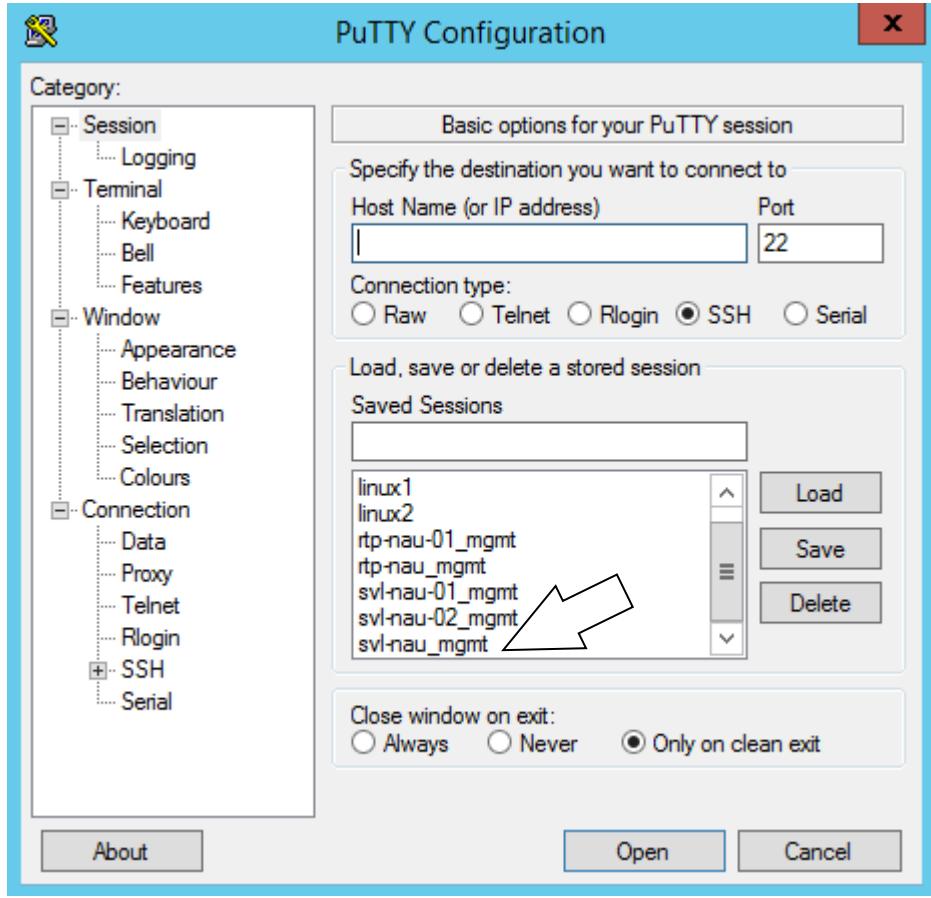
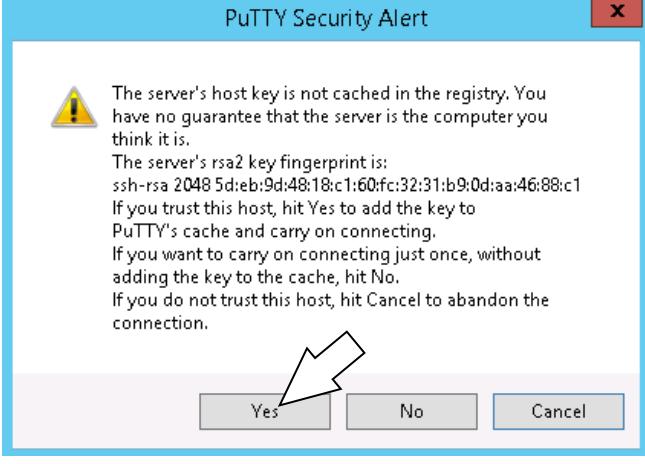
Machine	Host Name	IP Addresses	User Name	Password
Windows 2012 Server	w2k12	192.168.0.11	LEARN\Administrator	Netapp123
ONTAP cluster management LIF	svl-nau	192.168.0.50	admin (case sensitive)	Netapp123
node 1	svl-nau-01	192.168.0.51	admin (case sensitive)	Netapp123
node 2	svl-nau-02	192.168.0.52	admin (case sensitive)	Netapp123
ONTAP cluster management LIF	rtp-nau	192.168.0.100	admin (case sensitive)	Netapp123
node 1	rtp-nau-01	192.168.0.101	admin (case sensitive)	Netapp123
Linux Server	CentOS65	192.168.0.21	root	Netapp123

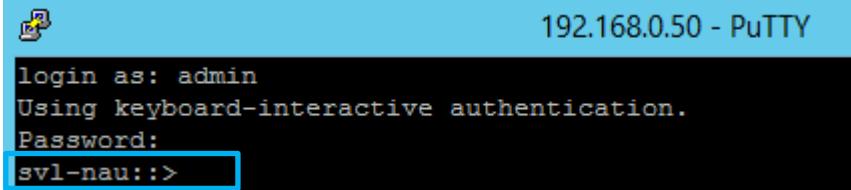
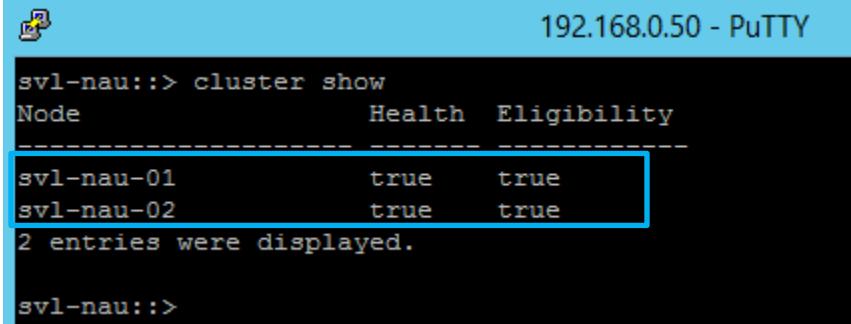
## TASK 1: ENSURE CONNECTIVITY TO YOUR ONTAP CLUSTER

In this task, you familiarize yourself with the Windows 2012 Server desktop. You ensure connectivity to the ONTAP cluster and verify the health of the ONTAP cluster.

STEP	ACTION
1.	<p>Ensure that you see the Start page of your assigned Windows 2012 Server.</p> 
2.	<p>On the Windows 2012 Server Start page, scroll down and click the <b>Desktop</b> tile.</p> 

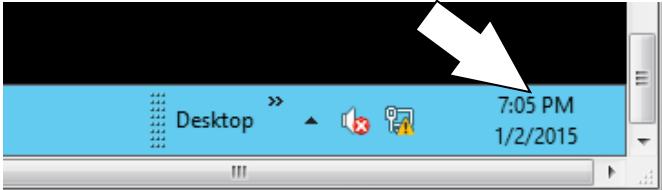
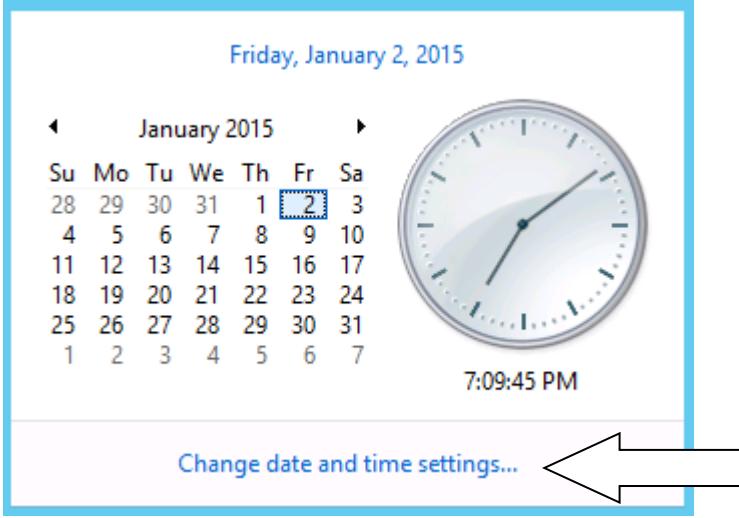
STEP	ACTION
3.	<p>Verify that you see the desktop and that it contains the PuTTY program.</p> 
4.	<p> To connect to the ONTAP cluster UI, browse to the NetApp OnCommand System Manager URL which is built in to ONTAP 9.0.</p> <p>To connect to the CLI of the ONTAP cluster, you use PuTTY. PuTTY is a UI for the Telnet and Secure Shell (SSH) protocols.</p>
5.	<p>Double-click the PuTTY shortcut:</p> 

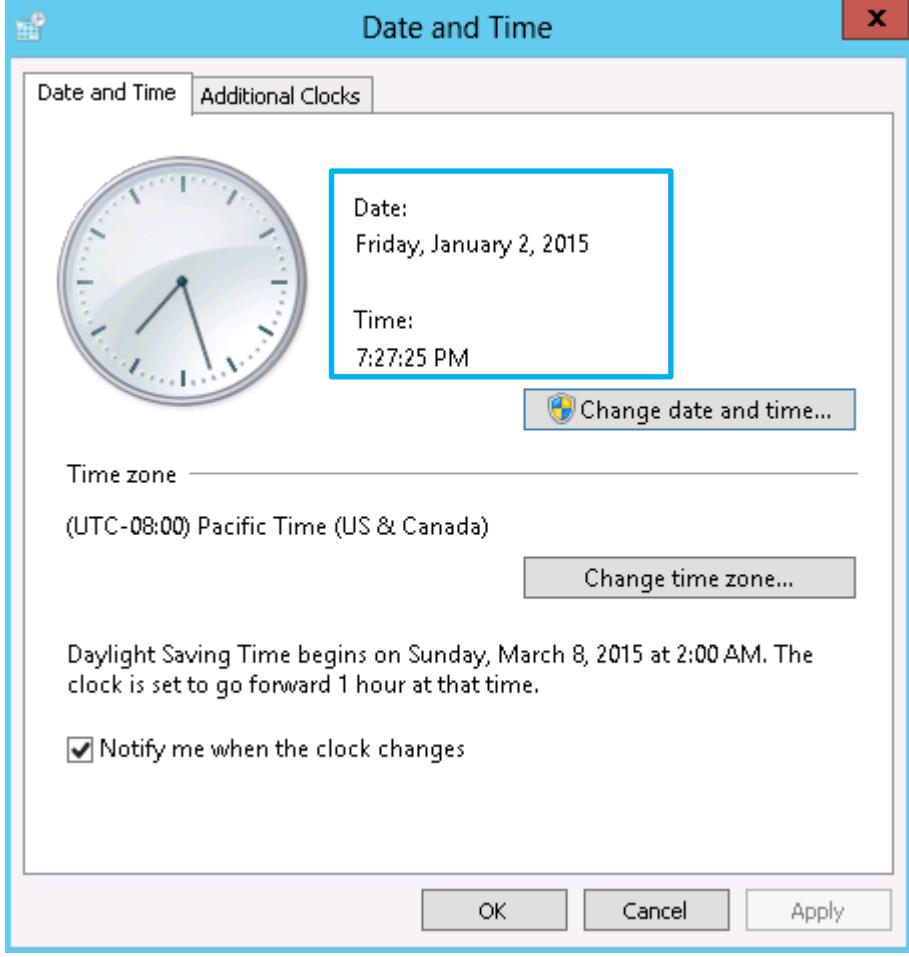
STEP	ACTION
6.	<p>In the PuTTY Configuration dialog box, verify that the svl-nau-mgmt saved session is listed.</p> <p>Double-click <b>svl-nau_mgmt</b>:</p>  <p>The screenshot shows the PuTTY Configuration dialog box. The left sidebar lists categories: Session, Terminal, Window, Connection, and SSH. Under Session, Logging, Bell, and Features are expanded. Under Window, Appearance, Behaviour, Translation, Selection, and Colours are listed. Under Connection, Data, Proxy, Telnet, Rlogin, and Serial are listed. Under SSH, SFTP, and Serial are listed. The right pane shows 'Basic options for your PuTTY session' with 'Host Name (or IP address)' and 'Port' fields. Below that is a 'Saved Sessions' list containing 'linux1', 'linux2', 'rtp-nau-01_mgmt', 'rtp-nau_mgmt', 'svl-nau-01_mgmt', 'svl-nau-02_mgmt', and 'svl-nau_mgmt'. An arrow points to the 'svl-nau_mgmt' entry in the list. At the bottom are 'Load', 'Save', and 'Delete' buttons, and a 'Close window on exit:' section with radio buttons for 'Always', 'Never', and 'Only on clean exit' (which is selected).</p>
7.	 <p>You can also connect to the ONTAP cluster CLI by connecting to any node in the cluster: svl-nau-01_mgt (node 1) or svl-nau-02_mgt (node 2).</p>
8.	<p>The first time you connect, you receive a PuTTY Security Alert. Click Yes.</p>  <p>The screenshot shows the PuTTY Security Alert dialog box. It contains a warning message about host key fingerprints and asks if the user trusts the host. It includes 'Yes', 'No', and 'Cancel' buttons. An arrow points to the 'Yes' button.</p>

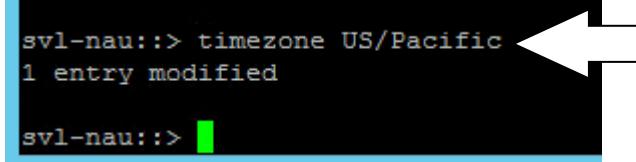
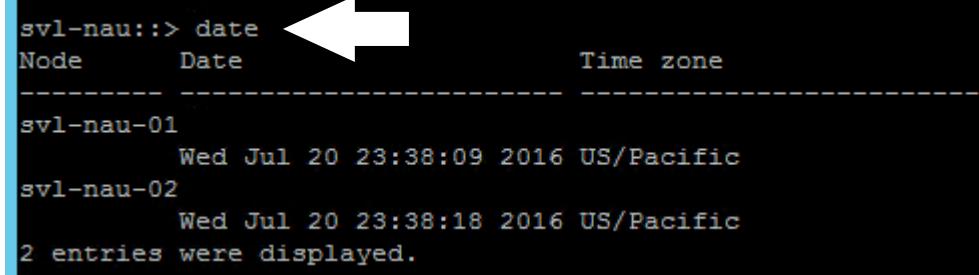
STEP	ACTION										
9.	<p>At the ONTAP cluster login prompt, provide the svl-nau credentials:</p> <ul style="list-style-type: none"> <li>▪ Log in as: <b>admin</b></li> <li>▪ Password: <b>Netapp123</b></li> </ul> <p>The ONTAP cluster CLI prompt and cursor appear.</p> 										
10.	<p> If you have any difficulty logging in to the ONTAP cluster CLI, refer to this table. Ensure that you are using the correct username and password in the correct case (both are case-sensitive).</p> <table border="1"> <thead> <tr> <th>System</th> <th>Host Name</th> <th>IP Address</th> <th>User Name</th> <th>Password</th> </tr> </thead> <tbody> <tr> <td>ONTAP cluster management LIF</td> <td>svl-nau</td> <td>192.168.0.50</td> <td>admin (case sensitive)</td> <td>Netapp123</td> </tr> </tbody> </table>	System	Host Name	IP Address	User Name	Password	ONTAP cluster management LIF	svl-nau	192.168.0.50	admin (case sensitive)	Netapp123
System	Host Name	IP Address	User Name	Password							
ONTAP cluster management LIF	svl-nau	192.168.0.50	admin (case sensitive)	Netapp123							
11.	<p>Verify that both nodes of the ONTAP cluster are healthy and eligible:</p> <pre>cluster show</pre>  <table border="1"> <thead> <tr> <th>Node</th> <th>Health</th> <th>Eligibility</th> </tr> </thead> <tbody> <tr> <td>svl-nau-01</td> <td>true</td> <td>true</td> </tr> <tr> <td>svl-nau-02</td> <td>true</td> <td>true</td> </tr> </tbody> </table> <p>2 entries were displayed.</p> <p>svl-nau::&gt;</p>	Node	Health	Eligibility	svl-nau-01	true	true	svl-nau-02	true	true	
Node	Health	Eligibility									
svl-nau-01	true	true									
svl-nau-02	true	true									
12.	 <p>If the health or eligibility of either node is listed as false, alert your instructor.</p>										

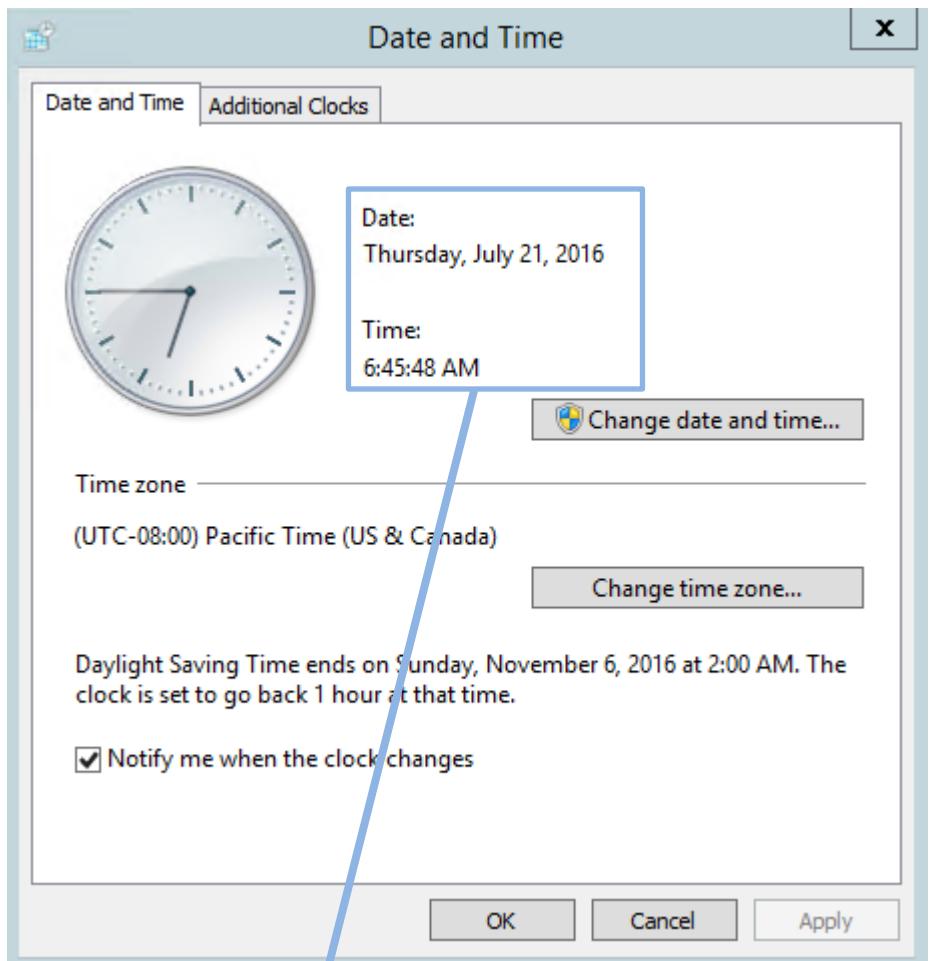
## TASK 2: SYNCHRONIZE SYSTEM TIME FOR WINDOWS DOMAINS

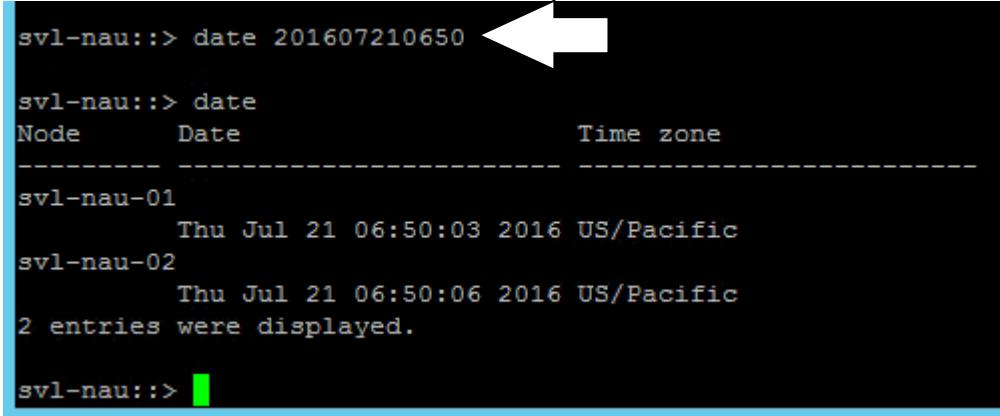
In this task, you manually synchronize the time zone, system date, and time on the Windows 2012 Server to the system date and time in the ONTAP cluster.

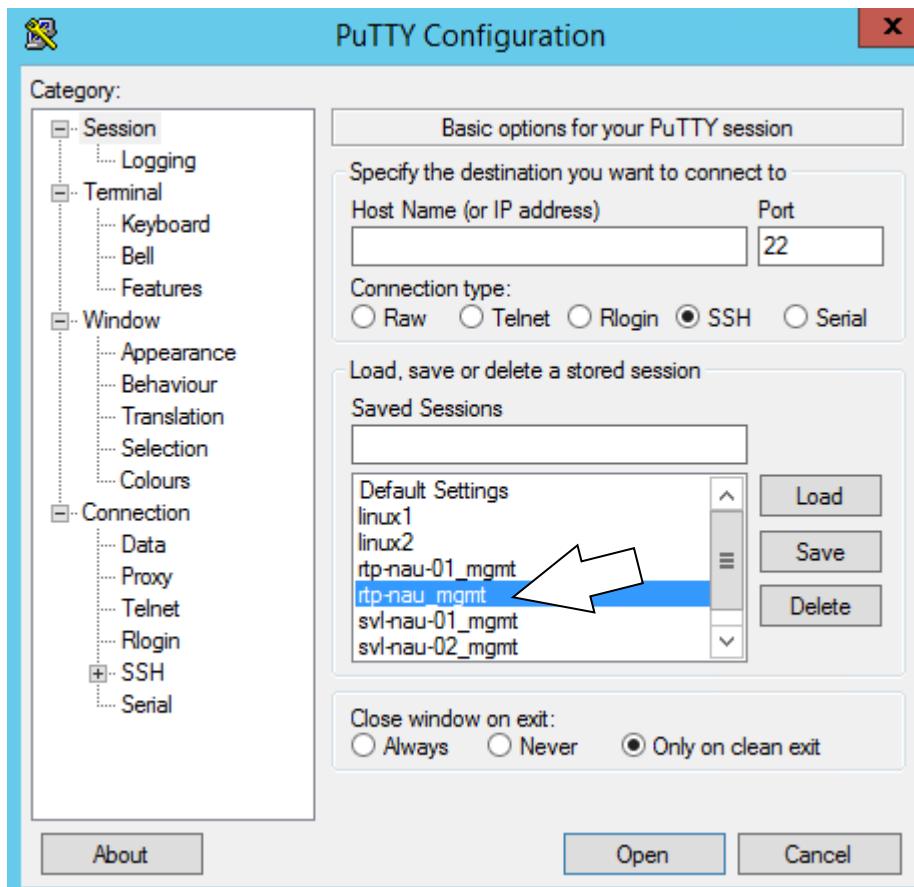
STEP	ACTION
1.	<p> Windows domains must be synchronized to within 5 minutes of all member servers. If the time of the ONTAP cluster is not synchronized with a domain controller, then the ONTAP cluster cannot join or remain joined to the Windows domain.</p> <p>Without synchronization, computers in the Windows domain cannot access resources in the ONTAP cluster, and resources in the cluster cannot access the Windows domain.</p> <p>In the next steps, you synchronize date and time between the ONTAP clusters and the Windows domain controller.</p>
2.	<p>Display the date and time on the Windows 2012 Server desktop by clicking the time and date display in the lower-right corner of the desktop window:</p> 
3.	<p>To view the time zone, date, and time, click <b>Change date and time settings</b>:</p>  <p>The screenshot shows the Windows Control Panel Date and Time settings window. It displays the date as Friday, January 2, 2015, and the time as 7:09:45 PM. A calendar for January 2015 is shown, with the 2nd highlighted. To the right of the calendar is a clock icon showing the current time. At the bottom of the window, there is a blue link labeled "Change date and time settings...". A large white arrow points from the text in step 3 towards this link.</p>

STEP	ACTION
4.	<p>Review the date, time, and time zone on the Windows 2012 Server:</p>  <p>The screenshot shows the Windows Date and Time control panel. It displays the following information:</p> <ul style="list-style-type: none"> <li>Date: Friday, January 2, 2015</li> <li>Time: 7:27:25 PM</li> <li>Time zone: (UTC-08:00) Pacific Time (US &amp; Canada)</li> <li>A note about Daylight Saving Time: Daylight Saving Time begins on Sunday, March 8, 2015 at 2:00 AM. The clock is set to go forward 1 hour at that time.</li> <li>A checked checkbox: <input checked="" type="checkbox"/> Notify me when the clock changes</li> </ul>
5.	 <p>In the following steps, you determine what time zone has been configured on your ONTAP cluster and then, if necessary, you change the cluster time zone to US/Pacific.</p> <h4>Etc/UTC Time Zone</h4> <p>Coordinated Universal Time (UTC) is the primary time standard by which the world regulates clocks and time. UTC is one of several replacements for Greenwich Mean Time (GMT).</p> <p>The zone info database, which is a collaborative compilation of time zone information, has a special area called “Etc.” The Etc area is for administrative zones, particularly for “Etc/UTC,” which represents UTC.</p>
6.	<p>Display the configured time zone on the ONTAP cluster:</p> <pre data-bbox="295 1649 817 1797"><code>timezone svl-nau::&gt; timezone Timezone: Etc/UTC</code></pre>

STEP	ACTION
7.	 Your ONTAP clusters might have a different time zone from the one displayed in this example. However, your goal is to make the time zone of the ONTAP clusters match the time zone of the Windows domain controller. In the next step, verify the time zone of the Windows Server.
8.	On the ONTAP cluster, change the time zone to US/Pacific by entering this case-sensitive command: <pre>timezone US/Pacific</pre> 
9.	Display the date, time, and time zone in the ONTAP cluster: <pre>date</pre> 

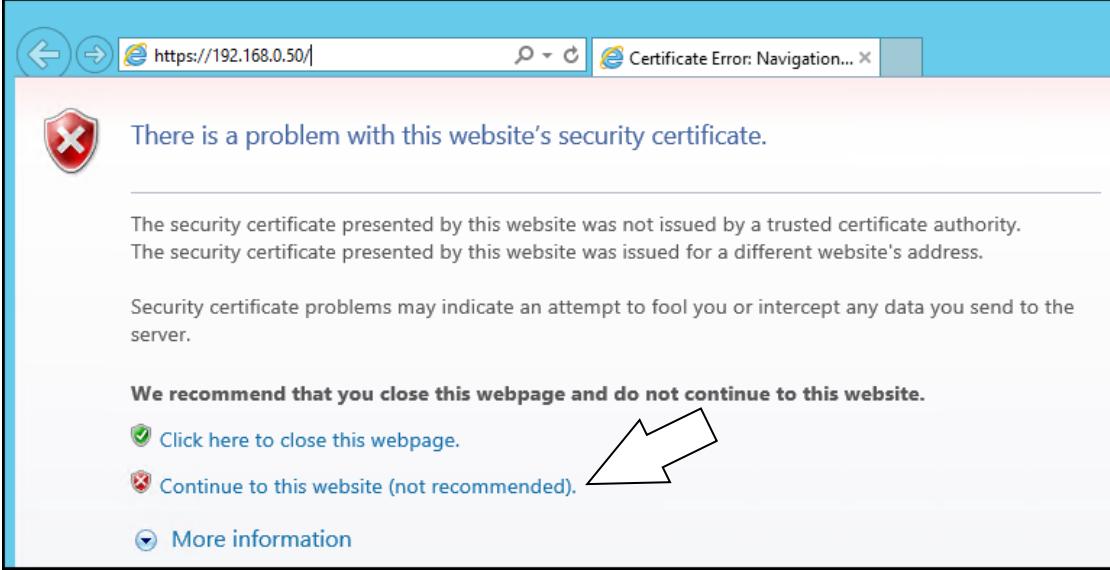
STEP	ACTION
10.	<p>Compare the date and time on the Windows 2012 Server with the date and time in the ONTAP cluster.</p>  <p>The screenshot shows the Windows Date and Time control panel. The 'Date and Time' tab is selected. A callout box highlights the date and time information: 'Date: Thursday, July 21, 2016' and 'Time: 6:45:48 AM'. Below the clock, there is a 'Change date and time...' button. Under 'Time zone', it shows '(UTC-08:00) Pacific Time (US &amp; Canada)' with a 'Change time zone...' button. A note about Daylight Saving Time is present, and a checked checkbox for 'Notify me when the clock changes' is shown. At the bottom are 'OK', 'Cancel', and 'Apply' buttons.</p>
11.	 <p>If the system date and time are not synchronized to within 5-minutes, correct the ONTAP cluster date.</p>

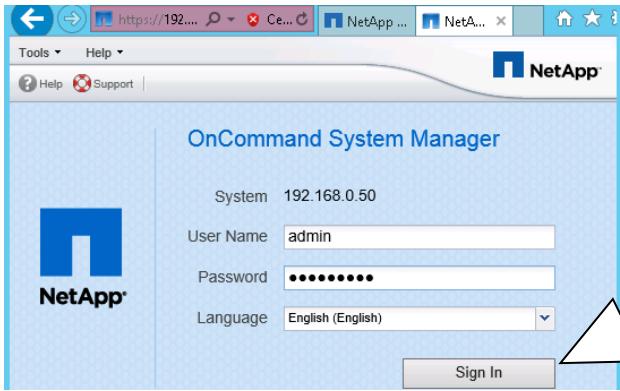
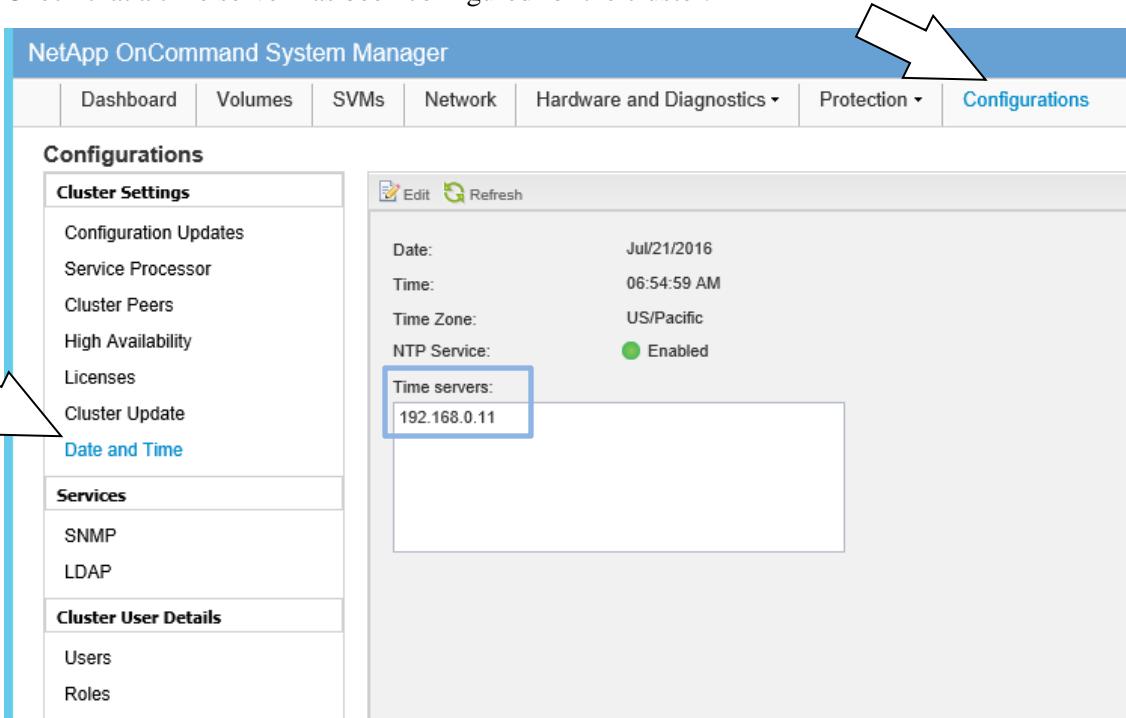
STEP	ACTION
12.	<p>Enter the <code>date</code> command plus the accurate date and time. Use the 24-hour time format with the following syntax:</p> <pre>date [YYYY] [MM] [DD] [HH] [MM]</pre>  <pre> svl-nau::&gt; date 201607210650 ←  svl-nau::&gt; date Node      Date                  Time zone ----- svl-nau-01 Thu Jul 21 06:50:03 2016 US/Pacific svl-nau-02 Thu Jul 21 06:50:06 2016 US/Pacific 2 entries were displayed.  svl-nau::&gt; </pre>
13.	 <p>When you enter the <code>date</code> command on any node in the cluster, the <code>date</code> command sets the date and time on all nodes in the ONTAP cluster.</p> <p>NTP service synchronizes the date and time for all nodes in the cluster. If an NTP time server has been configured, then all nodes in the cluster remain in time sync with the NTP time server.</p>

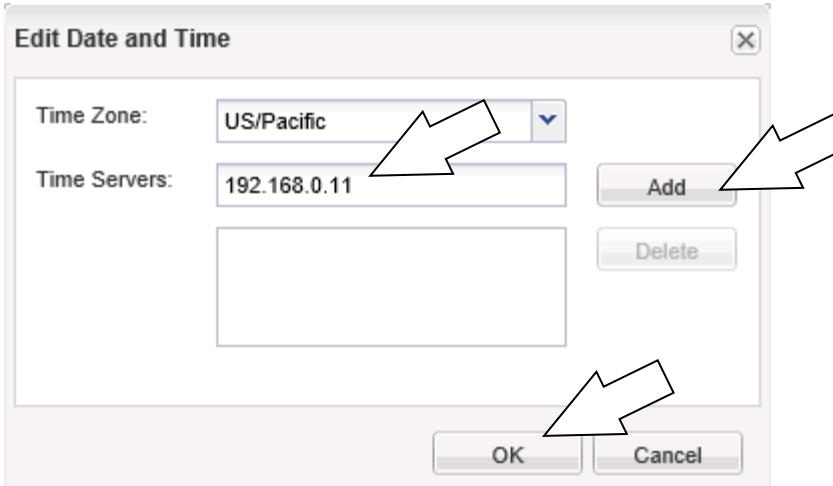
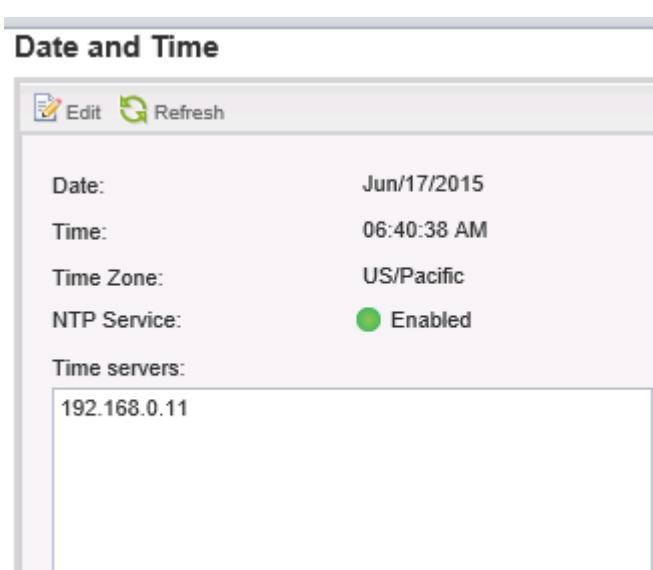
STEP	ACTION
14.	<p>Connect to rtp-nau and repeat Steps 2 -12 to change the time zone and synchronize time for rtp-nau.</p>  <p>The PuTTY Configuration window shows the 'Session' category selected. In the 'Saved Sessions' list, the entry 'rtp-nau_mgmt' is highlighted with a blue arrow pointing to it. The session details are as follows:</p> <ul style="list-style-type: none"> <li>Host Name (or IP address): [redacted]</li> <li>Port: 22</li> <li>Connection type: SSH (radio button selected)</li> <li>Close window on exit: Only on clean exit (radio button selected)</li> </ul> <p>Below the configuration window is a terminal window showing the output of the 'date' command on the 'rtp-nau' node.</p> <pre>rtp-nau::&gt; date Node      Date                  Time zone ----- ----- rtp-nau-01 Thu Jul 21 06:54:11 2016 US/Pacific  rtp-nau::&gt;</pre>

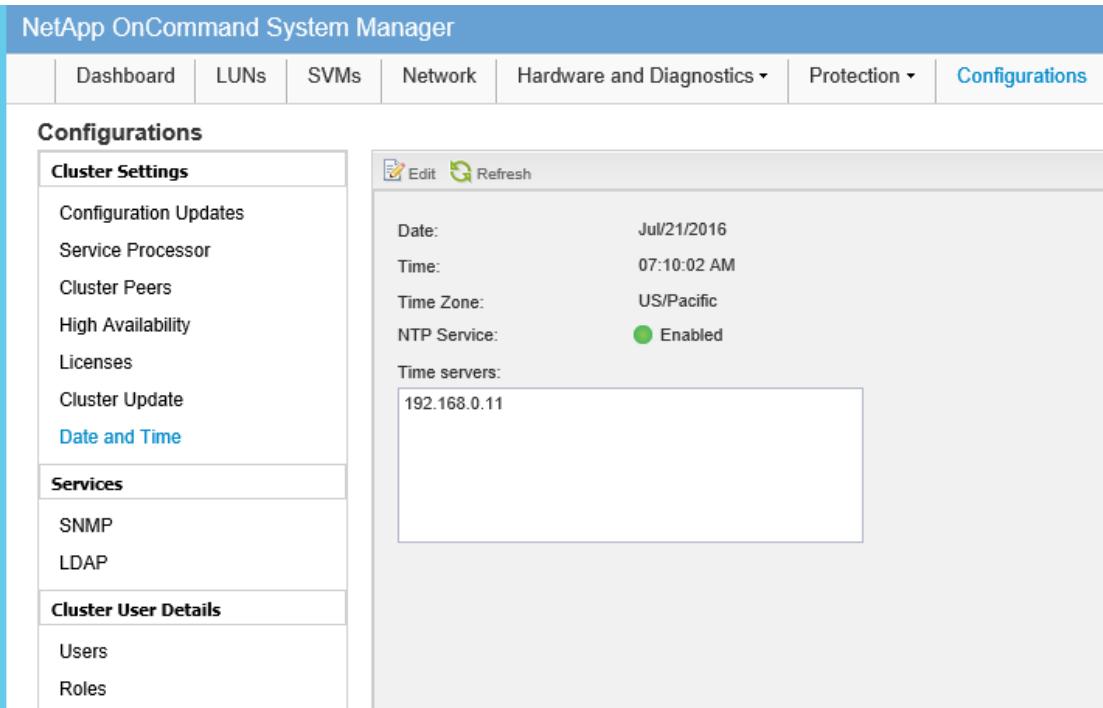
### TASK 3: ASSIGN A NETWORK TIME PROTOCOL (NTP) SERVER FOR SVL-NAU AND RTP-NAU

In this task, you access the NetApp OnCommand System Manager built-in management program to assign a network time server (NTP) for svl-nau and rtp-nau.

STEP	ACTION										
1.	<p> NetApp OnCommand System Manager is not a separate application, but a management solution that is built-into the ONTAP 9.0 operating system.</p> <p>To access the OnCommand System Manager, you open a browser, connect to the cluster management LIF, and authenticate with the cluster admin user name and password.</p> <table border="1"><thead><tr><th>System</th><th>Host Name</th><th>IP Address</th><th>User Name</th><th>Password</th></tr></thead><tbody><tr><td>ONTAP cluster management LIF</td><td>svl-nau</td><td>192.168.0.50</td><td>admin (case sensitive)</td><td>Netapp123</td></tr></tbody></table>	System	Host Name	IP Address	User Name	Password	ONTAP cluster management LIF	svl-nau	192.168.0.50	admin (case sensitive)	Netapp123
System	Host Name	IP Address	User Name	Password							
ONTAP cluster management LIF	svl-nau	192.168.0.50	admin (case sensitive)	Netapp123							
2.	<p>From the Windows desktop, access OnCommand System Manager:</p> <ol style="list-style-type: none"><li>Open Internet Explorer.</li><li>In the address bar, enter the management LIF IP address of svl-nau as the URL. <b>https://192.168.0.50</b></li></ol>										
3.	<p>Click the <b>Continue to this website</b> link.</p> 										

STEP	ACTION										
4.	<p>Enter the administrator's user name and password for svl-nau, and then click <b>Sign In</b>.</p> 										
5.	<p>In the top menu bar, click &gt; <b>Configurations</b></p> <p>In the left navigation pane click &gt; <b>Date and Time</b>.</p> <p>Check that a time server has been configured for the cluster.</p> 										
6.	<p> In ONTAP, the NTP Service is enabled by default. However, you must add the time servers and you must also ensure that the hosts you add as time servers have the NTP Service enabled.</p> <p>In the next step, you configure the Windows domain controller as the NTP time server.</p> <table border="1"> <thead> <tr> <th>System</th> <th>Host Name</th> <th>IP Address</th> <th>User Name</th> <th>Password</th> </tr> </thead> <tbody> <tr> <td>Windows 2012 Server</td> <td>w2k12</td> <td>192.168.0.11</td> <td>LEARN\Administrator</td> <td>Netapp123</td> </tr> </tbody> </table>	System	Host Name	IP Address	User Name	Password	Windows 2012 Server	w2k12	192.168.0.11	LEARN\Administrator	Netapp123
System	Host Name	IP Address	User Name	Password							
Windows 2012 Server	w2k12	192.168.0.11	LEARN\Administrator	Netapp123							

STEP	ACTION										
7.	<p><b>Perform tasks 7 and 8 only if necessary.</b></p> <p>In the Edit Date and Time configuration box, configure the NTP time server:</p> <ol style="list-style-type: none"> <li>Enter the IP address of the Windows 2012 Server (Domain Controller) in your lab kit.</li> <li>Click <b>Add</b>.</li> <li>Click <b>OK</b>.</li> </ol> 										
8.	<p>Verify that the domain controller's IP address has been set as the time server for svl-nau.</p> 										
9.	<p>From your Windows browser, open OnCommand System Manager for rtp-nau.</p> <table border="1"> <thead> <tr> <th>SYSTEM</th> <th>HOST NAME</th> <th>IP ADDRESS</th> <th>USER NAME</th> <th>PASSWORD</th> </tr> </thead> <tbody> <tr> <td>ONTAP cluster management LIF</td> <td>rtp-nau</td> <td>192.168.0.100</td> <td>admin (case sensitive)</td> <td>Netapp123</td> </tr> </tbody> </table>	SYSTEM	HOST NAME	IP ADDRESS	USER NAME	PASSWORD	ONTAP cluster management LIF	rtp-nau	192.168.0.100	admin (case sensitive)	Netapp123
SYSTEM	HOST NAME	IP ADDRESS	USER NAME	PASSWORD							
ONTAP cluster management LIF	rtp-nau	192.168.0.100	admin (case sensitive)	Netapp123							

STEP	ACTION
10.	To set the domain controller as the time server for rtp-nau, edit the date and time.   <p>The screenshot shows the 'Configurations' section of the NetApp OnCommand System Manager. On the left, there's a sidebar with 'Cluster Settings' selected. Under 'Date and Time', the NTP service is enabled, and the time server is listed as 192.168.0.11.</p>
11.	 To avoid issues with the CIFS protocol, always assign one of the domain controllers as the network time server for ONTAP clusters. The ONTAP cluster NTP service setting keeps all nodes in the cluster synchronized with Windows domain time.

#### **TASK 4: VERIFY THAT REQUIRED LICENSE CODES ARE INSTALLED**

Many of the advanced features of clustered ONTAP require licenses to work. In later exercises, you use several licensed features of clustered ONTAP. In this task, you ensure that the necessary licenses have been installed. You can check licenses in OnCommand System Manager or on the CLI.

END OF EXERCISE

## MODULE 1: ONTAP INTEGRATED DATA PROTECTION

There are no hands-on exercises for Module 1.

## MODULE 2: NETAPP MIRRORING FUNDAMENTALS

### EXERCISE 1: PREPARING FOR MIRROR RELATIONSHIPS

In this exercise, you set up several prerequisite configurations for data protection between primary and secondary ONTAP clusters.

#### OBJECTIVES

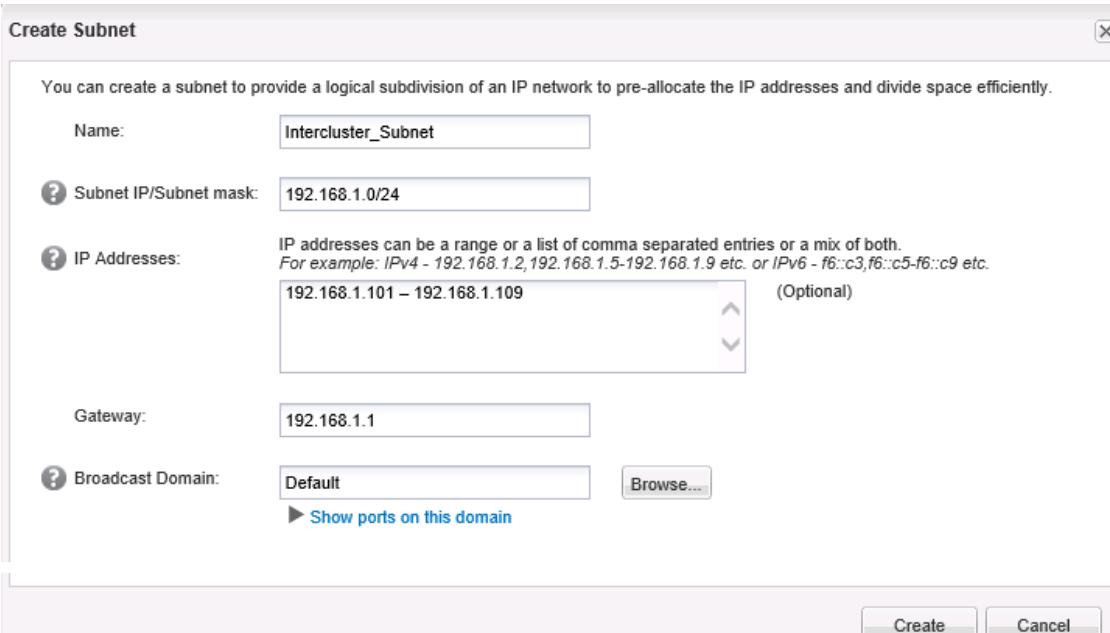
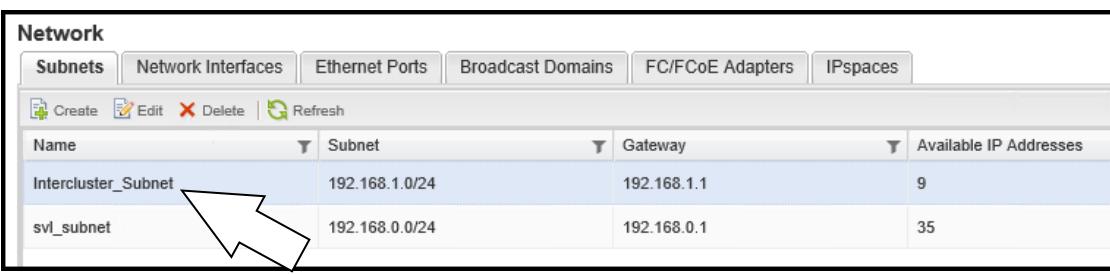
By the end of this exercise, you should be able to:

- Create an intercluster subnet and an intercluster LIFs for both clusters
- Configure cluster peering
- Configure storage virtual machine (SVM) peering

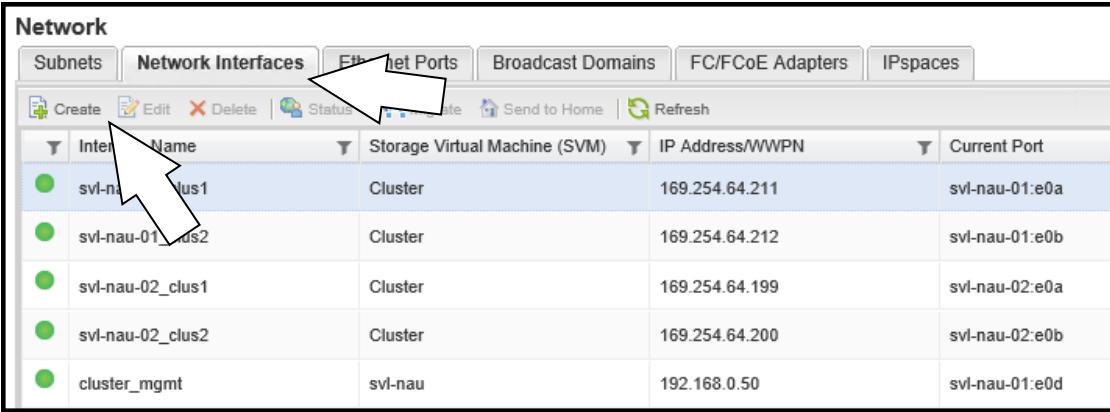
#### TASK 1: CREATE INTERCLUSTER SUBNETS AND LIFS

In this task, you add an intercluster subnet and redundant intercluster LIFs to svl-nau.

STEP	ACTION								
1.	<p> You are implementing the network connectivity that is necessary to enable peering relationships between clusters. First, you create a subnet on svl-nau to be used for intercluster traffic.</p>								
2.	<p>Using OnCommand System Manager, log in to the svl-nau cluster.</p> <ol style="list-style-type: none"><li>a. On the Network tab, click the <b>Subnets</b> tab.</li><li>b. On the Subnets tab, click <b>Create</b>.</li></ol>  <table border="1"><thead><tr><th>Name</th><th>Subnet</th><th>Gateway</th><th>Available IP Addresses</th></tr></thead><tbody><tr><td>svl_subnet</td><td>192.168.0.0/24</td><td>192.168.0.1</td><td>35</td></tr></tbody></table>	Name	Subnet	Gateway	Available IP Addresses	svl_subnet	192.168.0.0/24	192.168.0.1	35
Name	Subnet	Gateway	Available IP Addresses						
svl_subnet	192.168.0.0/24	192.168.0.1	35						

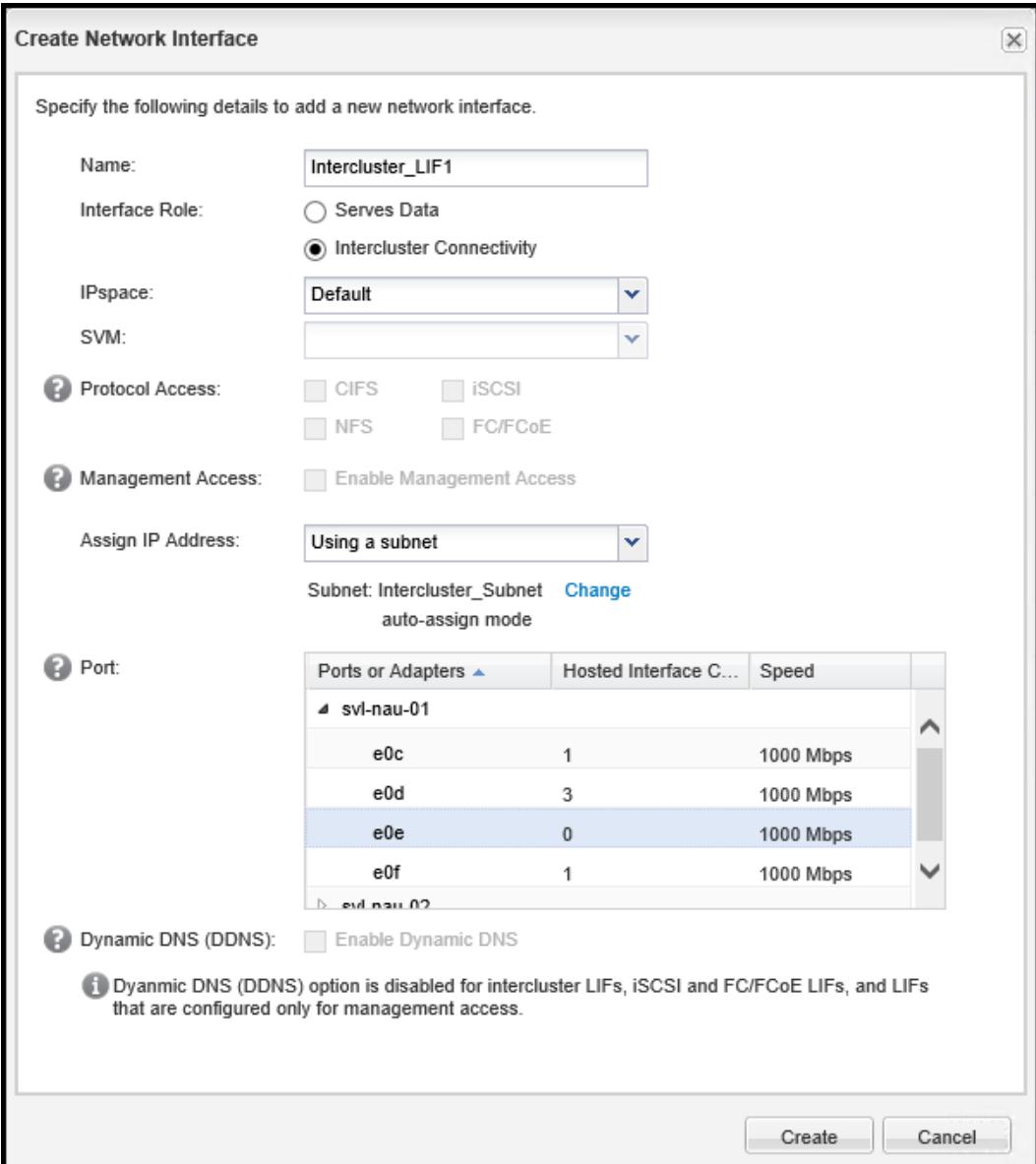
STEP	ACTION
3.	<p>In the Create Subnet window, enter the following settings:</p> <ul style="list-style-type: none"> <li>a. Name: <b>Intercluster_Subnet</b></li> <li>b. Subnet IP/Subnet mask: <b>192.168.1.0/24</b></li> <li>c. IP Addresses: <b>192.168.1.101 – 192.168.1.109</b></li> <li>d. Gateway: <b>192.168.1.1</b></li> <li>e. Broadcast Domain: <b>Default</b></li> </ul> 
4.	Click <b>Create</b> .
5.	Verify that the Intercluster_Subnet appears on the Subnets tab.
6.	 To implement intercluster network connectivity, a dedicated subnet is not mandatory. The intercluster communication can use a dedicated subnet, or it can be shared with data communication. In this exercise, you use a dedicated subnet for intercluster communication. You must have an intercluster-type LIF. In the steps that follow, you create intercluster LIFs for svl-nau and rtp-nau. 

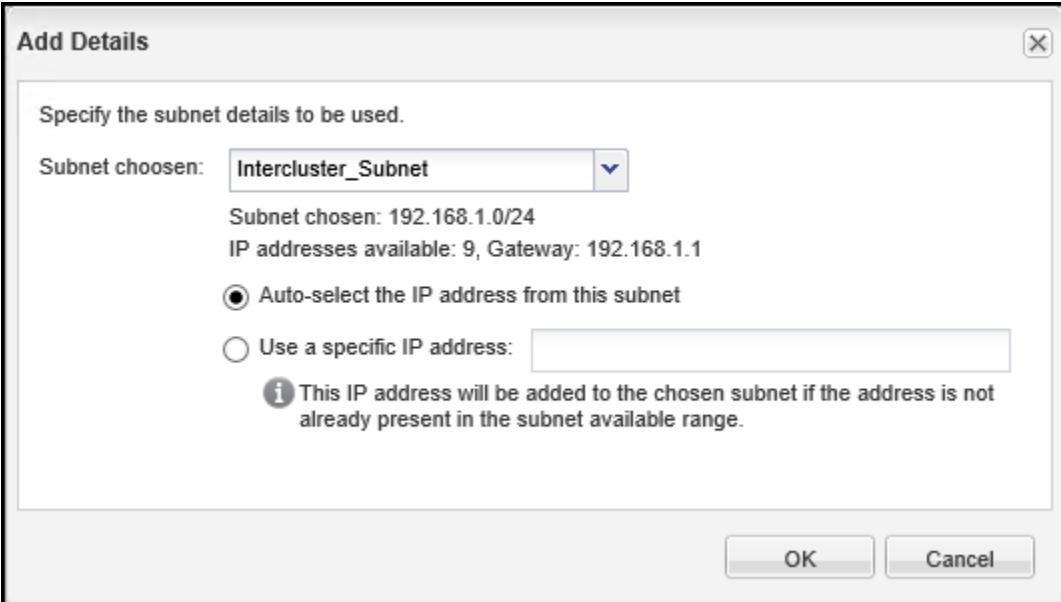
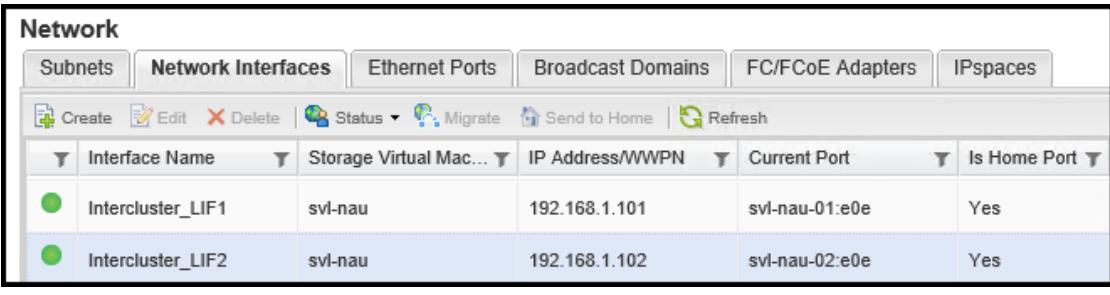
STEP	ACTION
7.	In the Network window, click the <b>Network Interfaces</b> tab, select <b>svl-nau-01_clus1</b> , and then click <b>Create</b> .



The screenshot shows the Network interface configuration screen. The 'Network Interfaces' tab is selected. A mouse cursor is hovering over the 'Create' button. The table lists five network interfaces:

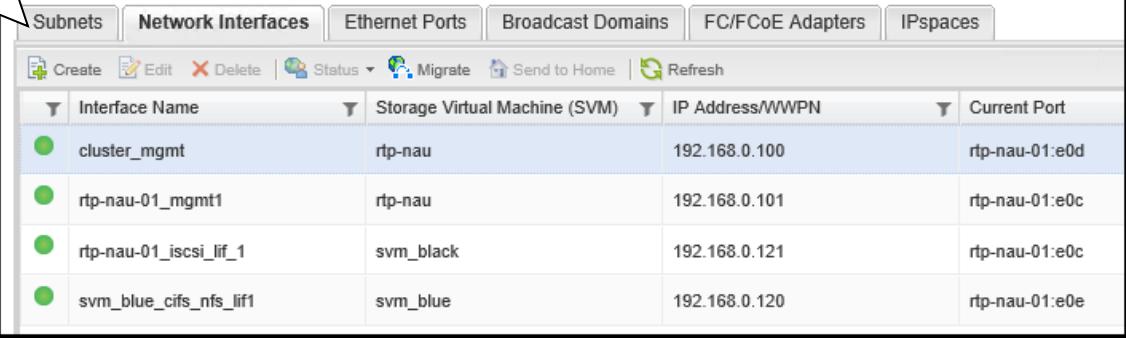
Interface Name	Storage Virtual Machine (SVM)	IP Address/WWPN	Current Port
svl-nau-01_clus1	Cluster	169.254.64.211	svl-nau-01:e0a
svl-nau-01_clus2	Cluster	169.254.64.212	svl-nau-01:e0b
svl-nau-02_clus1	Cluster	169.254.64.199	svl-nau-02:e0a
svl-nau-02_clus2	Cluster	169.254.64.200	svl-nau-02:e0b
cluster_mgmt	svl-nau	192.168.0.50	svl-nau-01:e0d

STEP	ACTION						
8.	<p>In the Create Network Interface window, enter the following configurations for the new LIF:</p> <table> <tr> <td>Name: <b>Intercluster_LIF1</b></td> <td>Assign IP Address: <b>Using a subnet</b></td> </tr> <tr> <td>Interface Role: <b>Intercluster Connectivity</b></td> <td>Port: <b>svl-nau-01:e0e</b></td> </tr> <tr> <td>IPspace: <b>Default</b></td> <td></td> </tr> </table> 	Name: <b>Intercluster_LIF1</b>	Assign IP Address: <b>Using a subnet</b>	Interface Role: <b>Intercluster Connectivity</b>	Port: <b>svl-nau-01:e0e</b>	IPspace: <b>Default</b>	
Name: <b>Intercluster_LIF1</b>	Assign IP Address: <b>Using a subnet</b>						
Interface Role: <b>Intercluster Connectivity</b>	Port: <b>svl-nau-01:e0e</b>						
IPspace: <b>Default</b>							

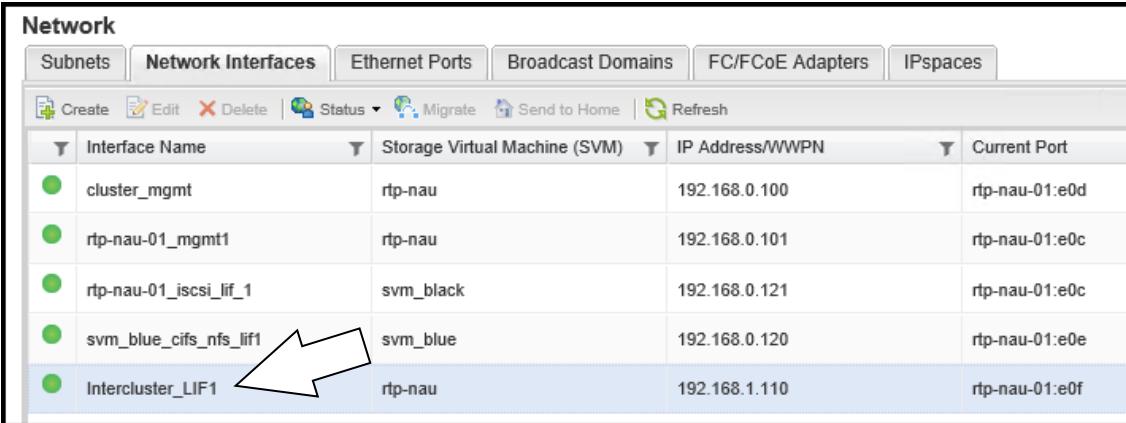
STEP	ACTION						
9.	In the Add Details window, select the <b>Assign IP Address: Using a subnet</b> option, and then click <b>OK</b> .						
							
10.	In the Create Network Interface window, click <b>Create</b> .						
11.	 For fault tolerance, every node of the cluster must have an intercluster LIF. In the next step, you repeat steps 7–10 to create an intercluster LIF that is named Intercluster_LIF2 and is located on cluster node 2.						
12.	Repeat steps 7–10 to create a second intercluster LIF with the following configurations: <table> <tbody> <tr> <td>Name: <b>Intercluster_LIF2</b></td> <td>Assign IP Address: <b>Using a subnet</b></td> </tr> <tr> <td>Interface Role: <b>Intercluster Connectivity</b></td> <td>Subnet: <b>Intercluster_Subnet/Auto-select the IP address from this subnet</b></td> </tr> <tr> <td>IPspace: <b>Default</b></td> <td>Port: <b>svl-nau-02:e0e</b></td> </tr> </tbody> </table>	Name: <b>Intercluster_LIF2</b>	Assign IP Address: <b>Using a subnet</b>	Interface Role: <b>Intercluster Connectivity</b>	Subnet: <b>Intercluster_Subnet/Auto-select the IP address from this subnet</b>	IPspace: <b>Default</b>	Port: <b>svl-nau-02:e0e</b>
Name: <b>Intercluster_LIF2</b>	Assign IP Address: <b>Using a subnet</b>						
Interface Role: <b>Intercluster Connectivity</b>	Subnet: <b>Intercluster_Subnet/Auto-select the IP address from this subnet</b>						
IPspace: <b>Default</b>	Port: <b>svl-nau-02:e0e</b>						
13.	In the Network window, click the <b>Network Interfaces</b> tab, and verify that the two new intercluster LIFs (named Intercluster_LIF1 and Intercluster_LIF2) are listed. 						

## TASK 2: PREPARE THE STORAGE ENVIRONMENT ON RTP-NAU AS THE SECONDARY TARGET

In this task, you repeat the preparations that you completed on svl-nau for the secondary cluster.

STEP	ACTION																				
1.	 The next steps repeat the steps of Task 1 to create an intercluster subnet and an intercluster LIF on the secondary cluster, rtp-nau.																				
2.	On rtp-nau, click the <b>Network</b> tab.																				
3.	On the Subnets tab, click <b>Create</b> .																				
4.	In the Create Subnet window, enter the following settings: <ol style="list-style-type: none"> <li>Name: <b>Intercluster_Subnet</b></li> <li>Subnet IP/Subnet mask: <b>192.168.1.0/24</b></li> <li>IP Addresses: <b>192.168.1.110 – 192.168.1.119</b></li> <li>Gateway: <b>192.168.1.1</b></li> <li>Broadcast Domain: <b>Default</b></li> </ol>																				
5.	Click <b>Create</b> .																				
6.	 In the next step, you create a single intercluster LIF on the secondary cluster, rtp-nau.																				
7.	In the Network window, click the <b>Network Interfaces</b> tab, select the intercluster LIF (named <b>cluster_mgmt</b> ), and then click <b>Create</b> .  <div style="border: 1px solid black; padding: 10px;">  <table border="1" data-bbox="306 1184 1400 1480"> <thead> <tr> <th>Interface Name</th> <th>Storage Virtual Machine (SVM)</th> <th>IP Address/WWPN</th> <th>Current Port</th> </tr> </thead> <tbody> <tr> <td>cluster_mgmt</td> <td>rtp-nau</td> <td>192.168.0.100</td> <td>rtp-nau-01:e0d</td> </tr> <tr> <td>rtp-nau-01_mgmt1</td> <td>rtp-nau</td> <td>192.168.0.101</td> <td>rtp-nau-01:e0c</td> </tr> <tr> <td>rtp-nau-01_iscsi_lif_1</td> <td>svm_black</td> <td>192.168.0.121</td> <td>rtp-nau-01:e0c</td> </tr> <tr> <td>svm_blue_cifs_nfs_lif1</td> <td>svm_blue</td> <td>192.168.0.120</td> <td>rtp-nau-01:e0e</td> </tr> </tbody> </table> </div>	Interface Name	Storage Virtual Machine (SVM)	IP Address/WWPN	Current Port	cluster_mgmt	rtp-nau	192.168.0.100	rtp-nau-01:e0d	rtp-nau-01_mgmt1	rtp-nau	192.168.0.101	rtp-nau-01:e0c	rtp-nau-01_iscsi_lif_1	svm_black	192.168.0.121	rtp-nau-01:e0c	svm_blue_cifs_nfs_lif1	svm_blue	192.168.0.120	rtp-nau-01:e0e
Interface Name	Storage Virtual Machine (SVM)	IP Address/WWPN	Current Port																		
cluster_mgmt	rtp-nau	192.168.0.100	rtp-nau-01:e0d																		
rtp-nau-01_mgmt1	rtp-nau	192.168.0.101	rtp-nau-01:e0c																		
rtp-nau-01_iscsi_lif_1	svm_black	192.168.0.121	rtp-nau-01:e0c																		
svm_blue_cifs_nfs_lif1	svm_blue	192.168.0.120	rtp-nau-01:e0e																		
8.	In the Create Network Interface window, enter the following configurations for the new LIF: <table border="0" data-bbox="290 1543 1437 1776"> <tr> <td>Name: <b>Intercluster_LIF1</b></td> <td>Assign IP Address: <b>Using a subnet</b></td> </tr> <tr> <td>Interface Role: <b>Intercluster Connectivity</b></td> <td>Subnet: <b>Intercluster_Subnet/Auto-select the IP address from this subnet</b></td> </tr> <tr> <td>IPspace: <b>Default</b></td> <td>Port: <b>rtp-nau-01:e0f</b></td> </tr> </table>	Name: <b>Intercluster_LIF1</b>	Assign IP Address: <b>Using a subnet</b>	Interface Role: <b>Intercluster Connectivity</b>	Subnet: <b>Intercluster_Subnet/Auto-select the IP address from this subnet</b>	IPspace: <b>Default</b>	Port: <b>rtp-nau-01:e0f</b>														
Name: <b>Intercluster_LIF1</b>	Assign IP Address: <b>Using a subnet</b>																				
Interface Role: <b>Intercluster Connectivity</b>	Subnet: <b>Intercluster_Subnet/Auto-select the IP address from this subnet</b>																				
IPspace: <b>Default</b>	Port: <b>rtp-nau-01:e0f</b>																				
9.	Click <b>Create</b> .																				

STEP	ACTION
10.	In the Network window on the Network Interfaces tab, verify that the intercluster LIF (named Intercluster_LIF1) was created on rtp-nau.

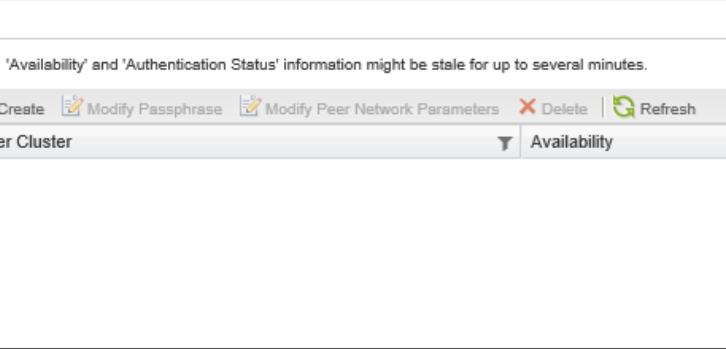
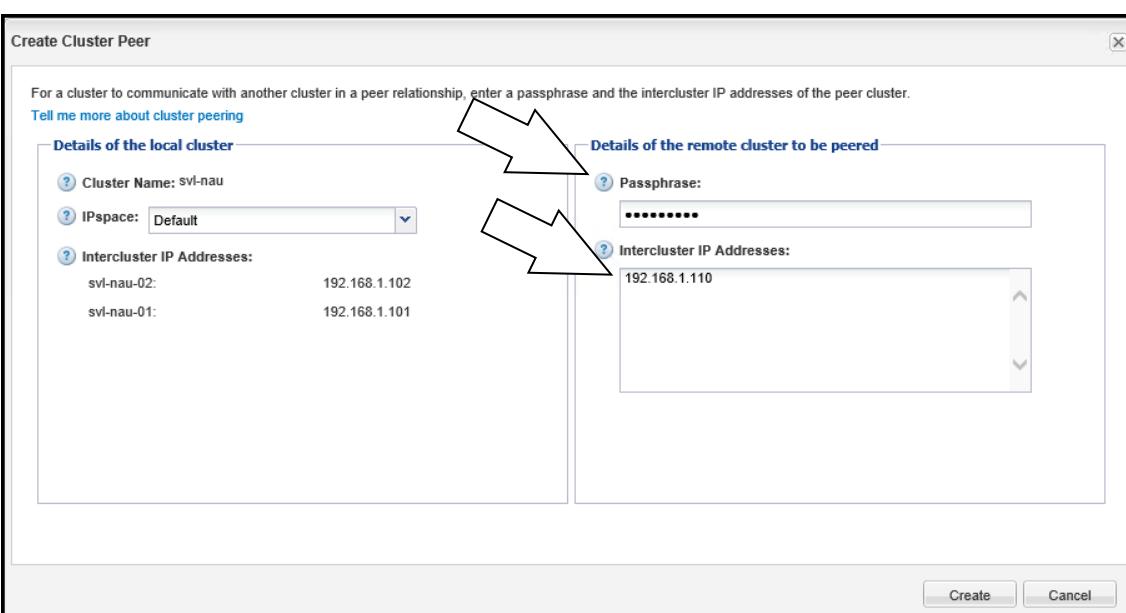


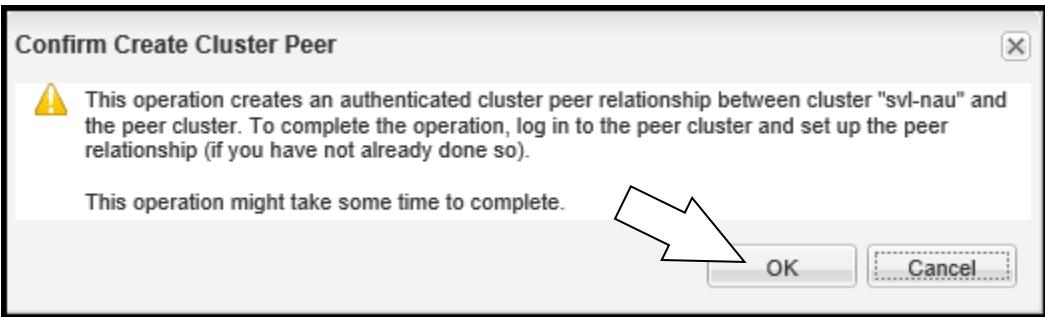
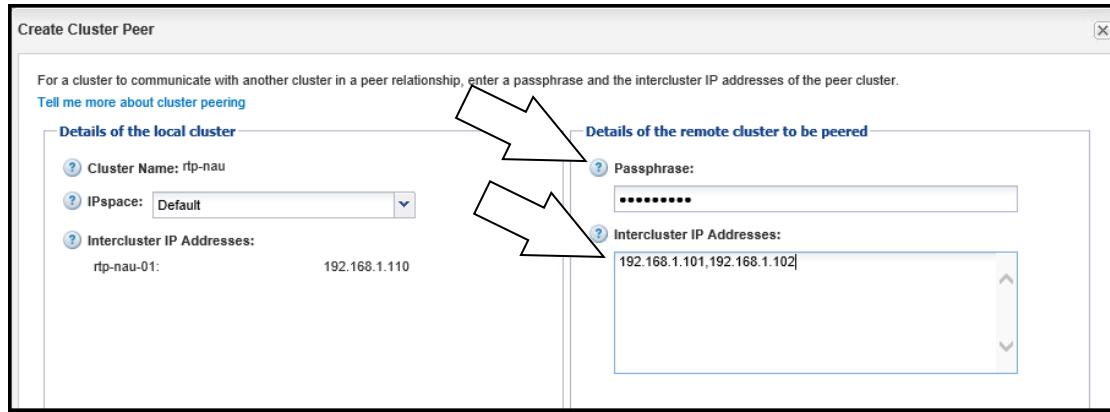
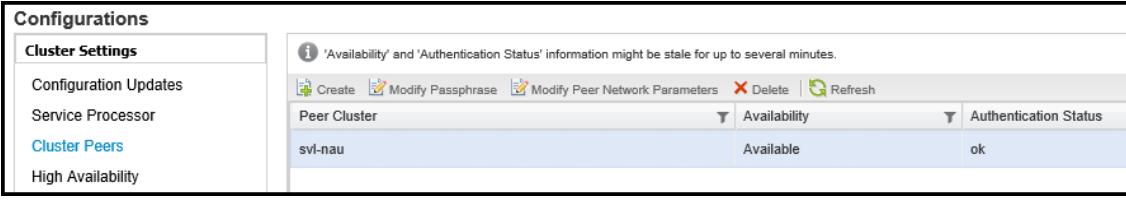
The screenshot shows the Network Interfaces tab in a management interface. A new row has been added to the table, highlighted with a light blue background. An arrow points to the last row, which contains the newly created intercluster LIF.

Interface Name	Storage Virtual Machine (SVM)	IP Address/WWPN	Current Port
cluster_mgmt	rtp-nau	192.168.0.100	rtp-nau-01:e0d
rtp-nau-01_mgmt1	rtp-nau	192.168.0.101	rtp-nau-01:e0c
rtp-nau-01_iscsi_lif_1	svm_black	192.168.0.121	rtp-nau-01:e0c
svm_blue_cifs_nfs_lif1	svm_blue	192.168.0.120	rtp-nau-01:e0e
Intercluster_LIF1	rtp-nau	192.168.1.110	rtp-nau-01:e0f

### TASK 3: CONFIGURE CLUSTER PEERING

Cluster peering is a requirement of intercluster communication. In this task, you configure a peer relationship between svl-nau and rtp-nau. To configure a peer relationship, you must create the peer relationship on svl-nau, and then, using the identical steps, you must create the relationship on rtp-nau.

STEP	ACTION
1.	<p>On svl-nau, on the Configurations tab, select <b>Cluster Peers</b>, and then click <b>Create</b>.</p>  
2.	<p>In the Create Cluster Peer window, enter the following settings:</p> <ol style="list-style-type: none"> <li>Passphrase: <b>Netapp123</b> (the administrative user name password for rtp-nau)</li> <li>Intercluster IP Addresses: <b>192.168.1.110</b> (the Intercluster_LIF IP address for rtp-nau)</li> </ol> 
3.	Click <b>Create</b> .

STEP	ACTION
4.	In the Confirm Create Cluster Peer window, click <b>OK</b> .
	
5.	 Notice that the status of rtp-nau availability is “unavailable,” pending authentication. You must establish the peer relationship from both svl-nau and rtp-nau. In the next step, you log in to rtp-nau to create the peer relationship from the other cluster.
6.	On rtp-nau, on the Configurations tab, select <b>Cluster Peers</b> , and then click <b>Create</b> .
7.	In the Create Cluster Peer window, enter the following settings: <ol style="list-style-type: none"> <li>Passphrase: <b>Netapp123</b> (the administrative user name password for svl-nau)</li> <li>Intercluster IP Addresses: <b>192.168.1.101,192.168.1.102</b> (both Intercluster_LIF IP addresses for svl-nau)          </li> </ol>
8.	Click <b>Create</b> .
9.	In the Confirm Create Cluster Peer window, click <b>OK</b> .
10.	 You can verify that the cluster peers are available by returning to the Configurations tab and clicking Refresh. If they are reported as “unavailable,” you must ensure that the intercluster LIF IP addresses were entered correctly for svl-nau and rtp-nau. 

## TASK 4: CONFIGURE SVM PEERING

In this task, you create a peer relationship between svm\_yellow and svm\_blue.

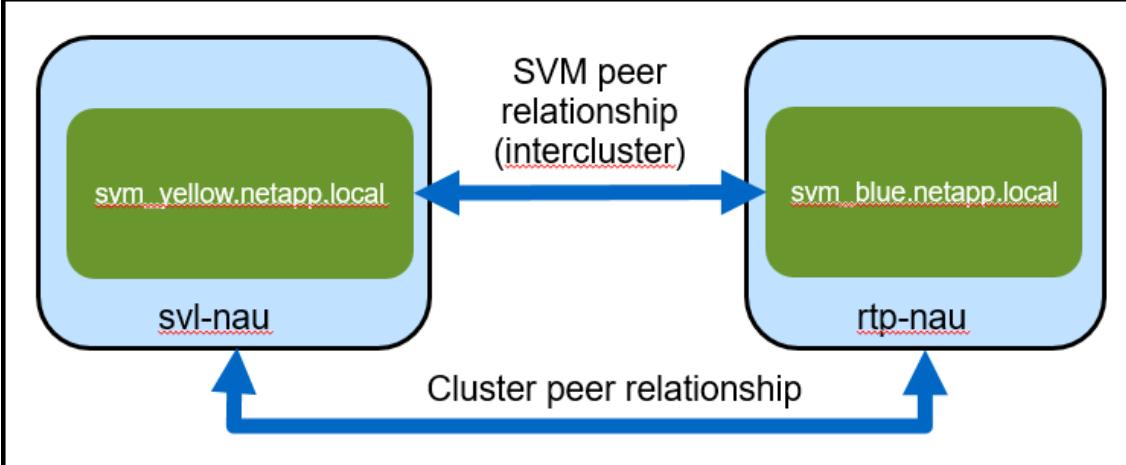
STEP	ACTION
1.	 To configure SVM peers, you must use the CLI. SVM peering is not yet configurable using OnCommand System Manager.
2.	 To create SVM peer relationships, the intended SVM peer partner must accept the relationship. In the steps that follow, you enter the vserver peer create command on the svl-nau CLI and the vserver peer accept command on the rtp-nau CLI.
3.	 The syntax of the vserver peer create command is as follows:  -vserver: local SVM peer partner -peer-vserver: remote SVM peer partner -peer-cluster: for intercluster SVMs, the name of the remote cluster peer -applications: SnapMirror is the only application you can enter for this option.
4.	Create the SVM peer relationship by entering the following command:  <pre>svl-nau::&gt; vserver peer create -vserver svm_yellow -peer-vserver svm_blue -peer-cluster rtp-nau -applications snapmirror</pre> Normal output:  Info: [Job 219] 'vserver peer create' job queued
5.	 rtp-nau must accept the vserver peer request from svl-nau.
6.	Use PuTTY to log in to rtp-nau.
7.	Accept the SVM peer relationship by entering the following command:  <pre>rtp-nau::&gt; vserver peer accept -vserver svm_blue -peer-vserver svm_yellow</pre> Normal output:  Info: [Job 140] 'vserver peer accept' job queued

STEP	ACTION
8.	<p>Verify that the SVMs are peered by entering the following command from either the svl-nau or rtp-nau CLI:</p> <pre>vserver peer show</pre> <pre>rtp-nau::&gt; vserver peer show       Peer          Peer          Peering          Remote Vserver    Vserver    State       Cluster        Applications   Vserver -----  ----- svm_blue  svm_yellow  peered    svl-nau        snapmirror    svm_yellow -----</pre> <pre>rtp-nau::&gt;</pre>

## TASK 5: EXERCISE REVIEW

In this task, you review the exercise environment that was created by performing the previous tasks.

STEP	ACTION
1.	<p>In this step, verify the following:</p> <ol style="list-style-type: none"> <li>You created an intercluster subnet on each of the two ONTAP clusters.</li> <li>You configured intercluster LIFs on each node of the two ONTAP clusters.</li> </ol> <p>The diagram illustrates the intercluster network setup. On the left, the 'svl-nau (2 nodes)' cluster is shown with two nodes. Each node has two blue rectangular boxes labeled 'LIF1' and 'LIF2'. Arrows point from these boxes to a central cloud-like shape representing the 'Intercluster Subnet'. On the right, the 'rtp-nau (single node)' cluster is shown with one node. It has a single blue rectangular box labeled 'Intercluster LIF' with an arrow pointing to the same 'Intercluster Subnet'. The entire setup is enclosed in a light gray border.</p>

STEP	ACTION
2.	<p>In this step, verify the following:</p> <ul style="list-style-type: none"> <li>a. You established peer relationships between the svl-nau and rtp-nau ONTAP clusters.</li> <li>b. You created a peer relationship between the svm_yellow and svm_blue SVMs on each of the clusters.</li> </ul>  <p>In the next exercise you will implement SnapMirror relationships to replicate volumes between the two SVMs.</p>

END OF EXERCISE

## MODULE 3: IMPLEMENT SNAMIRROR RELATIONSHIPS

### EXERCISE 1: USING SNAMIRROR TO MIRROR FLEXVOL VOLUMES

In this exercise, you create and implement a SnapMirror relationship between volumes. You follow a SnapMirror implementation workflow to implement the solution. Then you verify data transfer.

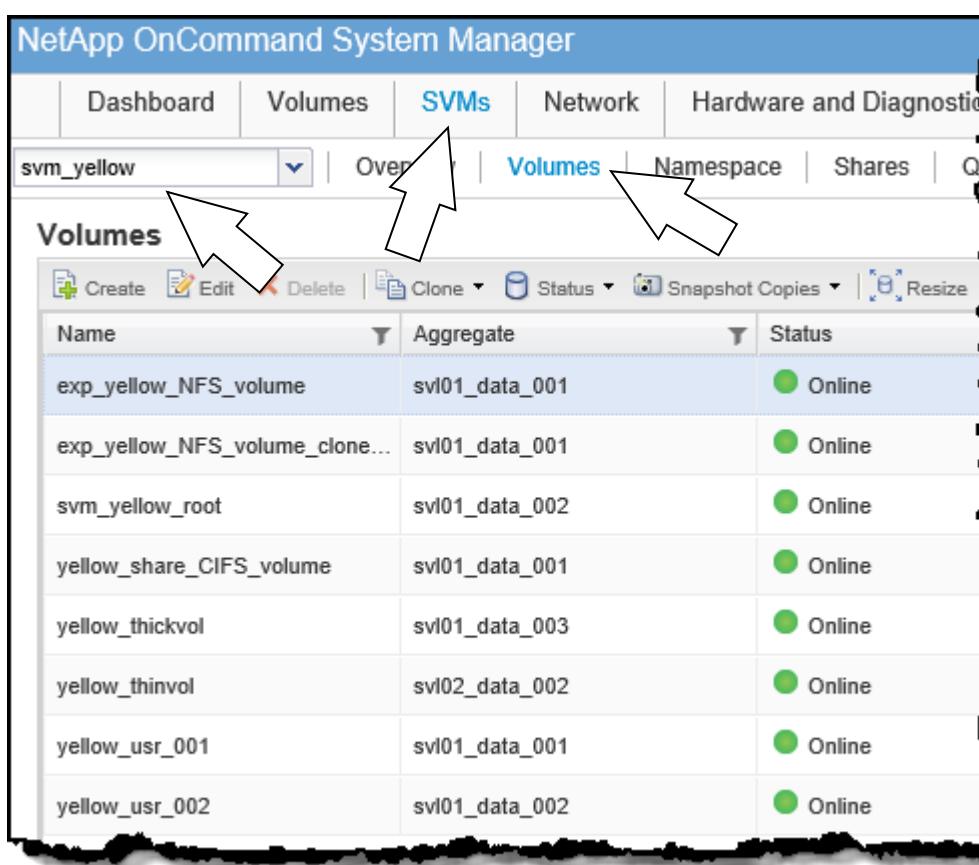
#### OBJECTIVES

This exercise focuses on enabling you to do the following:

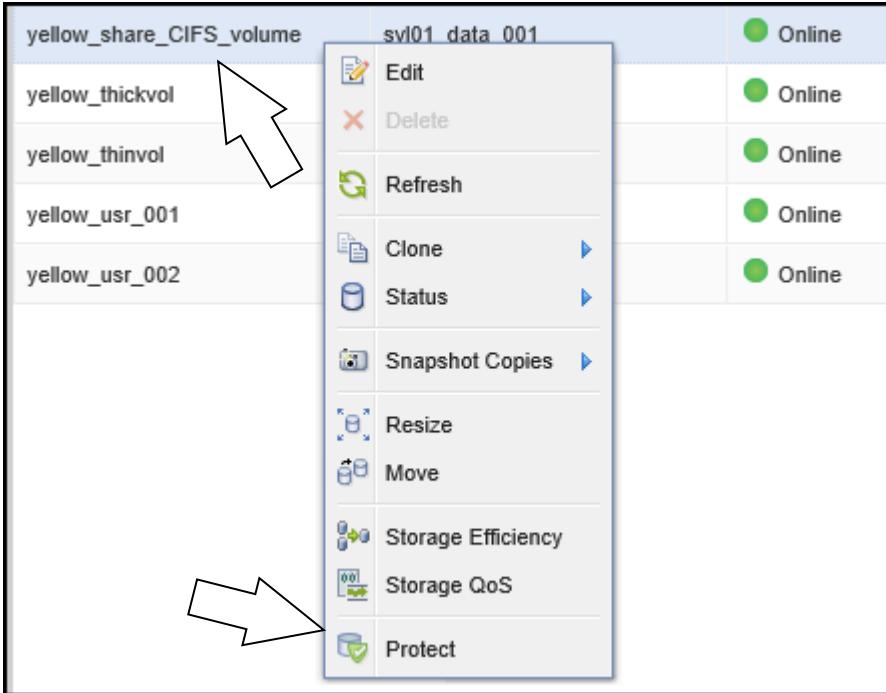
- Create a SnapMirror policy
- Create a SnapMirror relationship
- Perform a SnapMirror initial transfer
- Perform a manual SnapMirror update
- Schedule automatic SnapMirror updates
- Verify data transfer

#### TASK 1: CREATE A SNAMIRROR RELATIONSHIP

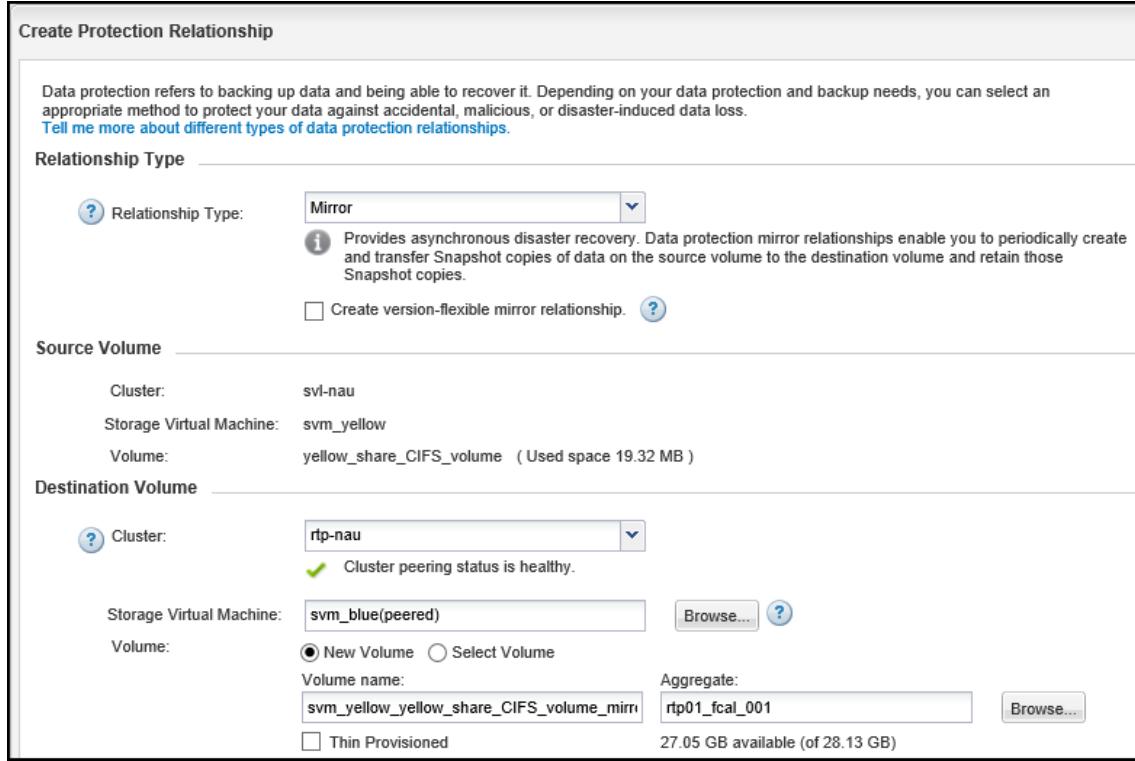
In this task, you use the OnCommand System Manager to create a SnapMirror relationship.

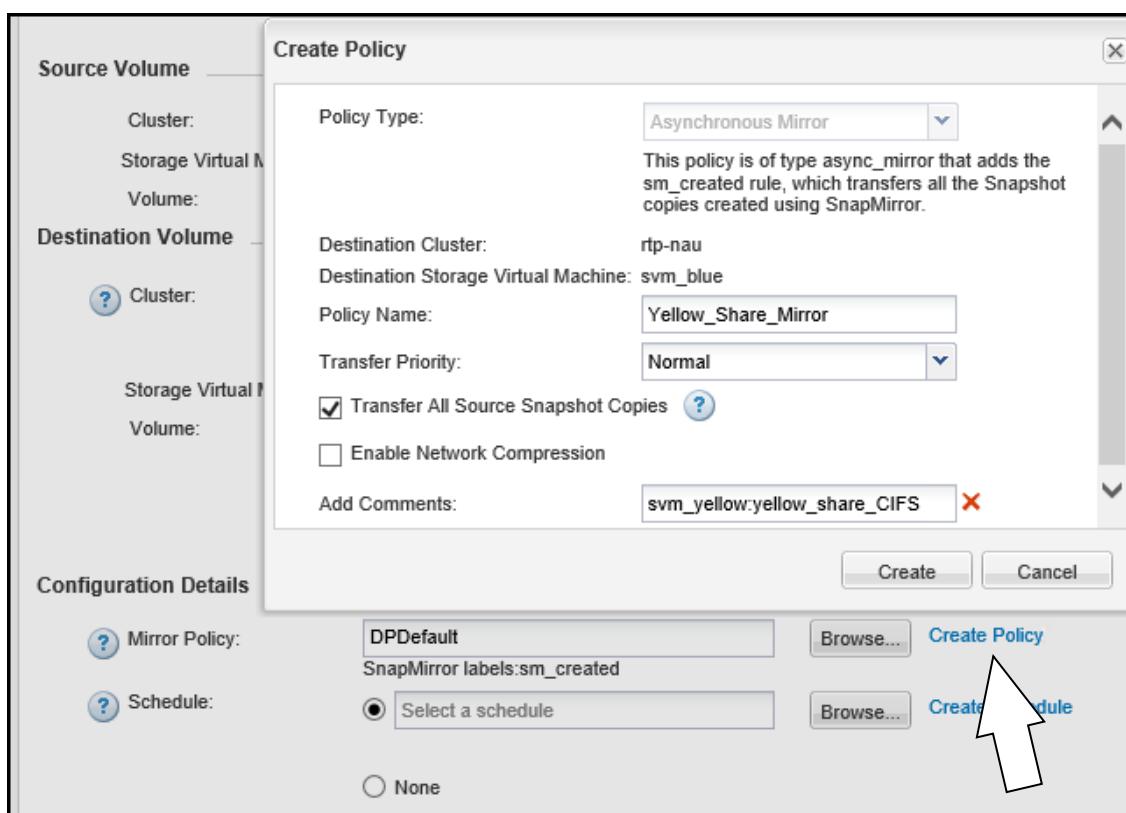
STEP	ACTION																											
1.	<p>On svl-nau, click the SVMs tab, and then select <b>svm_yellow &gt; Volumes</b>.</p>  <p>The screenshot shows the OnCommand System Manager web interface. At the top, there's a navigation bar with tabs: Dashboard, Volumes, SVMs (which is highlighted in blue), Network, and Hardware and Diagnostic. Below the navigation bar, there's a dropdown menu set to 'svl_yellow' and several other tabs: Overview, Volumes (which is also highlighted in blue), Namespace, Shares, and QoS. The main content area is titled 'Volumes' and contains a table with the following data:</p> <table border="1"><thead><tr><th>Name</th><th>Aggregate</th><th>Status</th></tr></thead><tbody><tr><td>exp_yellow_NFS_volume</td><td>svl01_data_001</td><td>Online</td></tr><tr><td>exp_yellow_NFS_volume_clone...</td><td>svl01_data_001</td><td>Online</td></tr><tr><td>svm_yellow_root</td><td>svl01_data_002</td><td>Online</td></tr><tr><td>yellow_share_CIFS_volume</td><td>svl01_data_001</td><td>Online</td></tr><tr><td>yellow_thickvol</td><td>svl01_data_003</td><td>Online</td></tr><tr><td>yellow_thinvol</td><td>svl02_data_002</td><td>Online</td></tr><tr><td>yellow_usr_001</td><td>svl01_data_001</td><td>Online</td></tr><tr><td>yellow_usr_002</td><td>svl01_data_002</td><td>Online</td></tr></tbody></table>	Name	Aggregate	Status	exp_yellow_NFS_volume	svl01_data_001	Online	exp_yellow_NFS_volume_clone...	svl01_data_001	Online	svm_yellow_root	svl01_data_002	Online	yellow_share_CIFS_volume	svl01_data_001	Online	yellow_thickvol	svl01_data_003	Online	yellow_thinvol	svl02_data_002	Online	yellow_usr_001	svl01_data_001	Online	yellow_usr_002	svl01_data_002	Online
Name	Aggregate	Status																										
exp_yellow_NFS_volume	svl01_data_001	Online																										
exp_yellow_NFS_volume_clone...	svl01_data_001	Online																										
svm_yellow_root	svl01_data_002	Online																										
yellow_share_CIFS_volume	svl01_data_001	Online																										
yellow_thickvol	svl01_data_003	Online																										
yellow_thinvol	svl02_data_002	Online																										
yellow_usr_001	svl01_data_001	Online																										
yellow_usr_002	svl01_data_002	Online																										

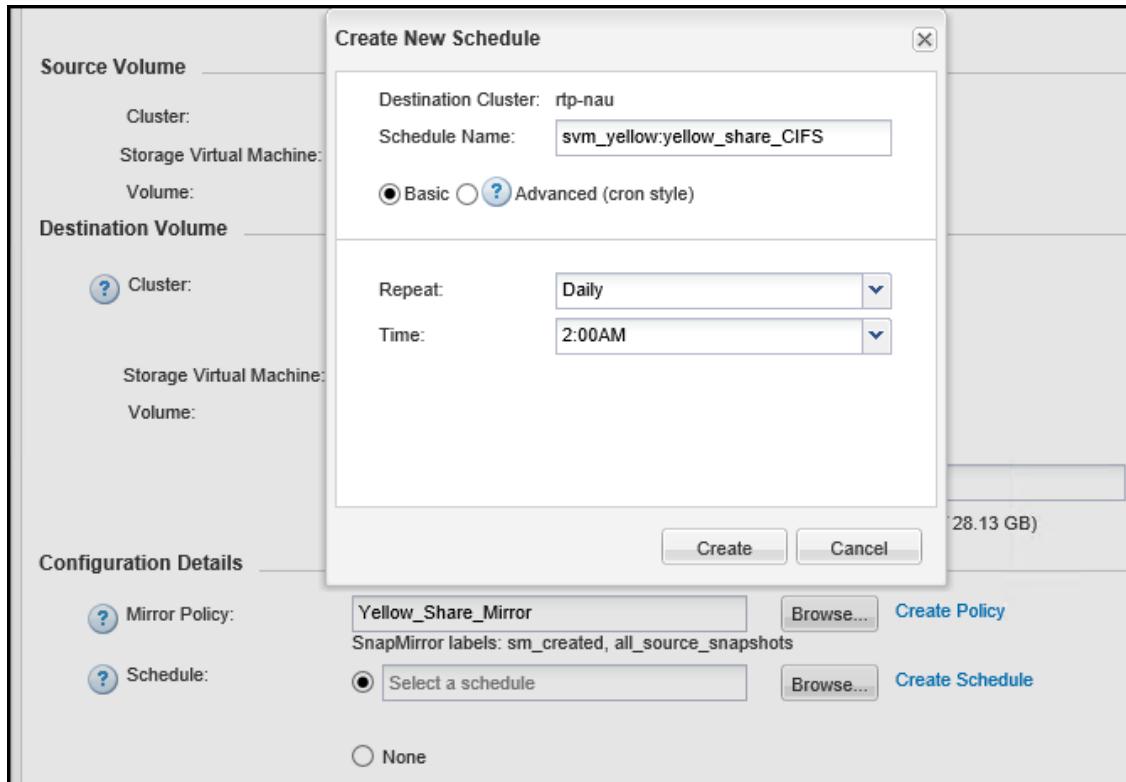
STEP	ACTION
2.	Right-click volume <b>yellow_share_CIFS_volume</b> . Then select <b>Protect</b> .



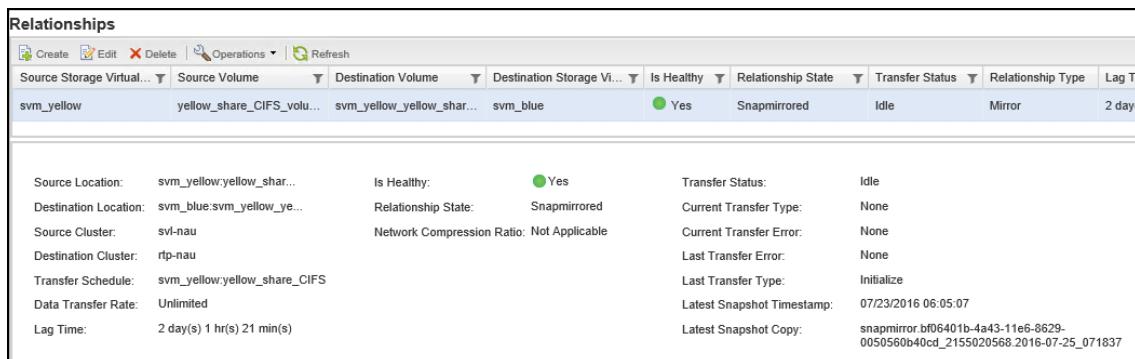
The screenshot shows a list of volumes on the left: yellow\_thickvol, yellow\_thinvol, yellow\_usr\_001, and yellow\_usr\_002. A context menu is open over the 'yellow\_share\_CIFS\_volume'. The menu items are: Edit, Delete, Refresh, Clone, Status, Snapshot Copies, Resize, Move, Storage Efficiency, Storage QoS, and Protect. The 'Protect' option is highlighted with a large green arrow pointing to it from the bottom-left.

STEP	ACTION
3.	<p>In the Create Protection Relationship window, enter the following configurations:</p> <p>Relationship Type:</p> <ul style="list-style-type: none"> <li>▪ Relationship Type: <b>Mirror</b></li> <li>▪ Do not select the checkbox labeled Create version-flexible mirror relationship.</li> </ul> <p>Destination Volume:</p> <ul style="list-style-type: none"> <li>▪ Cluster: <b>rtp-nau</b></li> <li>▪ Storage Virtual Machine: <b>svm_blue</b></li> <li>▪ Volume: <b>New Volume</b></li> <li>▪ Volume name: (Leave the default volume name.)</li> <li>▪ Aggregate: <b>rtp01_fc1_001</b></li> <li>▪ Thin Provisioned: (Leave the checkbox cleared.)</li> </ul>  <p>The screenshot shows the 'Create Protection Relationship' dialog box. In the 'Relationship Type' section, 'Mirror' is selected. A tooltip explains that it provides asynchronous disaster recovery by creating and transferring Snapshot copies of data from the source volume to the destination volume. There is also an unchecked checkbox for 'Create version-flexible mirror relationship'. In the 'Source Volume' section, the cluster is 'svl-nau', storage virtual machine is 'svm_yellow', and the volume is 'yellow_share_CIFS_volume' (Used space 19.32 MB). In the 'Destination Volume' section, the cluster is 'rtp-nau' (status is healthy), storage virtual machine is 'svm_blue(peered)', and the volume is 'New Volume' named 'svm_yellow_yellow_share_CIFS_volume_mirr'. The aggregate is 'rtp01_fc1_001' with 27.05 GB available (of 28.13 GB). The 'Thin Provisioned' checkbox is unchecked.</p>

STEP	ACTION
4.	<p>Enter these configuration details:</p> <ol style="list-style-type: none"> <li>Mirror Policy: Click the <b>Create Policy</b> link.</li> <li>In the Create Policy window, enter the following configurations:           <ul style="list-style-type: none"> <li>▪ Policy Name: <b>Yellow_Share_Mirror</b></li> <li>▪ Transfer Priority: <b>Normal</b></li> <li>▪ Transfer All Source Snapshot Copies: selected</li> <li>▪ Enable Network Compression: cleared</li> <li>▪ Add Comments: <b>svm_yellow:yellow_share_CIFS</b></li> </ul> </li> <li>Click <b>Create</b>.</li> </ol> 
5.	<p>Details of the Create Mirror Relationship dialog box:</p> <p></p> <ul style="list-style-type: none"> <li>▪ Default values appear because cluster and storage virtual machine (SVM) peering has been configured.</li> <li>▪ NetApp ONTAP software automatically selects the peered cluster.</li> <li>▪ If cluster peering had not been preconfigured, you would be notified and guided to complete cluster and SVM peering configurations. After peering is configured, the Create Mirror Relationship dialog box automatically reappears.</li> <li>▪ By default, ONTAP software creates a destination volume for the SnapMirror relationship. You can change the default volume setting and select an existing volume.</li> <li>▪ You can enable the Create version flexible mirror relationship in this dialog box.</li> </ul>

STEP	ACTION
6.	<p>Before you leave the Create Protection Relationship window, create a schedule to automate the SnapMirror updates:</p> <ol style="list-style-type: none"> <li>In the Configuration Details section, click the <b>Create Schedule</b> link.</li> <li>In the Create New Schedule window, enter the following configurations:           <ul style="list-style-type: none"> <li>▪ Schedule Name: <b>svm_yellow:yellow_share_CIFS</b></li> <li>▪ Select the <b>Basic</b> radio button.</li> <li>▪ Repeat: <b>Daily</b></li> <li>▪ Time: <b>2:00AM</b></li> </ul> </li> <li>Click <b>Create</b>.</li> </ol> 
7.	<p>In the Create Protection Relationship window, verify that the <b>Initialize Relationship</b> checkbox is selected, and then click <b>Create</b>.</p>

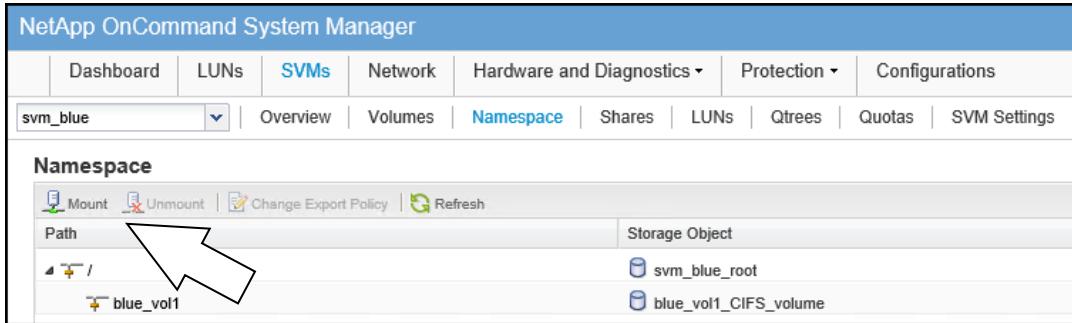
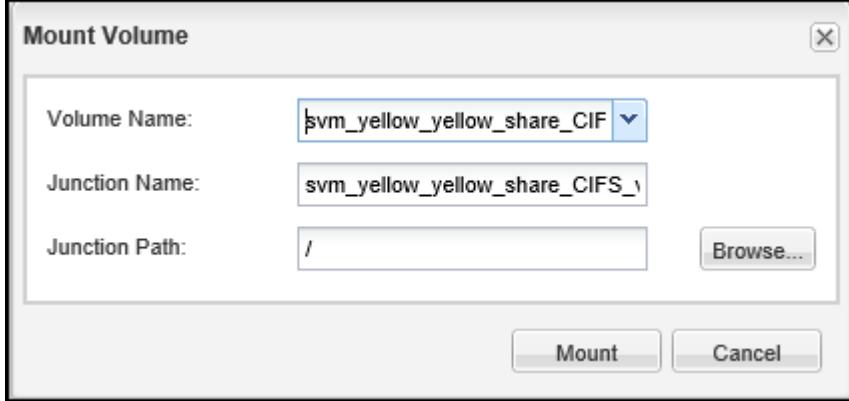
STEP	ACTION												
8.	<p>Click <b>OK</b>.</p> <p>The Create Protection Relationship wizard has a Status area that reports when the secondary volume has been created and the mirror relationship.</p>  <p>The screenshot shows the 'Create Protection Relationship' dialog box. It includes sections for 'Source Volume' and 'Destination Volume' with their respective details, 'Configuration Details' (Mirror Policy: Yellow_Share_Mirror, Schedule: svm_yellow:yellow_share_CIFS), and a 'Status' section listing the progress of five tasks:</p> <table border="1"> <thead> <tr> <th>Action</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>Create volume</td> <td>Completed successfully</td> </tr> <tr> <td>Create policy</td> <td>Completed successfully</td> </tr> <tr> <td>Create schedule</td> <td>Completed successfully</td> </tr> <tr> <td>Create relationship</td> <td>Completed successfully</td> </tr> <tr> <td>Initialize relationship</td> <td>Started successfully</td> </tr> </tbody> </table> <p>An 'Ok' button is at the bottom right of the dialog.</p>	Action	Status	Create volume	Completed successfully	Create policy	Completed successfully	Create schedule	Completed successfully	Create relationship	Completed successfully	Initialize relationship	Started successfully
Action	Status												
Create volume	Completed successfully												
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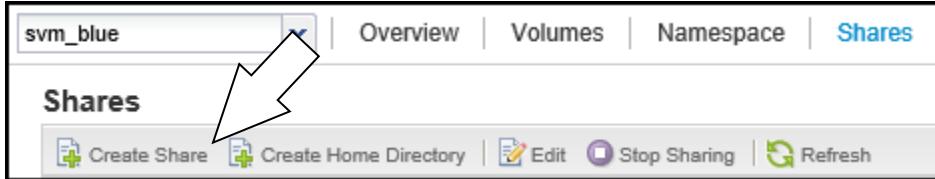
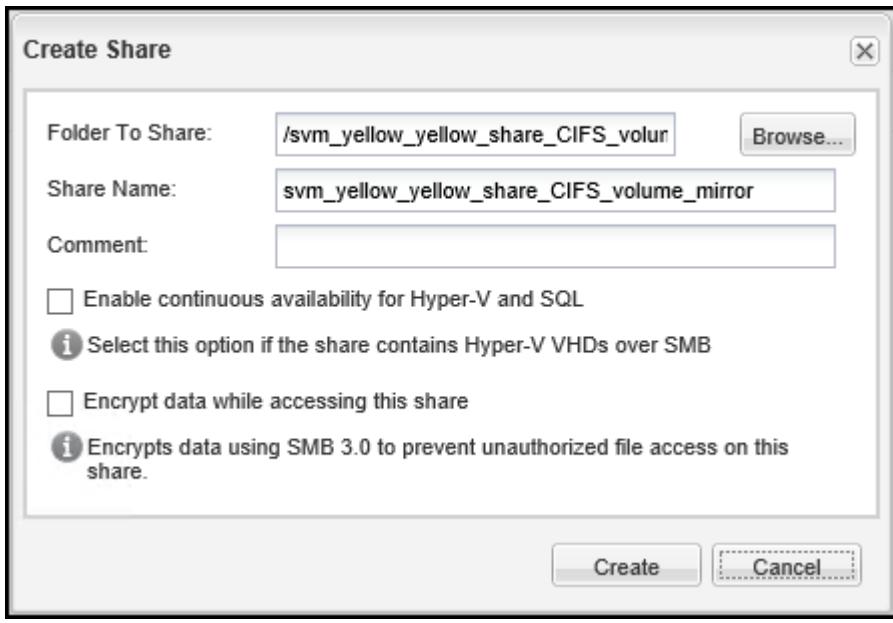
STEP	ACTION																																										
9.	<p>Verify the SnapMirror status on the destination cluster, rtp-nau, by clicking <b>Protection &gt; Relationships</b>.</p>  <table border="1"> <thead> <tr> <th>Source Location:</th> <th>svm_yellow:yellow_shar...</th> <th>Is Healthy:</th> <th>● Yes</th> <th>Transfer Status:</th> <th>Idle</th> </tr> </thead> <tbody> <tr> <td>Destination Location:</td> <td>svm_blue:svm_yellow_ye...</td> <td>Relationship State:</td> <td>Snapmirrored</td> <td>Current Transfer Type:</td> <td>None</td> </tr> <tr> <td>Source Cluster:</td> <td>svl-nau</td> <td>Network Compression Ratio:</td> <td>Not Applicable</td> <td>Current Transfer Error:</td> <td>None</td> </tr> <tr> <td>Destination Cluster:</td> <td>rtp-nau</td> <td></td> <td></td> <td>Last Transfer Error:</td> <td>None</td> </tr> <tr> <td>Transfer Schedule:</td> <td>svm_yellow:yellow_share_CIFS</td> <td></td> <td></td> <td>Last Transfer Type:</td> <td>Initialize</td> </tr> <tr> <td>Data Transfer Rate:</td> <td>Unlimited</td> <td></td> <td></td> <td>Latest Snapshot Timestamp:</td> <td>07/23/2016 06:05:07</td> </tr> <tr> <td>Lag Time:</td> <td>2 day(s) 1 hr(s) 21 min(s)</td> <td></td> <td></td> <td>Latest Snapshot Copy:</td> <td>snapmirror bf06401b-4a43-11e6-8629-0050560b40cd_2155020568.2016-07-25_071837</td> </tr> </tbody> </table>	Source Location:	svm_yellow:yellow_shar...	Is Healthy:	● Yes	Transfer Status:	Idle	Destination Location:	svm_blue:svm_yellow_ye...	Relationship State:	Snapmirrored	Current Transfer Type:	None	Source Cluster:	svl-nau	Network Compression Ratio:	Not Applicable	Current Transfer Error:	None	Destination Cluster:	rtp-nau			Last Transfer Error:	None	Transfer Schedule:	svm_yellow:yellow_share_CIFS			Last Transfer Type:	Initialize	Data Transfer Rate:	Unlimited			Latest Snapshot Timestamp:	07/23/2016 06:05:07	Lag Time:	2 day(s) 1 hr(s) 21 min(s)			Latest Snapshot Copy:	snapmirror bf06401b-4a43-11e6-8629-0050560b40cd_2155020568.2016-07-25_071837
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10.	<p>Answer the following questions:</p> <p>Is the relationship healthy?_____</p> <p>What is the relationship state?_____</p> <p>What is the relationship type?_____</p> <p>What is the policy type?_____</p> <p>What is the last transfer type?_____</p>																																										
11.	 <p>You should make a note of the source volume settings, such as thin provisioning, deduplication, compression, and auto-grow. You can use this information when you break the SnapMirror relationship and verify the destination volume settings.</p>																																										

## TASK 2: VERIFY DATA TRANSFER

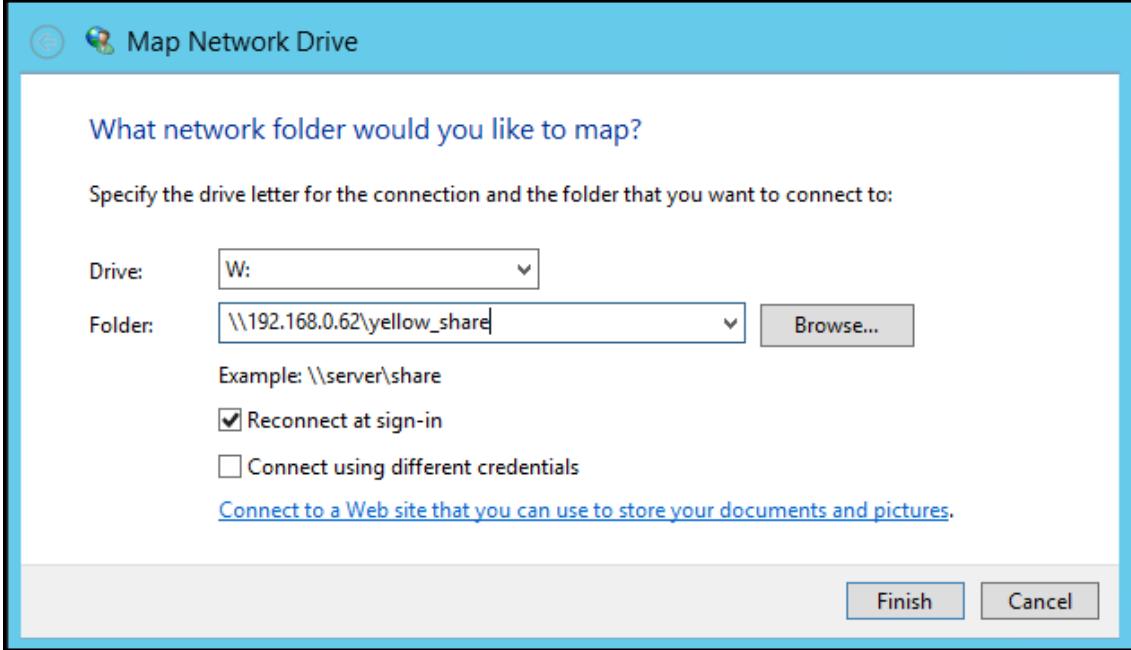
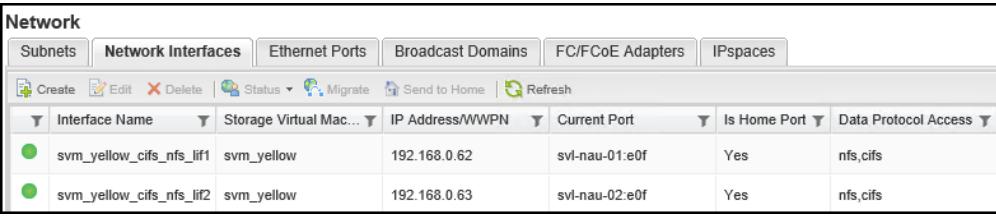
In this task, first you look at the SnapMirror destination volume to see the initialized data.

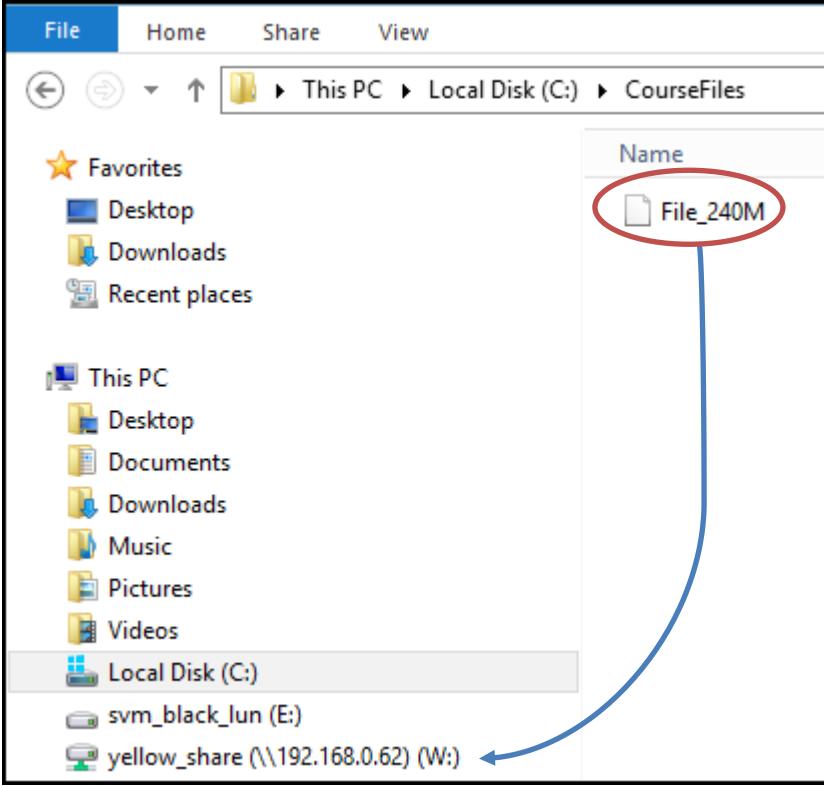
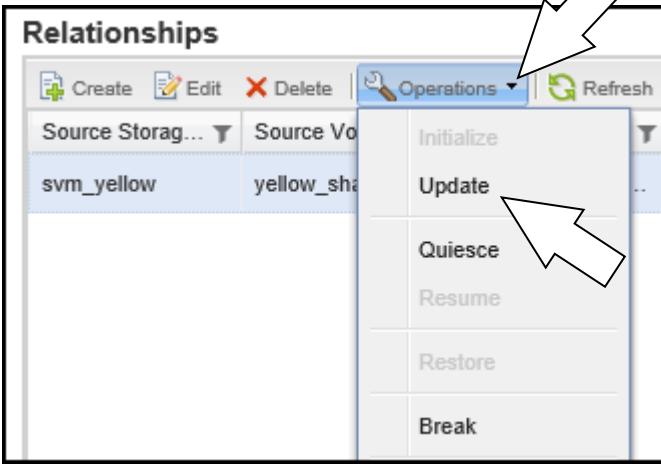
Next, you create data on the primary. Perform a manual update, and then you verify that the new data was transferred to the SnapMirror destination volume.

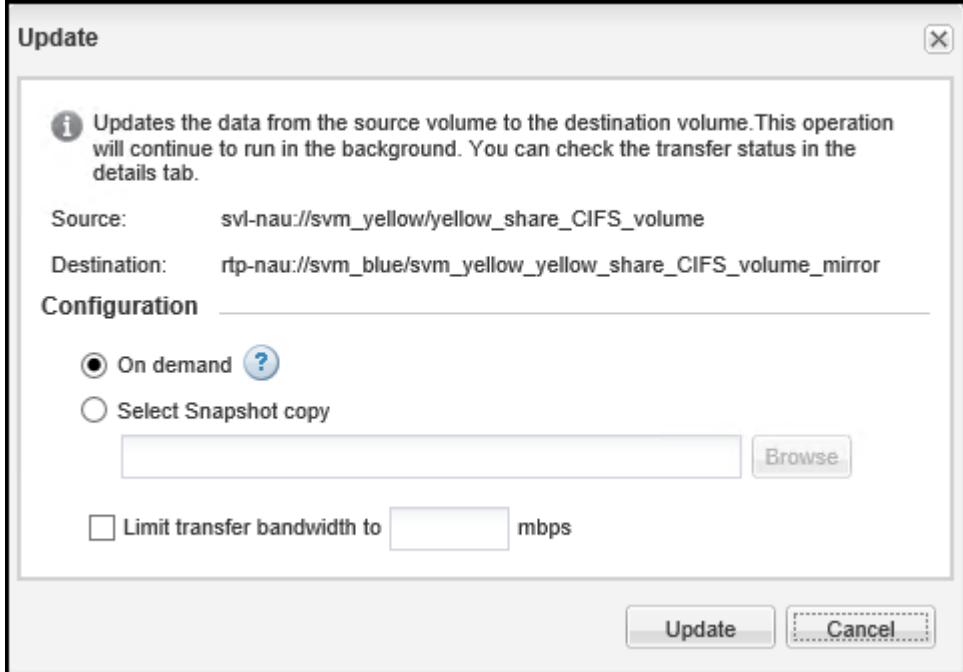
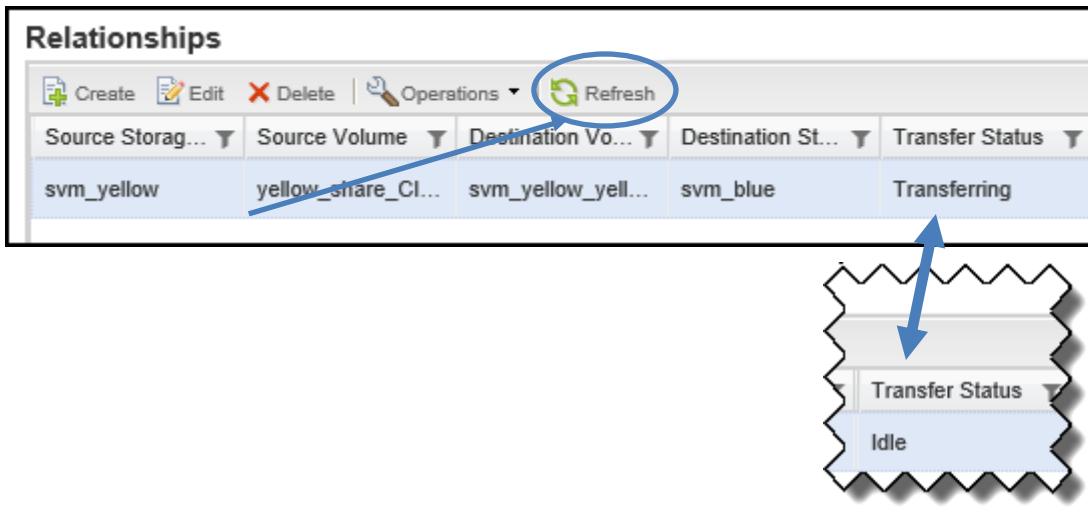
STEP	ACTION
1.	<p> In the process of creating and initializing the SnapMirror relationship, the SnapMirror secondary volume is not automatically mounted.</p> <p>To see the data that has been copied to the SnapMirror secondary volume, you must first mount the secondary volume in the cluster namespace. In the next steps, you mount the secondary volume in the rtp-nau namespace.</p>
2.	<p>Open the Mount Volume dialog box:</p> <ol style="list-style-type: none"><li>On rtp-nau, click the <b>SVMs</b> tab, and then click <b>svm_blue &gt; Namespace</b>.</li><li>Click <b>Mount</b>.</li></ol> 
3.	<p>In the Mount Volume dialog box, enter the following settings:</p> <ul style="list-style-type: none"><li>Volume Name: <b>svm_yellow_yellow_share_CIFS_volume_mirror</b></li><li>Junction Name: <b>svm_yellow_yellow_share_CIFS_volume_mirror</b></li><li>Junction Path: <b>/</b> (the forward slash mark which refers to the root of the namespace)</li></ul> 
4.	Click <b>Mount</b> .

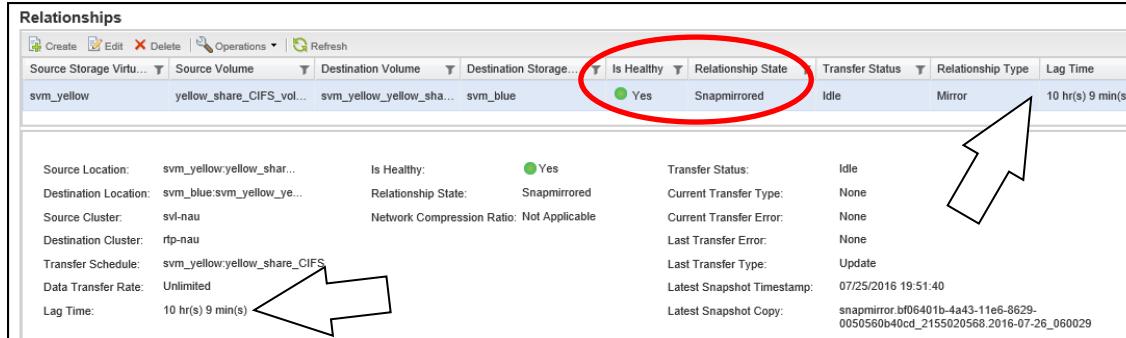
STEP	ACTION
5.	Verify that the secondary volume is listed on the Namespace window.  
6.	 In the next steps, you create a share for the volume that you added to the namespace. Then you map a Windows drive letter to the share.
7.	Open the Create Share window: ol type="a"> <li>With the svm_blue SVM selected, click the <b>Shares</b> tab.</li> <li>Click <b>Create Share</b>.</li> 
8.	Create a share: ol type="a"> <li>In the Create Share window, enter the following configurations: <ul style="list-style-type: none"> <li>▪ Folder To Share: Browse to the /svm_yellow_share_CIFS_volume_mirror volume.</li> <li>▪ Share Name: Accept the default share name.</li> <li>▪ Comment: Leave blank.</li> </ul> </li> <li>Click <b>Create</b>.</li> 

STEP	ACTION
9.	<p>Open Windows File Explorer, and then double-click the <b>blue_root</b> mapping.</p> <p>On the Windows Server, a drive letter is already mapped to a share on <b>svm_blue</b>.</p>
10.	<p>Double-click the <b>svm_yellow_yellow_share_CIFS_volume_mirror</b> folder.</p> <p>Notice that the folder is empty.</p>
11.	<p>Using Windows File Explorer, right-click <b>Network</b>, and then select <b>Map network drive...</b></p>

STEP	ACTION
12.	<p>Map a drive letter to the source volume on svl-nau\svm_yellow:</p> <ol style="list-style-type: none"> <li>Select an available drive letter and configure the folder path as follows: <b>\\\192.168.0.62\yellow_share</b></li> <li>Click <b>Finish</b>.</li> </ol> <p>The svm_yellow SVM has a data logical interface (LIF) and a CIFS share already set up.</p> 
13.	 <p>In the previous step, the IP address used is one of two that are assigned to the SVM data LIF with the CIFS protocol access permitted.</p> 

STEP	ACTION
14.	<p>Copy the file named <b>File_240M</b> from the C:\CourseFiles folder into the yellow_share folder.</p> 
15.	<p>Perform a manual SnapMirror update:</p> <ol style="list-style-type: none"> <li>On rtp-nau, click <b>Protection &gt; Relationships</b>.</li> <li>Click <b>Operations</b>, and then select <b>Update</b>.</li> </ol> 

STEP	ACTION
16.	In the Update window, do not change anything, and then click <b>Update</b> .
	
17.	Wait for the Transfer Status to change from Transferring to Idle.
	
18.	Click the <b>Refresh</b> button to update the status.
19.	<p>In Windows File Explorer, check for the file in the destination volume. The SnapMirror relationship has successfully transferred the file.</p> 

STEP	ACTION
20.	<p>Monitor the status of SnapMirror data transfers in the Relationships window on the destination cluster to ensure that the transfers are occurring on the specified schedule:</p> <ul style="list-style-type: none"> <li>▪ The Is Healthy field must display Yes.</li> <li>▪ The Relationship State field must display Snapmirrored.</li> <li>▪ The Lag Time must be no more than the transfer schedule interval.</li> </ul> 

### TASK 3: EXERCISE REVIEW

In this task, you review the exercise environment that was created by performing the previous tasks.

STEP	ACTION
1.	<p>Verify that you have configured the following relationships between the ONTAP clusters, SVMs, and volumes:</p> <pre>graph LR; subgraph syl-nau [syl-nau]; direction TB; sylSVM[svm_yellow.netapp.local]; end; subgraph rtp-nau [rtp-nau]; direction TB; rtpSVM[svm_blue.netapp.local]; end; sylSVM &lt;--&gt; Cluster peer relationship  rtpSVM; sylSVM &lt;--&gt; SVM peer relationship  rtpSVM; sylSVM --&gt; SnapMirror relationship  rtpSVM; yellowShare[yellow_share_CIFS_volume] --- mirror[svm_yellow_yellow_share_CIFS_volume_mirror]</pre>

END OF EXERCISE

## EXERCISE 2: SNAPMIRROR DISASTER RECOVERY

In this exercise, you simulate a disaster on the source volume. Perform the steps necessary to make the destination volume's data accessible by clients. You then repair the simulated disaster and return the SnapMirror relationship to its original configuration.

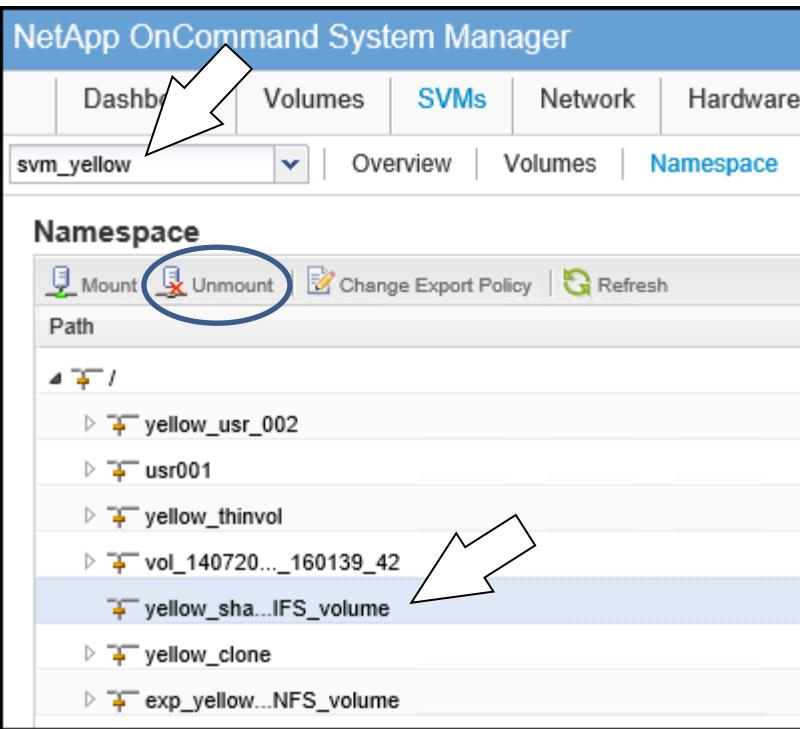
### OBJECTIVES

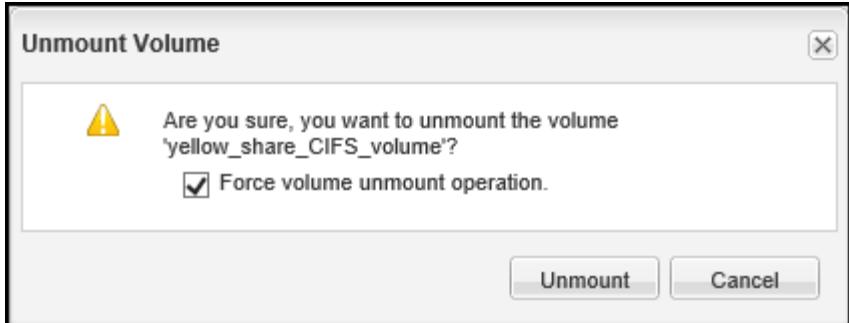
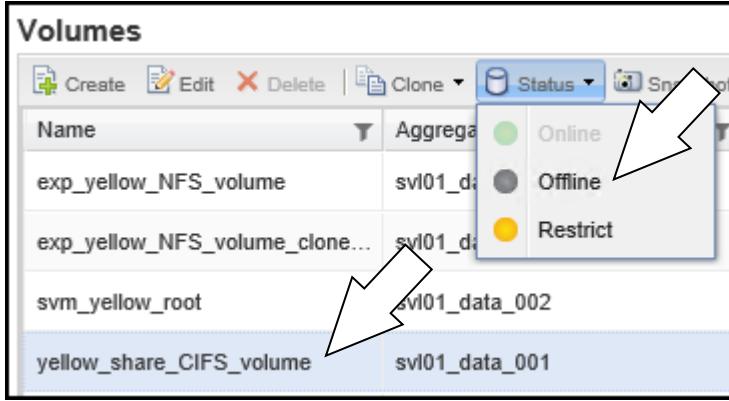
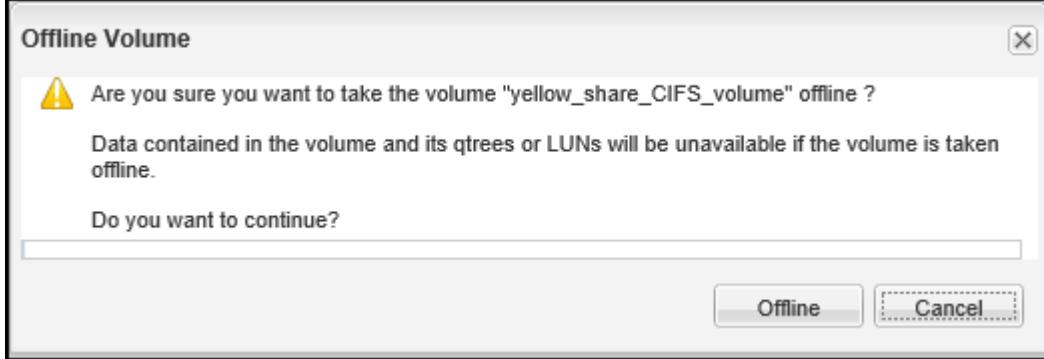
This exercise focuses on enabling you to do the following:

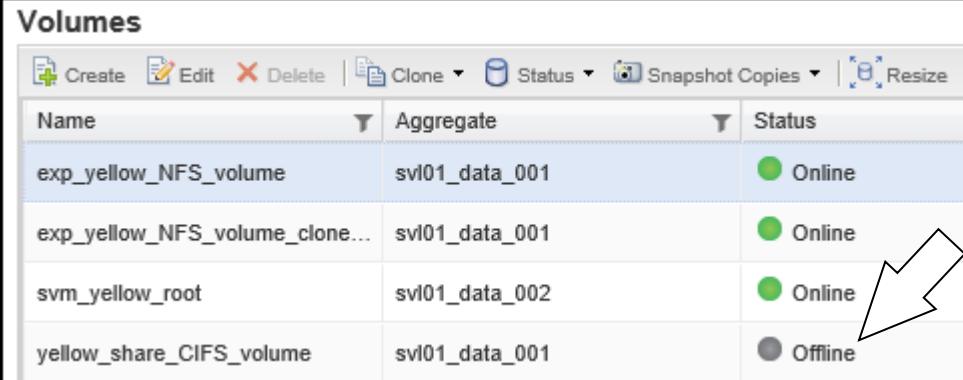
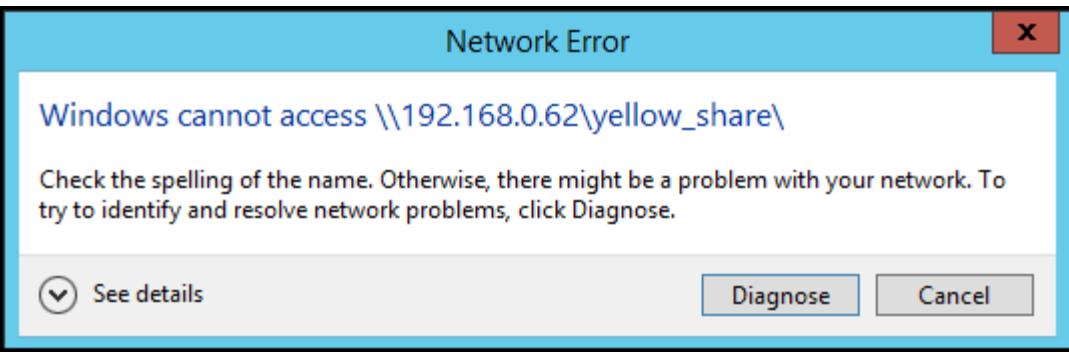
- Create a simulated disaster on the SnapMirror source volume
- Perform disaster recovery procedures on the SnapMirror destination volume
- Return the SnapMirror relationship to its original configuration
- Verify data transfer

### TASK 1: TAKE THE SOURCE VOLUME OFFLINE

In this task, you take the source volume on svl-nau offline. Before you can take a shared volume offline, you must remove it from the namespace.

STEP	ACTION
1.	<p>Begin the unmount process:</p> <ol style="list-style-type: none"><li>a. On svl-nau click the SVMs tab, and then click <b>svm_yellow &gt; Namespace</b>.</li><li>b. Select the source volume, <b>yellow_share_CIFS_volume</b>, and then click <b>Unmount</b>.</li></ol> 

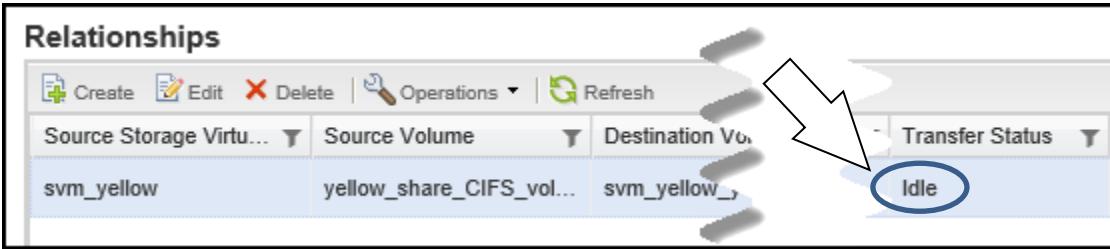
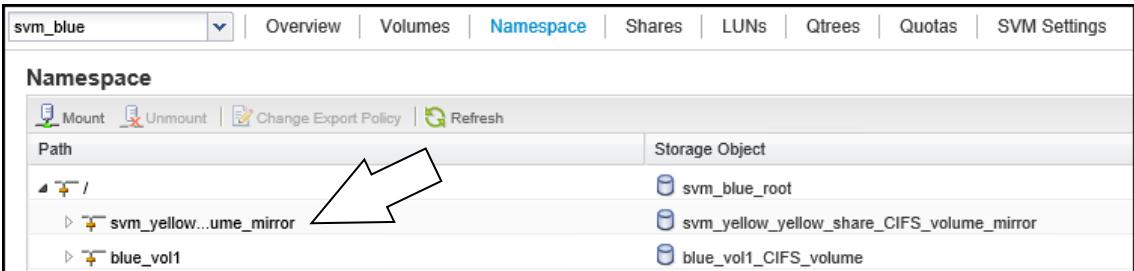
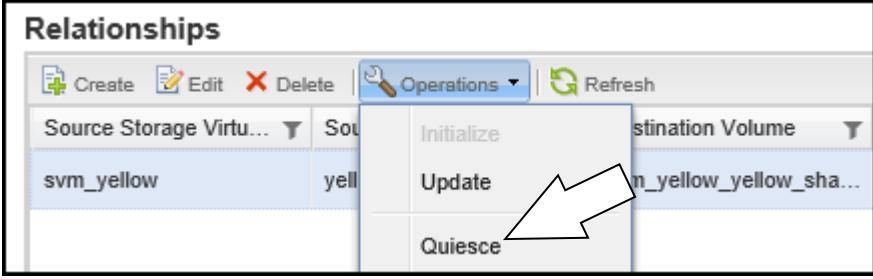
STEP	ACTION
2.	In the Unmount Volume dialog box, select the <b>Force volume unmount operation</b> checkbox, and then click <b>Unmount</b> .
	 <p>The dialog box contains a warning icon and the text: "Are you sure, you want to unmount the volume 'yellow_share_CIFS_volume'?". A checkbox labeled "Force volume unmount operation." is checked. At the bottom are "Unmount" and "Cancel" buttons.</p>
3.	Click the <b>Volumes</b> tab, select <b>yellow_share_CIFS_volume</b> , and then click <b>Status &gt; Offline</b> .
	 <p>The screenshot shows a volumes list with several entries. The entry "yellow_share_CIFS_volume" is highlighted with a blue selection bar. A context menu is open over this entry, with the "Offline" option being pointed to by a white arrow. Other options in the menu are "Online" and "Restrict".</p>
4.	In the Offline Volume confirmation window, click <b>Offline</b> .
	 <p>The dialog box contains a warning icon and the text: "Are you sure you want to take the volume \"yellow_share_CIFS_volume\" offline ?". It also includes the message: "Data contained in the volume and its qtrees or LUNs will be unavailable if the volume is taken offline.". A question "Do you want to continue?" is at the bottom. At the bottom right are "Offline" and "Cancel" buttons.</p>

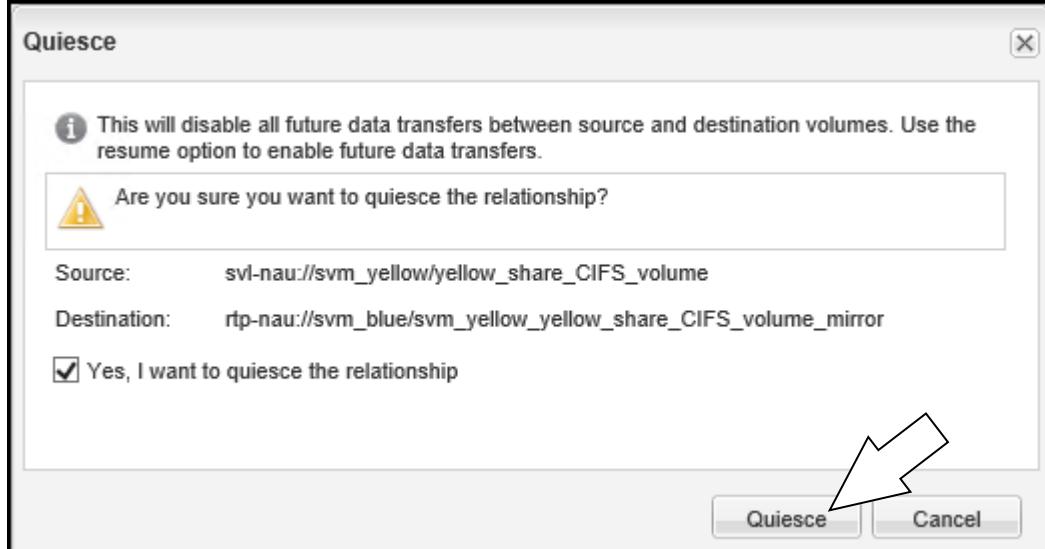
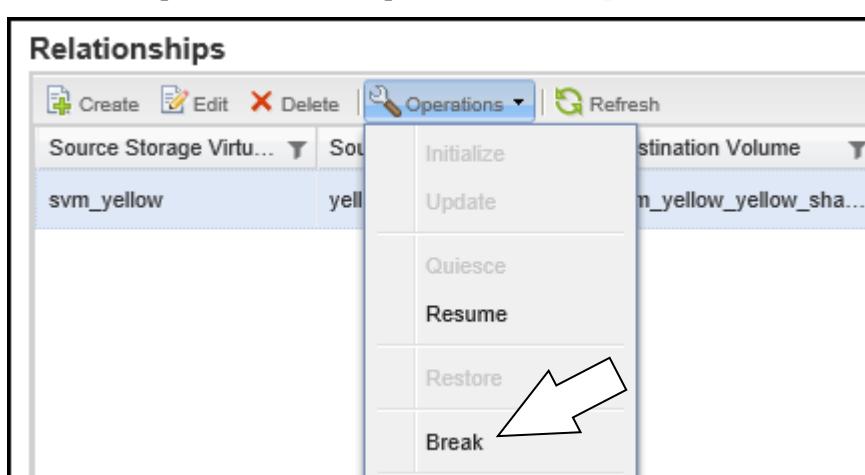
STEP	ACTION															
5.	<p>Verify that the status of the volume is offline.</p>  <table border="1"> <thead> <tr> <th>Name</th> <th>Aggregate</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>exp_yellow_NFS_volume</td> <td>svl01_data_001</td> <td>Online</td> </tr> <tr> <td>exp_yellow_NFS_volume_clone...</td> <td>svl01_data_001</td> <td>Online</td> </tr> <tr> <td>svm_yellow_root</td> <td>svl01_data_002</td> <td>Online</td> </tr> <tr> <td>yellow_share_CIFS_volume</td> <td>svl01_data_001</td> <td>Offline</td> </tr> </tbody> </table>	Name	Aggregate	Status	exp_yellow_NFS_volume	svl01_data_001	Online	exp_yellow_NFS_volume_clone...	svl01_data_001	Online	svm_yellow_root	svl01_data_002	Online	yellow_share_CIFS_volume	svl01_data_001	Offline
Name	Aggregate	Status														
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exp_yellow_NFS_volume_clone...	svl01_data_001	Online														
svm_yellow_root	svl01_data_002	Online														
yellow_share_CIFS_volume	svl01_data_001	Offline														
6.	<p>On your Windows desktop, attempt to access the yellow_share (W:) mapped drive. After 1 or 2 minutes of searching, Windows should display an error message.</p>  <p>Results might vary. You might get a different error message from Windows.</p> 															

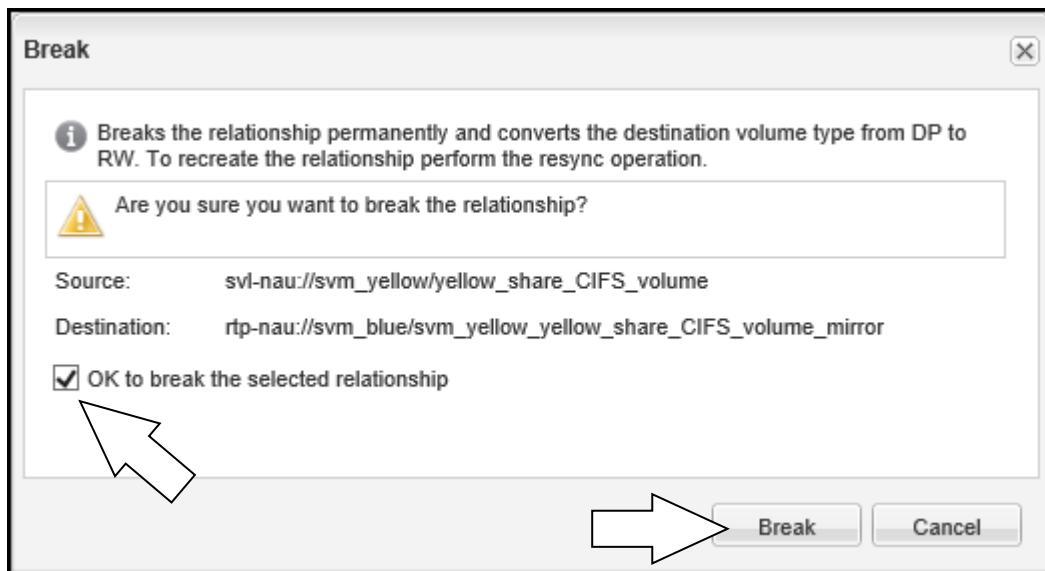
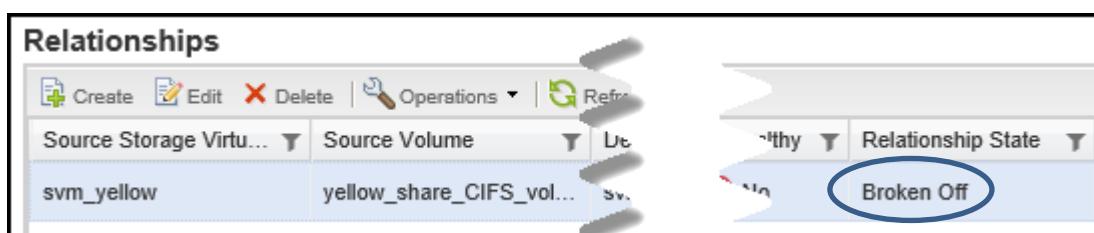
## TASK 2: ACTIVATE THE DESTINATION VOLUME

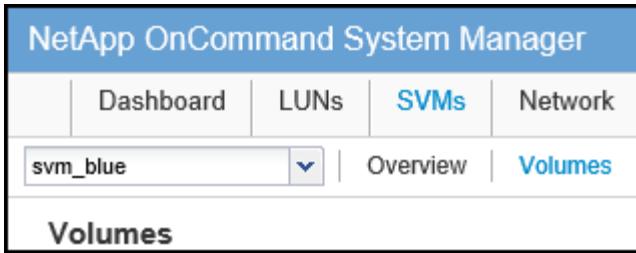
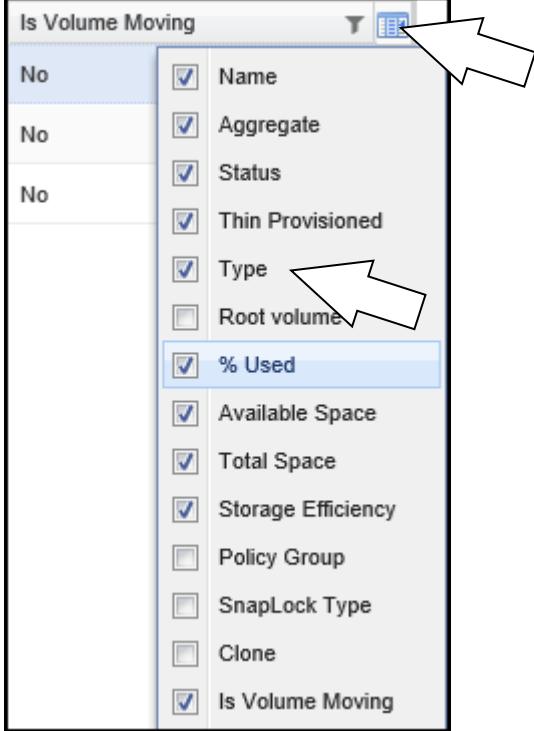
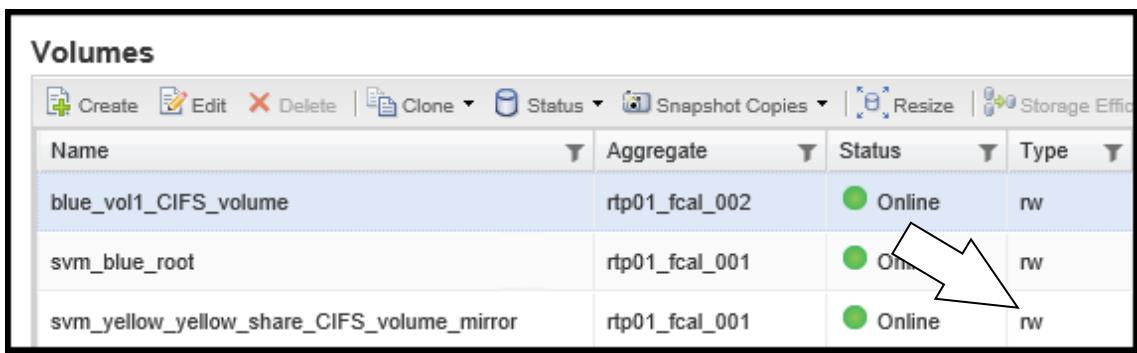
In the previous task, you took the source volume offline and rendered the shared data unavailable.

In this task, you activate the destination volume and configure it for data access using a best practices workflow.

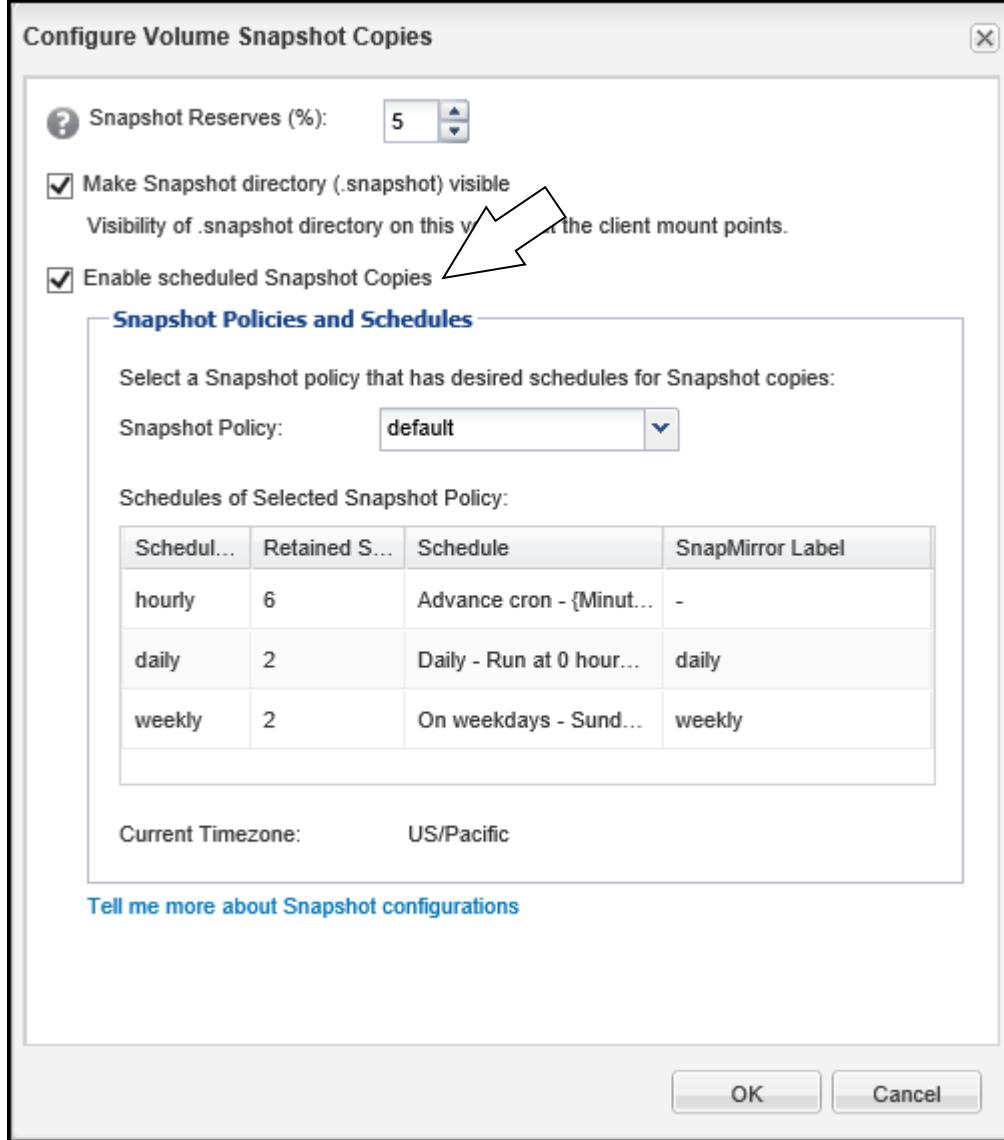
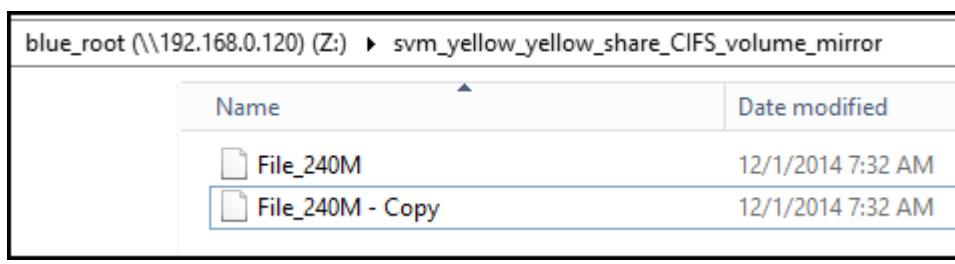
STEP	ACTION
1.	<p>The first steps of the volume disaster workflow include the following actions:</p>  <ul style="list-style-type: none"> <li>a. You verify the source volume status.</li> <li>b. You quiesce and break the SnapMirror relationship.</li> <li>c. You verify the destination volume status.</li> </ul>
2.	 <p>You must always perform the SnapMirror break operation from the destination volume. On the destination SVM, you check the SnapMirror status to see whether a transfer is in progress. The SnapMirror relationship must be in an idle state before you can break the SnapMirror relationship.</p>
3.	<p>On rtp-nau, expand <b>Protection &gt; Relationships</b>, and then check the Transfer Status column.</p> 
4.	 <p>Before you begin, the destination volume must be mounted on the destination SVM namespace.</p> 
5.	<p>Open the Quiesce dialog box:</p> <ol style="list-style-type: none"> <li>Click <b>Protection &gt; Relationships</b>.</li> <li>Select the SnapMirror relationship, and then click <b>Operations &gt; Quiesce</b> to disable future data transfers.</li> </ol> 

STEP	ACTION
6.	<p>In the Quiesce dialog box, enter the following settings:</p> <ol style="list-style-type: none"> <li>Select the checkbox labeled <b>Yes, I want to quiesce the relationship</b>.</li> <li>Click <b>Quiesce</b>.</li> </ol> 
7.	 <p>You must ensure that the transfer status of the SnapMirror relationship is quiesced before you run the SnapMirror break operation. The quiesce operation might take some time if there was a transfer in progress.</p>
8.	<p>With the SnapMirror relationship selected, click <b>Operations &gt; Break</b>.</p> 

STEP	ACTION
9.	In the Break dialog box, select the checkbox labeled <b>OK to break the selected relationship</b> , and then click <b>Break</b> .
	
10.	Verify that the Relationship State column displays Broken Off.
11.	 <p>During normal SnapMirror operations, the secondary volume is a data protection type volume which is read-only. In the next step, you look at the volume type of the secondary volume to see whether it is still read-only or the type has changed to RW.</p>

STEP	ACTION
12.	<p>In the OnCommand System Manager, select the columns shown on the screen:</p> <p>a. Click <b>SVMs &gt; svm_blue &gt; Volumes</b>.</p>  <p>b. Activate the Type column:</p> <ol style="list-style-type: none"> <li>To display the column selection window, click the far-right icon next to the Storage Efficiency column.</li> <li>Select the <b>Type</b> checkbox.</li> </ol> 
13.	<p>Verify that the Type column indicates rw for the volume labeled <code>svm_yellow_yellow_share_CIFS_volume_mirror</code>.</p> 

STEP	ACTION																												
14.	 The state of the SnapMirror relationship is now broken. The SnapMirror primary volume is offline and unavailable to read and write requests from clients. The SnapMirror secondary volume is now writable.																												
15.	 Verify the volume settings (such as thin provisioning, deduplication, compression, and autogrow) on the destination volume: <ol style="list-style-type: none"> <li>Click <b>Edit</b>, make any necessary changes, and then click <b>Save and Close</b>.</li> <li>The settings should match the settings on the source volume.</li> </ol> <div style="border: 1px solid black; padding: 10px;"> <p><b>Edit Volume</b></p> <p><b>General</b>   <b>Storage Efficiency</b>   <b>Advanced</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Name:</td> <td>svm_yellow_yellow_share_CIFS_volume_mirror</td> </tr> <tr> <td>Security style:</td> <td>UNIX</td> </tr> <tr> <td colspan="2"> <input checked="" type="checkbox"/> Configure UNIX permissions (Optional)           </td> </tr> <tr> <td colspan="2" style="text-align: right;"> <b>Read</b>   <b>Write</b>   <b>Execute</b> </td> </tr> <tr> <td>Owner</td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Group</td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>Others</td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td colspan="4"> <input type="checkbox"/> Thin Provisioned            When a volume is thin provisioned, space for the volume is not allocated in advance. Instead, space is allocated as data is written to the volume. The unused aggregate space is available to other thin provisioned volumes and LUNs.  <a href="#">Tell me more about Thin Provisioning</a> </td> </tr> <tr> <td colspan="4" style="text-align: right;"> <input type="button" value="Save"/>   <input type="button" value="Save and Close"/>   <input type="button" value="Cancel"/> </td> </tr> </table> </div>	Name:	svm_yellow_yellow_share_CIFS_volume_mirror	Security style:	UNIX	<input checked="" type="checkbox"/> Configure UNIX permissions (Optional)		<b>Read</b> <b>Write</b> <b>Execute</b>		Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Group	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Others	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Thin Provisioned When a volume is thin provisioned, space for the volume is not allocated in advance. Instead, space is allocated as data is written to the volume. The unused aggregate space is available to other thin provisioned volumes and LUNs. <a href="#">Tell me more about Thin Provisioning</a>				<input type="button" value="Save"/> <input type="button" value="Save and Close"/> <input type="button" value="Cancel"/>			
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<input type="button" value="Save"/> <input type="button" value="Save and Close"/> <input type="button" value="Cancel"/>																													

STEP	ACTION																
16.	<p>Configure volume Snapshot copies:</p> <ol style="list-style-type: none"> <li>Click <b>Snapshot Copies &gt; Configure</b>.</li> <li>Select the checkbox labeled <b>Enable scheduled Snapshot Copies</b>.</li> <li>Click <b>OK</b>.</li> </ol>  <p><b>Configure Volume Snapshot Copies</b></p> <p>Snapshot Reserves (%): 5</p> <p><input checked="" type="checkbox"/> Make Snapshot directory (.snapshot) visible Visibility of .snapshot directory on this volume at the client mount points.</p> <p><input checked="" type="checkbox"/> Enable scheduled Snapshot Copies</p> <p><b>Snapshot Policies and Schedules</b></p> <p>Select a Snapshot policy that has desired schedules for Snapshot copies:</p> <p>Snapshot Policy: default</p> <p>Schedules of Selected Snapshot Policy:</p> <table border="1"> <thead> <tr> <th>Schedule</th> <th>Retained S...</th> <th>Schedule</th> <th>SnapMirror Label</th> </tr> </thead> <tbody> <tr> <td>hourly</td> <td>6</td> <td>Advance cron - {Minut...</td> <td>-</td> </tr> <tr> <td>daily</td> <td>2</td> <td>Daily - Run at 0 hour...</td> <td>daily</td> </tr> <tr> <td>weekly</td> <td>2</td> <td>On weekdays - Sund...</td> <td>weekly</td> </tr> </tbody> </table> <p>Current Timezone: US/Pacific</p> <p><a href="#">Tell me more about Snapshot configurations</a></p> <p>OK Cancel</p>	Schedule	Retained S...	Schedule	SnapMirror Label	hourly	6	Advance cron - {Minut...	-	daily	2	Daily - Run at 0 hour...	daily	weekly	2	On weekdays - Sund...	weekly
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daily	2	Daily - Run at 0 hour...	daily														
weekly	2	On weekdays - Sund...	weekly														
17.	<p>On your Windows desktop, open Windows File Explorer, and click the drive letter mapped to the blue_root share. Notice that the mirrored volume was already mounted into the destination SVMs namespace.</p>  <p>blue_root (\\\192.168.0.120) (Z): ▶ svm_yellow_yellow_share_CIFS_volume_mirror</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Date modified</th> </tr> </thead> <tbody> <tr> <td>File_240M</td> <td>12/1/2014 7:32 AM</td> </tr> <tr> <td>File_240M - Copy</td> <td>12/1/2014 7:32 AM</td> </tr> </tbody> </table>	Name	Date modified	File_240M	12/1/2014 7:32 AM	File_240M - Copy	12/1/2014 7:32 AM										
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File_240M - Copy	12/1/2014 7:32 AM																

STEP	ACTION
18.	Double-click the <b>svm_yellow_yellow_share_CIFS_volume_mirror</b> folder.
19.	Right-click the <b>File_240M</b> file, and then select <b>Copy</b> .
20.	Right-click in the folder, and then select <b>Paste</b> . This action creates a copy of the file.

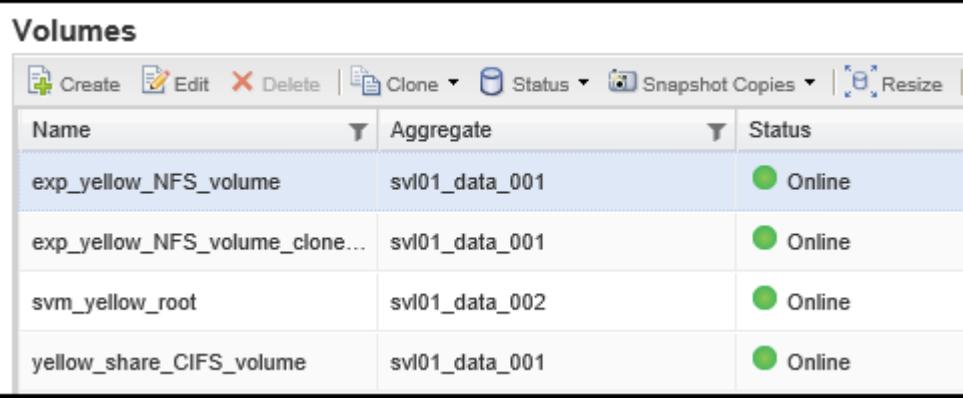
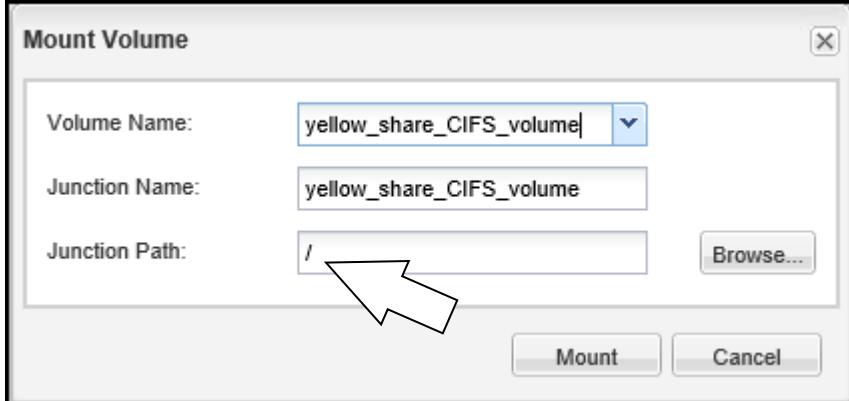
### TASK 3: EXERCISE REVIEW

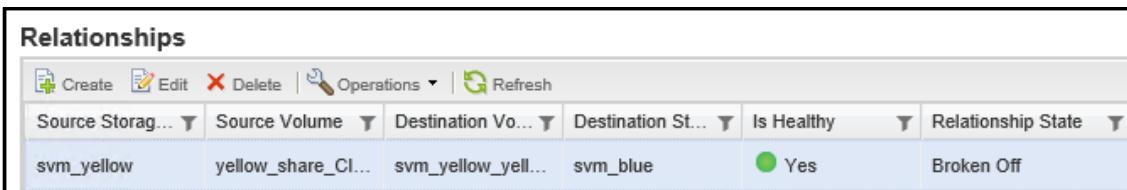
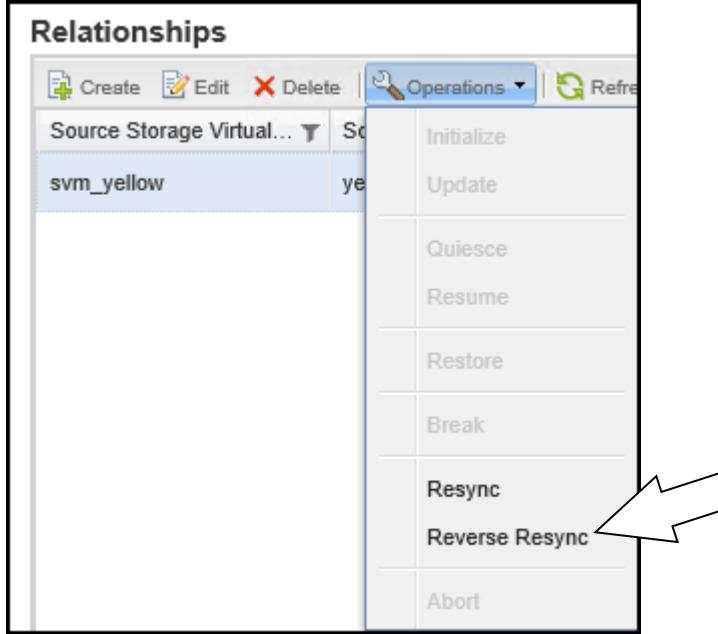
In this task, you review the exercise environment that was created by performing the previous tasks.

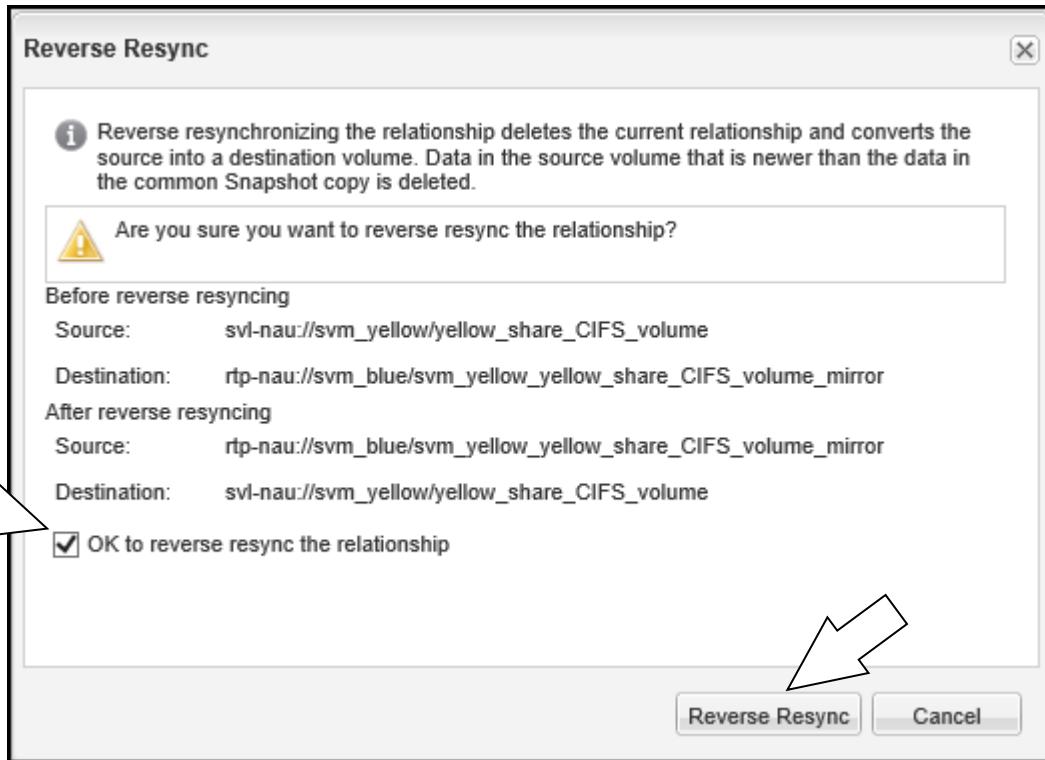
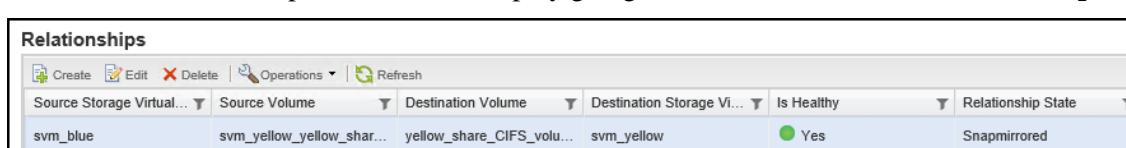
STEP	ACTION
1.	<p>Verify that the SnapMirror relationship is broken off and the destination volume is in a read/write state.</p> <p>The diagram illustrates the state of two NetApp storage clusters, svl-nau and rtp-nau, during Task 3. Both clusters are connected via a Cluster peer relationship. Each cluster has an SVM peer relationship. Within each SVM, there is a yellow Share CIFS volume. A red SnapMirror relationship is shown as a dashed arrow pointing from the source volume in svl-nau to the destination volume in rtp-nau. The destination volume is labeled 'writable'.</p>

## TASK 4: REACTIVATE THE ORIGINAL SOURCE VOLUME

In this task, you bring the primary volume back online. Before normal operations can be restored, though, you must run a SnapMirror reverse resynchronization to update the primary volume with data that was written to the secondary.

STEP	ACTION
1.	<p> When the source volume becomes available, you must resynchronize the data from the destination volume to the source volume, update any modifications after the resynchronization, and activate the source volume. First, you bring the original source volume online.</p>
2.	On svl-nau, click <b>Volumes</b> .
3.	Right-click <b>yellow_share_CIFS_volume</b> , and then click <b>Status &gt; Online</b> .
4.	<p>Verify that yellow_share_CIFS_volume is online.</p> 
5.	<p> In this next step, you mount yellow_share_CIFS_volume into the namespace.</p>
6.	On svl-nau, click the <b>Namespace</b> button, and then click <b>Mount</b> .
7.	<p>On the Mount Volume dialog box, click <b>Mount</b>.  This action mounts yellow_share_CIFS_volume to the root of the Junction Path.</p> 
8.	<p> The primary volume is again online and mounted into the svl-nau namespace.  In the next step, on rtp-nau, you check the SnapMirror status.</p>

STEP	ACTION
9.	<p>On rtp-nau, click <b>Protection &gt; Relationships</b>. The relationship is healthy and is in the broken off state.</p> 
10.	<p> The status of the SnapMirror relationship is Broken Off. The primary volume is online. However, data is written to the secondary volume. In the next step, you reverse the direction of the SnapMirror relationship to copy data that was written to the secondary back to the primary volume. The Reverse Resync operation can be run from only the SnapMirror secondary SVM.</p>
11.	<p>On the Relationships page, click <b>Operations &gt; Reverse Resync</b>.</p> 

STEP	ACTION
12.	<p>In the Reverse Resync dialog box, select the checkbox labeled <b>OK to reverse resync the relationship</b>, click <b>Reverse Resync</b>, and then click <b>Refresh</b> to see the change.</p> <p>The SnapMirror relationship is removed from the protection list.</p> 
13.	<p>Locate the reversed SnapMirror relationship by going to <b>svl-nau Protection &gt; Relationships</b>.</p> 
14.	<p> On the svl-nau Relationships page, the original source is now the destination, and the original destination is now the source. The SnapMirror policy is set to DPDefault.</p>

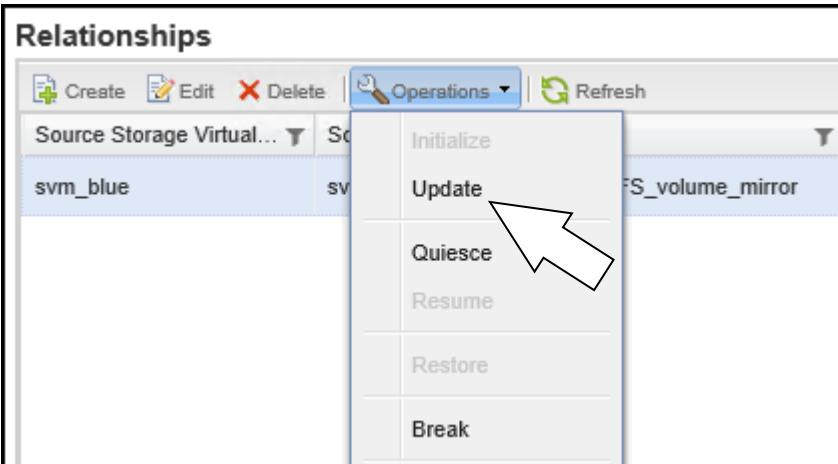
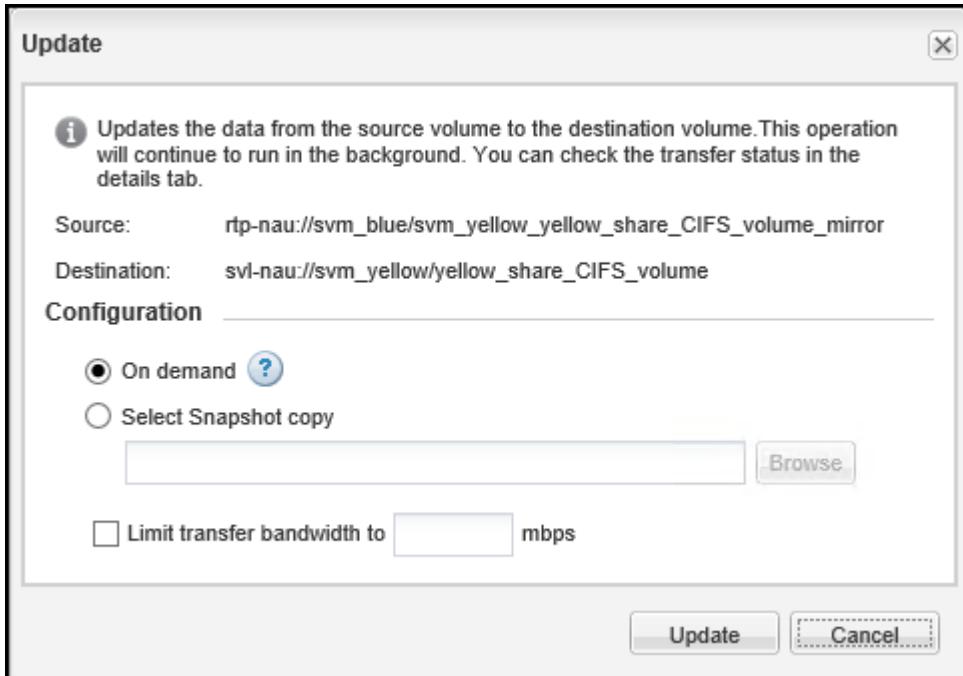
## TASK 5: EXERCISE REVIEW

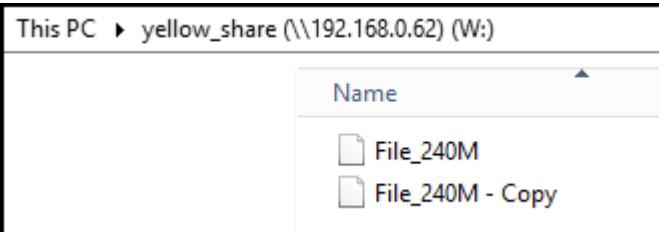
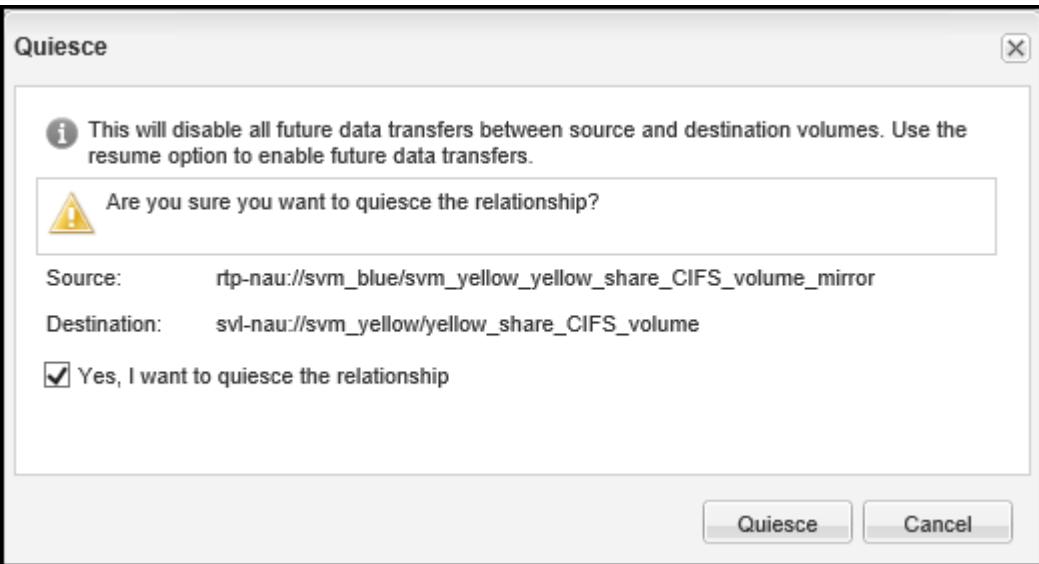
In this task, you review the exercise environment that was created by performing the previous tasks.

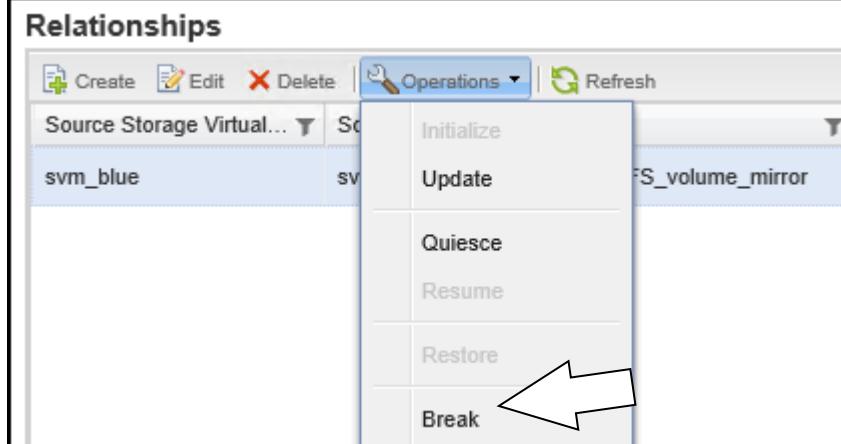
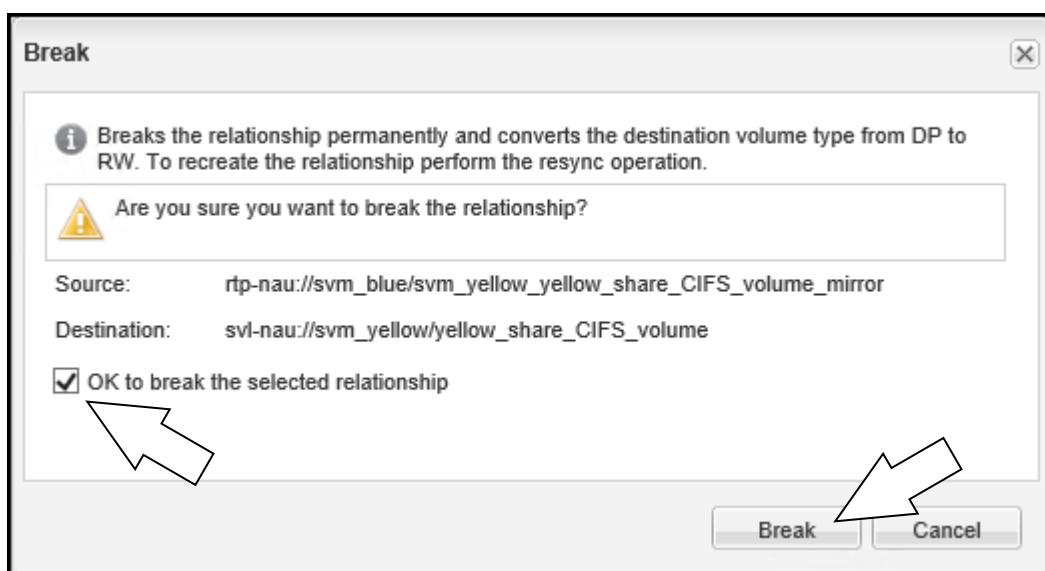
STEP	ACTION
1.	<p>Verify that the original source volume is now configured as the SnapMirror destination, and the original destination is now the SnapMirror source volume.</p> <p>If the relationship stays in this configuration for long, you might need to reset the mirror policy and update schedule until time to return the SnapMirror relationship to its original configuration</p> <pre>graph LR; subgraph Cluster [Cluster]; direction TB; svl-nau[svl-nau] &lt;--&gt; rtp-nau[rtp-nau]; end; svl-nau -- "SVM peer relationship" --&gt; rtp-nau; svl-nau -- "yellow_share_CIFS_volume" --&gt; rtp-nau -- "blue_share_CIFS_volume" --&gt; rtp-nau; svl-nau -- "SnapMirror relationship" --&gt; rtp-nau;</pre>

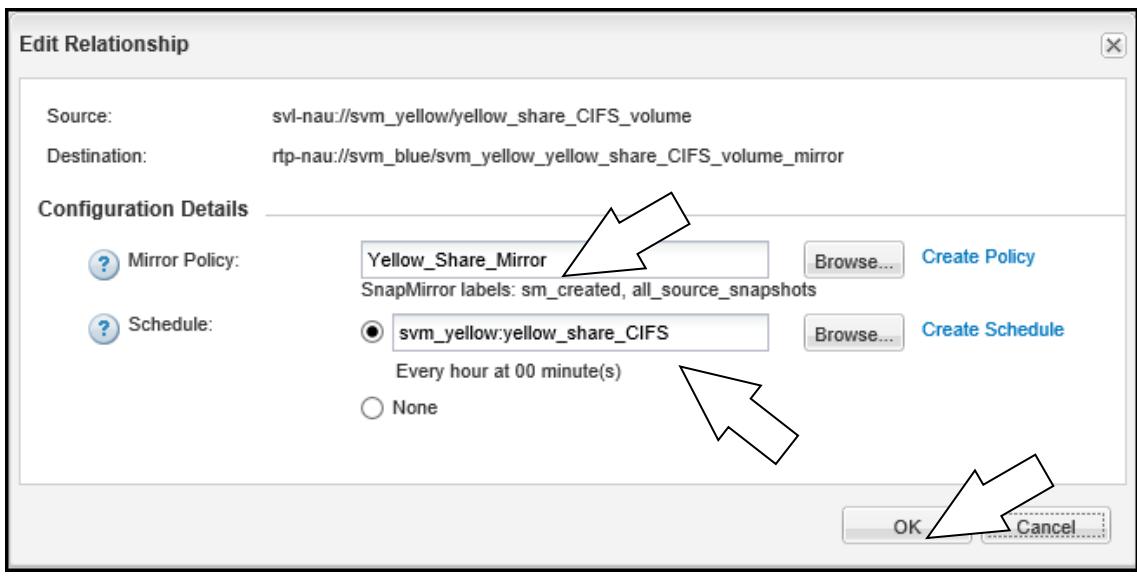
## TASK 6: RESTORE THE ORIGINALSNAPMIRROR RELATIONSHIP

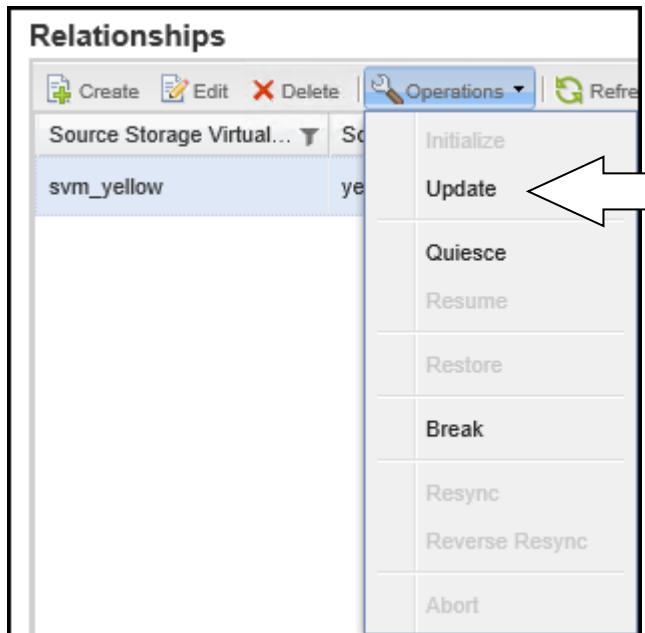
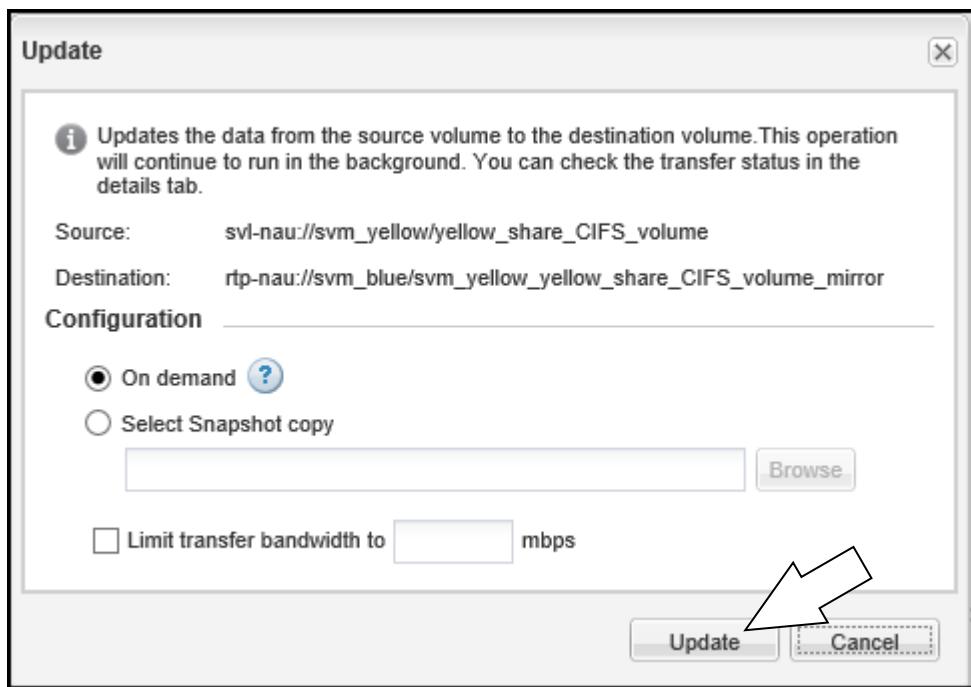
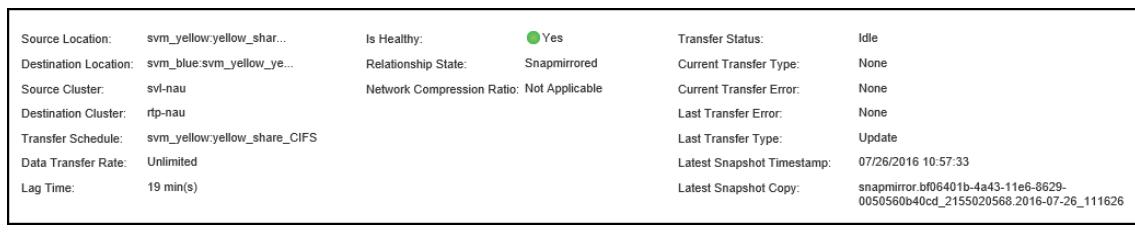
Now that data written to the SnapMirror secondary was updated to the primary, you can restore the original relationship between the two SnapMirror volumes.

STEP	ACTION
1.	<p> You start to restore the original relationship by updating the reversed SnapMirror relationship, because clients might have written to the SnapMirror reversed secondary.</p> <p>After you update the reversed relationship, you break the relationship. Be sure that you verify that the transfer status is idle before you break the reversed mirror.</p>
2.	<p>On svl-nau, click <b>Protection &gt; Relationships</b>, and then click <b>Operations &gt; Update</b>.</p> 
3.	<p>In the Update window, leave the default configuration setting of On demand, and then click <b>Update</b>.</p> 

STEP	ACTION
4.	<p> When you reverse synchronize, the schedule is not applied to the temporary reversed relationship. The update operation is necessary to bring all data written to the reversed secondary back to the primary volume. The On demand configuration setting in the Update window transfers based on the newest shared Snapshot copy on the source and destination volumes.</p>
5.	<p>Use Windows File Explorer to check that the file copy you made on the rtp-nau SVM share has been replicated to the svl-nau SVM share.</p> 
6.	<p>On svl-nau, click <b>Protection &gt; Relationships</b>, and then click <b>Operations &gt; Quiesce</b>.</p>
7.	<p>In the Quiesce dialog box, enter the following settings:</p> <ol style="list-style-type: none"> <li>Select the checkbox labeled <b>Yes, I want to quiesce the relationship</b>.</li> <li>Click <b>Quiesce</b>.</li> </ol>  <p>The dialog box contains the following text:  <b>Quiesce</b>  <i>This will disable all future data transfers between source and destination volumes. Use the resume option to enable future data transfers.</i>  <b>Are you sure you want to quiesce the relationship?</b>  Source: rtp-nau://svm_blue/svm_yellow_yellow_share_CIFS_volume_mirror  Destination: svl-nau://svm_yellow/yellow_share_CIFS_volume  <input checked="" type="checkbox"/> Yes, I want to quiesce the relationship  Buttons: Quiesce, Cancel</p>

STEP	ACTION
8.	<p>After you make sure that the transfer status is quiesced, click <b>Operations &gt; Break</b>.</p> 
9.	<p>In the Break dialog box, select the checkbox labeled <b>OK to break the selected relationship</b>, and then click <b>Break</b>.</p> 
10.	<p>Verify that the SnapMirror relationship is Broken Off.</p> 
11.	<p> In the next step, you reestablish the original SnapMirror relationship by again using the Reverse Resync operation.</p>
12.	<p>Perform a Reverse Resync by clicking <b>Operations &gt; Reverse Resync</b>.</p>
13.	<p>Select the checkbox labeled <b>OK to reverse resync the relationship</b>, and then click <b>Reverse Resync</b>.</p>

STEP	ACTION
14.	<p> Now that the SnapMirror relationship is reversed, you must log in to rtp-nau to verify and manage the SnapMirror relationship. SnapMirror is always managed from the SnapMirror destination.</p> <p>You also must reapply the SnapMirror update schedule.</p>
15.	On rtp-nau, on the Relationships page, click <b>Refresh</b> .
16.	<p>Verify that the original SnapMirror relationship has been restored and is healthy. The Relationship State column should display Snapmirrored.</p> 
17.	<p>On the rtp-nau Protection page, reassign the SnapMirror policy and schedule:</p> <ol style="list-style-type: none"> <li>With the SnapMirror relationship selected, click <b>Edit</b>.</li> <li>Assign the original mirror policy and schedule.</li> <li>Click <b>OK</b>.</li> </ol> 

STEP	ACTION																																										
18.	Manually update the SnapMirror relationship by clicking <b>Operations &gt; Update</b> .																																										
	 <p>The screenshot shows the 'Relationships' interface. A context menu is open over a row in the list. The 'Update' option is highlighted with a white arrow pointing to it from the left.</p>																																										
19.	In the Update dialog box, click <b>Update</b> .																																										
	 <p>The screenshot shows the 'Update' dialog box. It displays the source and destination volumes, configuration options (On demand selected), and bandwidth limit settings. A white arrow points to the 'Update' button at the bottom right of the dialog.</p>																																										
20.	Verify that the original SnapMirror relationship has been reestablished.																																										
	 <table border="1"> <tbody> <tr> <td>Source Location:</td> <td>svm_yellow:yellow_share_CIFS</td> <td>Is Healthy:</td> <td><input checked="" type="radio"/> Yes</td> <td>Transfer Status:</td> <td>Idle</td> </tr> <tr> <td>Destination Location:</td> <td>rtp-nau:svm_blue:svm_yellow_ye...</td> <td>Relationship State:</td> <td>Snapmirrored</td> <td>Current Transfer Type:</td> <td>None</td> </tr> <tr> <td>Source Cluster:</td> <td>svl-nau</td> <td>Network Compression Ratio:</td> <td>Not Applicable</td> <td>Current Transfer Error:</td> <td>None</td> </tr> <tr> <td>Destination Cluster:</td> <td>rtp-nau</td> <td></td> <td></td> <td>Last Transfer Error:</td> <td>None</td> </tr> <tr> <td>Transfer Schedule:</td> <td>svm_yellow:yellow_share_CIFS</td> <td></td> <td></td> <td>Last Transfer Type:</td> <td>Update</td> </tr> <tr> <td>Data Transfer Rate:</td> <td>Unlimited</td> <td></td> <td></td> <td>Latest Snapshot Timestamp:</td> <td>07/26/2016 10:57:33</td> </tr> <tr> <td>Lag Time:</td> <td>19 min(s)</td> <td></td> <td></td> <td>Latest Snapshot Copy:</td> <td>snapmirror bf06401b-4a43-11e6-8629-0050560b40cd_2155020568.2016-07-26_111626</td> </tr> </tbody> </table>	Source Location:	svm_yellow:yellow_share_CIFS	Is Healthy:	<input checked="" type="radio"/> Yes	Transfer Status:	Idle	Destination Location:	rtp-nau:svm_blue:svm_yellow_ye...	Relationship State:	Snapmirrored	Current Transfer Type:	None	Source Cluster:	svl-nau	Network Compression Ratio:	Not Applicable	Current Transfer Error:	None	Destination Cluster:	rtp-nau			Last Transfer Error:	None	Transfer Schedule:	svm_yellow:yellow_share_CIFS			Last Transfer Type:	Update	Data Transfer Rate:	Unlimited			Latest Snapshot Timestamp:	07/26/2016 10:57:33	Lag Time:	19 min(s)			Latest Snapshot Copy:	snapmirror bf06401b-4a43-11e6-8629-0050560b40cd_2155020568.2016-07-26_111626
Source Location:	svm_yellow:yellow_share_CIFS	Is Healthy:	<input checked="" type="radio"/> Yes	Transfer Status:	Idle																																						
Destination Location:	rtp-nau:svm_blue:svm_yellow_ye...	Relationship State:	Snapmirrored	Current Transfer Type:	None																																						
Source Cluster:	svl-nau	Network Compression Ratio:	Not Applicable	Current Transfer Error:	None																																						
Destination Cluster:	rtp-nau			Last Transfer Error:	None																																						
Transfer Schedule:	svm_yellow:yellow_share_CIFS			Last Transfer Type:	Update																																						
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## TASK 7: EXERCISE REVIEW

In this task, you review the exercise environment that was created by performing the previous tasks.

STEP	ACTION
1.	<p>Verify that you have now successfully returned the SnapMirror relationship to its original configuration.</p> <p>The diagram illustrates the state of two NetApp clusters, <b>syl-nau</b> and <b>rtp-nau</b>, after returning the SnapMirror relationship to its original configuration. Both clusters have a <b>Cluster peer relationship</b> indicated by a double-headed blue arrow between them. Cluster <b>syl-nau</b> contains an SVM named <b>svm_yellow.netapp.local</b> which has a <b>yellow_share_CIFS_volume</b>. Cluster <b>rtp-nau</b> contains an SVM named <b>svm_blue.netapp.local</b> which has a <b>svm_yellow_yellow_share_CIFS_volume_mirror</b>. A dashed blue arrow labeled <b>SVM peer relationship</b> connects the two SVMs. A dashed red arrow labeled <b>SnapMirror relationship</b> points from the SVM in <b>rtp-nau</b> back to the volume in <b>syl-nau</b>.</p>

END OF EXERCISE

## EXERCISE 3: SNAMIRROR AND FLEXCLONE TECHNOLOGY

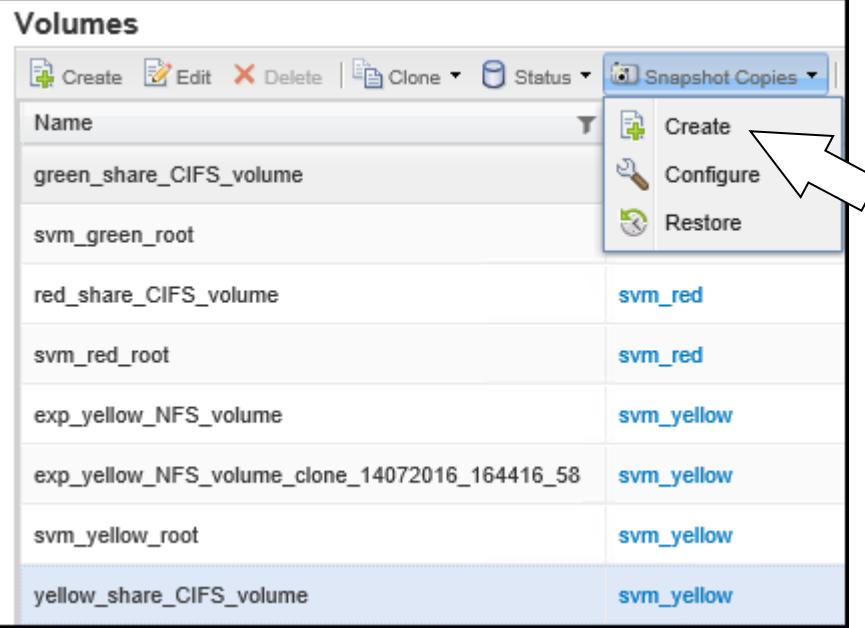
In this exercise, you use FlexClone technology to create a clone of the SnapMirror destination volume for disaster recovery testing.

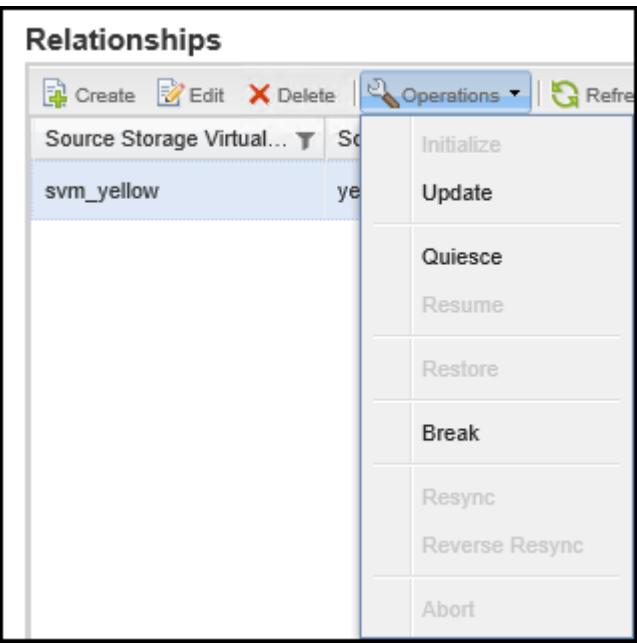
### OBJECTIVES

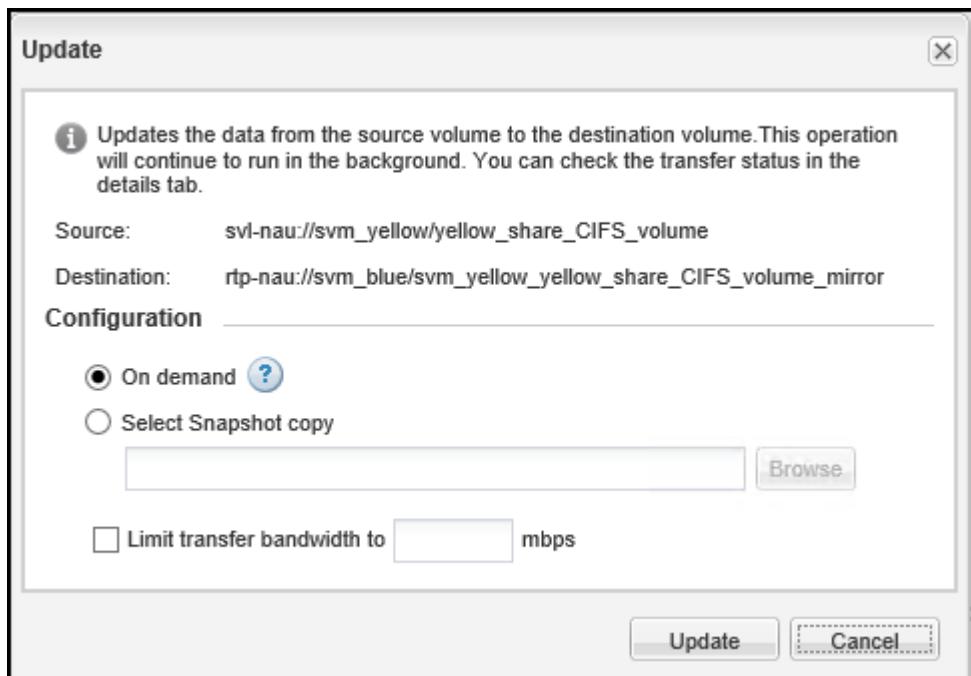
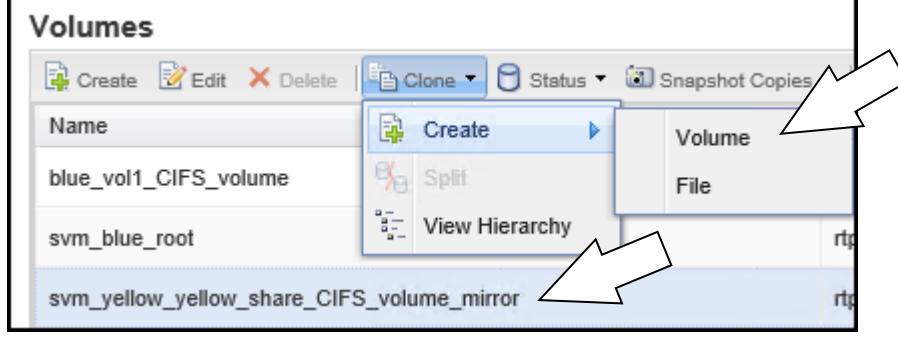
This exercise focuses on enabling you to do the following:

- Create an unscheduled Snapshot copy on the SnapMirror source volume
- Perform a SnapMirror update to replicate the unscheduled Snapshot copy to the destination volume
- Use the unscheduled Snapshot copy as a base for the FlexClone volume
- Offline and delete the cloned volume

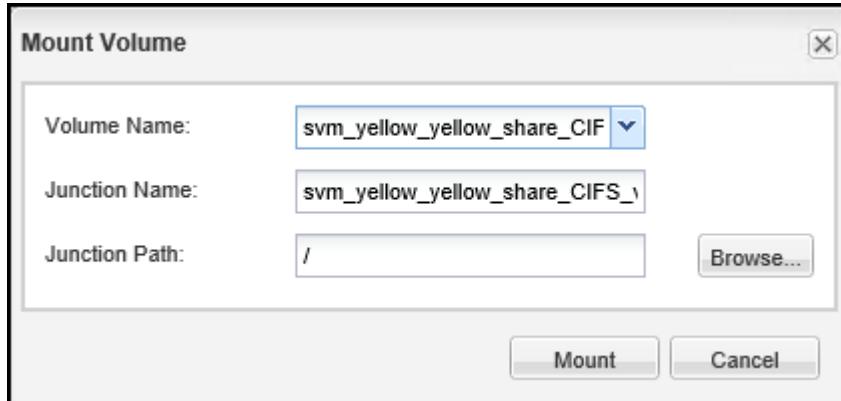
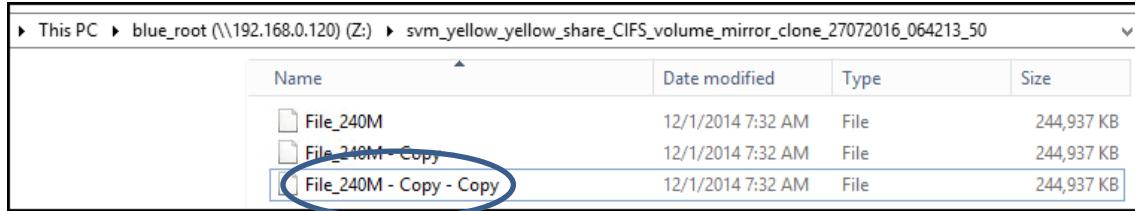
### TASK 1: CREATE AN UNSCHEDULED SNAPSHOT COPY

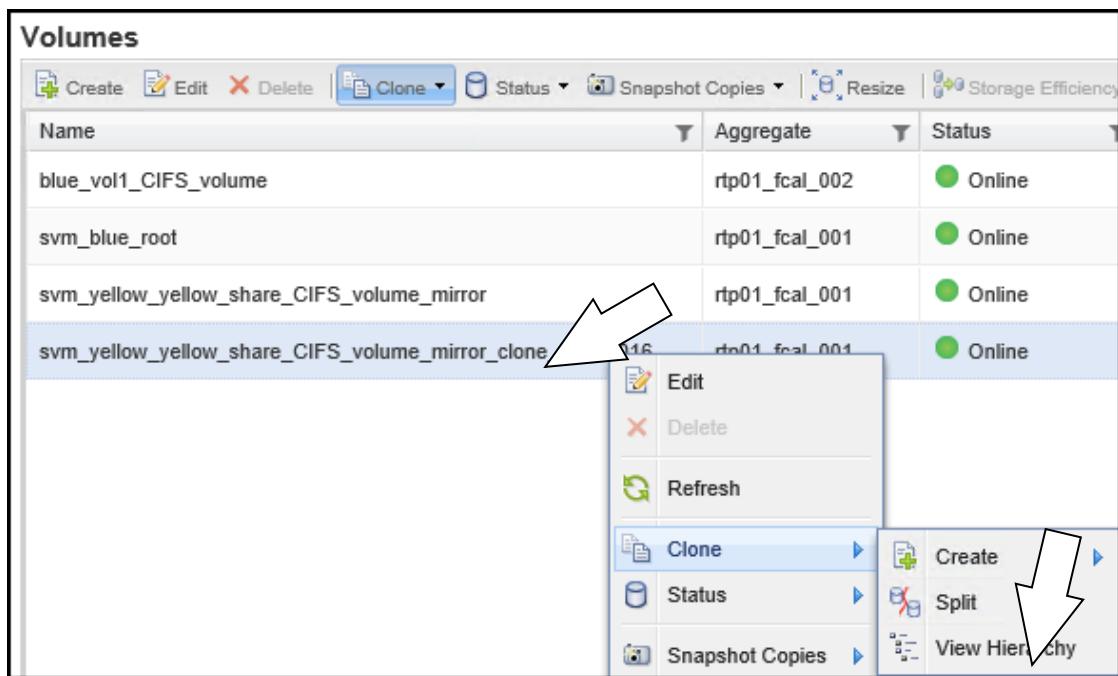
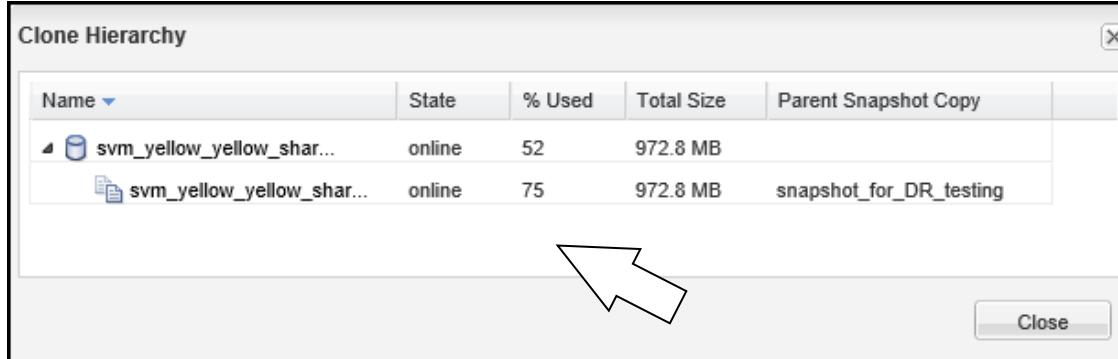
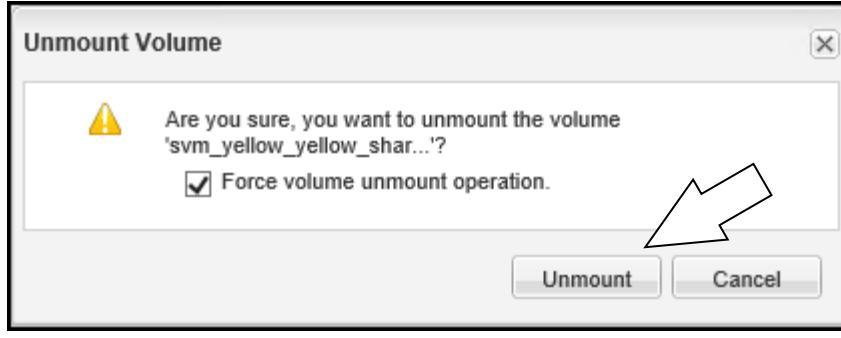
STEP	ACTION																		
1.	<p> SnapMirror replicates the Snapshot copy history from the source to the destination volumes. If a Snapshot copy is locked because it is the base Snapshot copy of a FlexClone volume, the SnapMirror update fails. For the SnapMirror update to succeed, you should delete the FlexClone volume or split it to remove the Snapshot copy dependency.</p> <p>Many situations arise in which testing must be performed using the data on the SnapMirror destination volume. For SnapMirror updates to proceed uninterrupted while the testing takes place, it is a NetApp best practice to follow these steps:</p> <ol style="list-style-type: none"><li>a. You create an unscheduled Snapshot copy on the source volume.</li><li>b. You replicate that Snapshot copy to the destination volume.</li><li>c. You use the Snapshot copy as the base for the FlexClone volume.</li></ol>																		
2.	<p>Create an unscheduled Snapshot copy on the SnapMirror source volume:</p> <ol style="list-style-type: none"><li>a. On syl-nau, in the SVMs &gt; svm_yellow &gt; volumes window, select the <b>yellow_share_CIFS_volume</b>.</li><li>b. Click <b>Snapshot Copies &gt; Create</b>.</li></ol>  <table border="1"><thead><tr><th>Name</th><th>Status</th></tr></thead><tbody><tr><td>green_share_CIFS_volume</td><td>svm_green</td></tr><tr><td>svm_green_root</td><td>svm_green</td></tr><tr><td>red_share_CIFS_volume</td><td>svm_red</td></tr><tr><td>svm_red_root</td><td>svm_red</td></tr><tr><td>exp_yellow_NFS_volume</td><td>svm_yellow</td></tr><tr><td>exp_yellow_NFS_volume_clone_14072016_164416_58</td><td>svm_yellow</td></tr><tr><td>svm_yellow_root</td><td>svm_yellow</td></tr><tr><td>yellow_share_CIFS_volume</td><td>svm_yellow</td></tr></tbody></table>	Name	Status	green_share_CIFS_volume	svm_green	svm_green_root	svm_green	red_share_CIFS_volume	svm_red	svm_red_root	svm_red	exp_yellow_NFS_volume	svm_yellow	exp_yellow_NFS_volume_clone_14072016_164416_58	svm_yellow	svm_yellow_root	svm_yellow	yellow_share_CIFS_volume	svm_yellow
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svm_green_root	svm_green																		
red_share_CIFS_volume	svm_red																		
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svm_yellow_root	svm_yellow																		
yellow_share_CIFS_volume	svm_yellow																		

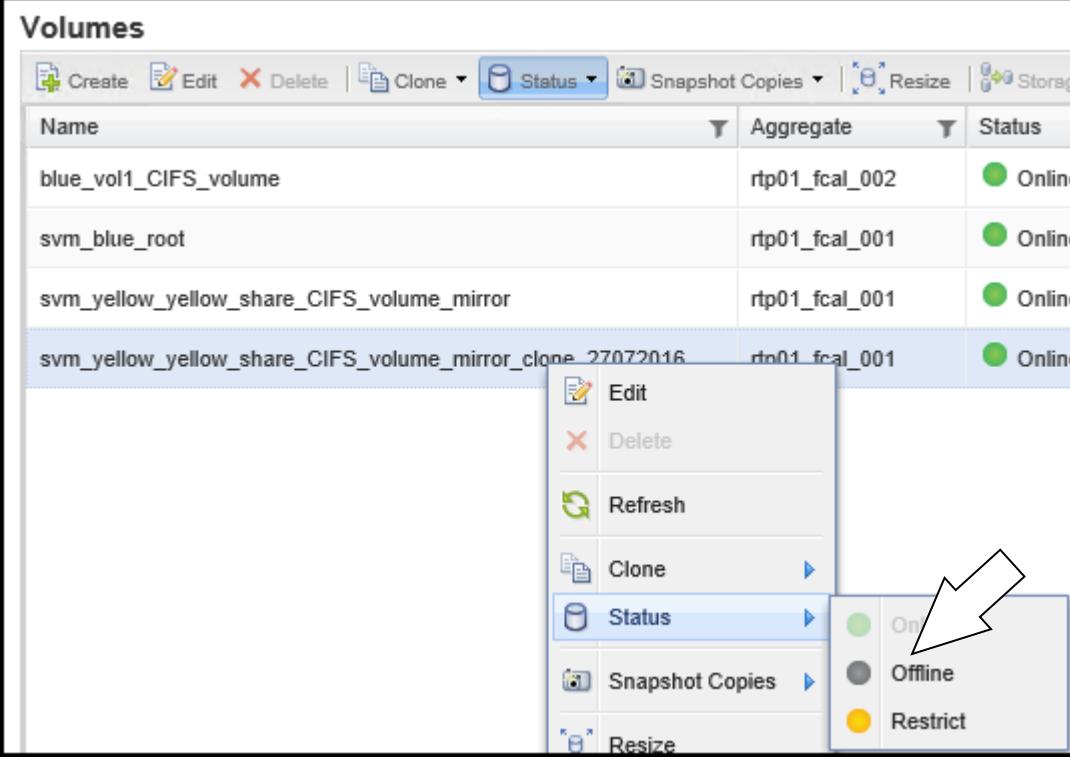
STEP	ACTION
3.	In the Create Snapshot Copy window, name the Snapshot Copy <b>snapshot_for_DR_testing</b> , and then click <b>Create</b> .
4.	<p>Perform a manual SnapMirror update:</p> <ol style="list-style-type: none"> <li>On rtp-nau, in the Protection &gt; Relationships window, select the SnapMirror relationship.</li> <li>Click <b>Operations &gt; Update</b>.</li> </ol> 

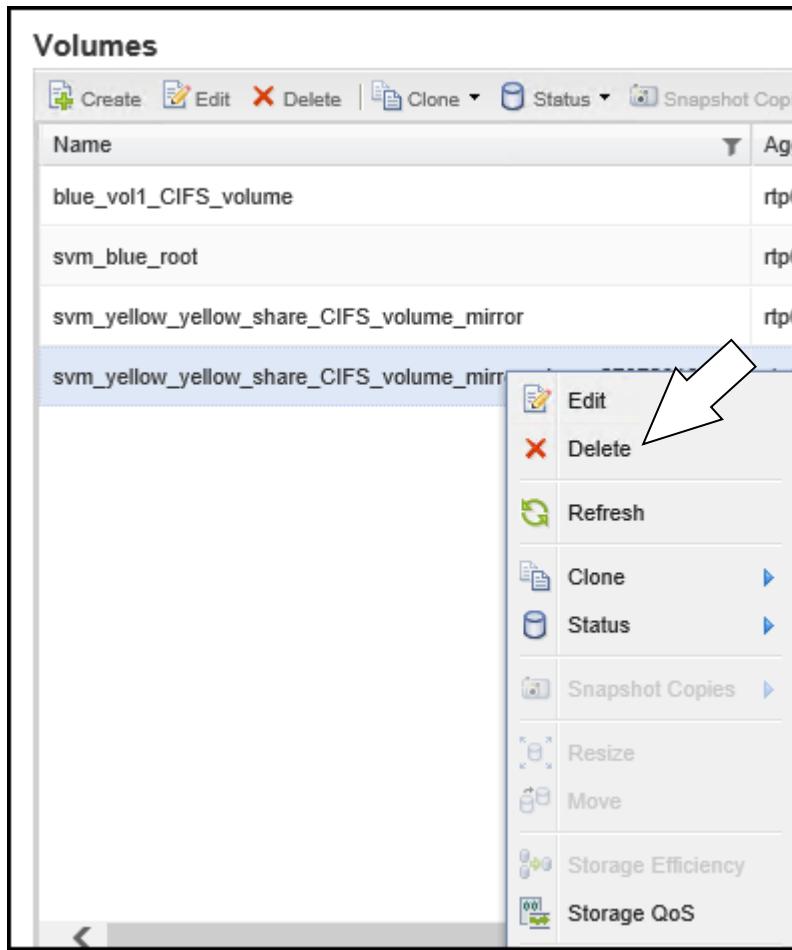
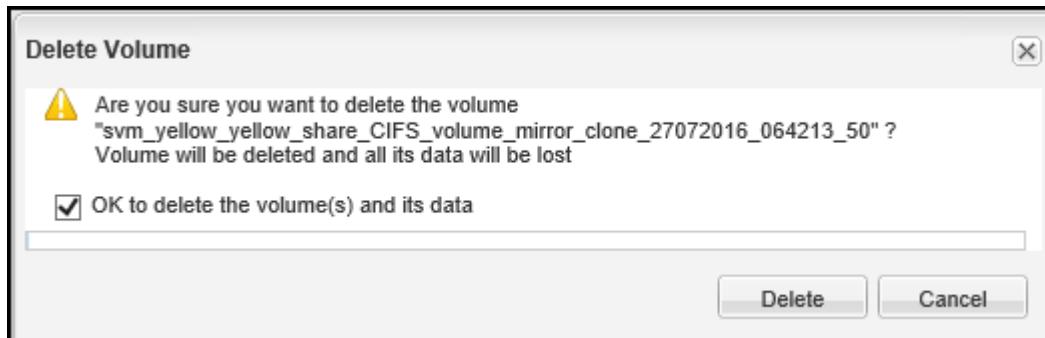
STEP	ACTION
5.	In the Update window, leave the default selection of the On demand radio button, and then click <b>Update</b> .
	
6.	Wait for the Transfer Status to change from Transferring to Idle.
7.	If the transfer status does not change in a reasonable amount of time, click the <b>Refresh</b> button.
8.	Click <b>SVMs &gt; svm_blue &gt; Volumes</b> .
9.	In the Volumes window, select the SnapMirror destination volume, and then click <b>Clone &gt; Create &gt; Volume</b> .
	

STEP	ACTION
10.	<p>In the Create FlexClone Volume window, scroll down the list of Snapshot copies, select the one named <b>snapshot_for_DR_testing</b>, and then click <b>Clone</b>.</p>
11.	<p>In the Warning window that appears, click <b>Yes</b>.</p>

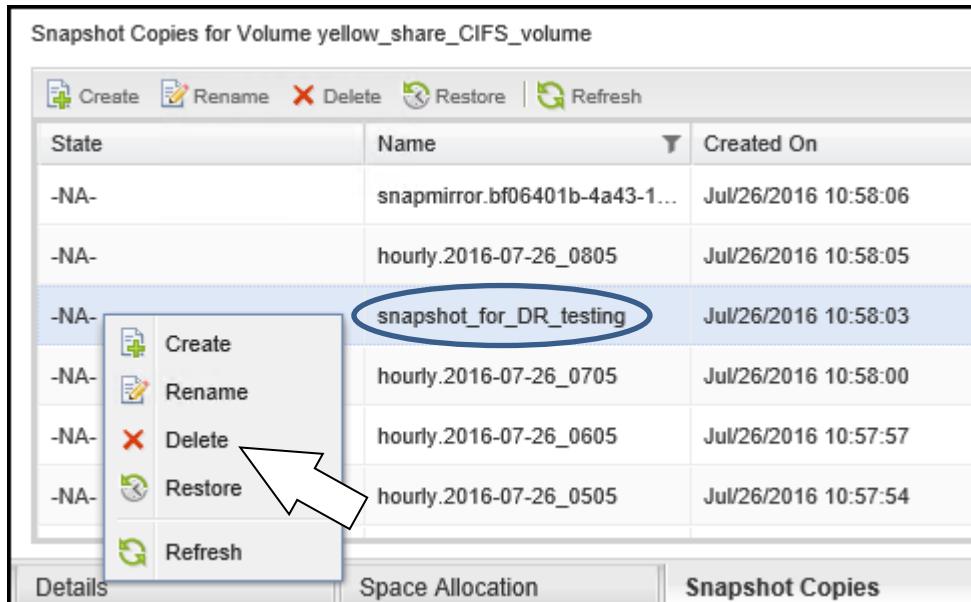
STEP	ACTION
12.	<p>Put the FlexClone volume in the SVM Namespace:</p> <ol style="list-style-type: none"> <li>Click the <b>Namespace</b> button.</li> <li>Click <b>Mount</b>.</li> <li>In the Mount Volume window, select the clone volume.</li> <li>Accept the default junction name and path.</li> <li>Click <b>Mount</b>.</li> </ol> 
13.	Using Windows File Explorer, click the <b>blue_root</b> share.
14.	<p>Double-click the folder of the mirror clone (the actual folder names might vary).</p> <p>You should see the same two files that exist in the SnapMirror source and destination volumes.</p> 
15.	Right-click the <b>File_240M – Copy</b> file, and then select <b>Copy</b> .
16.	<p>Right-click in the folder, and then select <b>Paste</b> to create another copy of the file.</p> <p>You should see a third copy of the original File_240M file in the folder.</p> 

STEP	ACTION
17.	On rtp-nau, click the <b>Volumes</b> button, right-click the cloned volume, and then select <b>Clone &gt; View Hierarchy</b> .
	
18.	Click the arrow to expand the volume selection, notice the difference in the % Used column between the two volumes, and then click <b>Close</b> .
	
19.	Click the <b>Namespace</b> button, select the cloned volume, and then click <b>Unmount</b> .
20.	In the Unmount Volume window, select the checkbox labeled <b>Force volume unmount operation</b> , and then click <b>Unmount</b> .
	

STEP	ACTION															
21.	<p>Click the <b>Volumes</b> button, right-click the cloned volume, and then select <b>Status &gt; Offline</b>.</p>  <p>The screenshot shows the 'Volumes' list in the ONTAP interface. A context menu is open over the fourth row, which represents a cloned volume named 'svm_yellow_yellow_share_CIFS_volume_mirror_clone_27072016'. The menu path 'Status' is highlighted, and a sub-menu is displayed with three options: 'Online' (green circle), 'Offline' (grey circle), and 'Restrict' (yellow circle). An arrow points from the 'Offline' option to the mouse cursor.</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Aggregate</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>blue_vol1_CIFS_volume</td> <td>rtp01_fc1_002</td> <td>Online</td> </tr> <tr> <td>svm_blue_root</td> <td>rtp01_fc1_001</td> <td>Online</td> </tr> <tr> <td>svm_yellow_yellow_share_CIFS_volume_mirror</td> <td>rtp01_fc1_001</td> <td>Online</td> </tr> <tr> <td>svm_yellow_yellow_share_CIFS_volume_mirror_clone_27072016</td> <td>rtp01_fc1_001</td> <td>Online</td> </tr> </tbody> </table>	Name	Aggregate	Status	blue_vol1_CIFS_volume	rtp01_fc1_002	Online	svm_blue_root	rtp01_fc1_001	Online	svm_yellow_yellow_share_CIFS_volume_mirror	rtp01_fc1_001	Online	svm_yellow_yellow_share_CIFS_volume_mirror_clone_27072016	rtp01_fc1_001	Online
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svm_yellow_yellow_share_CIFS_volume_mirror_clone_27072016	rtp01_fc1_001	Online														
22.	In the Offline Volume confirmation window that appears, click the <b>Offline</b> button.															

STEP	ACTION
23.	Right-click the cloned volume again, then select <b>Delete</b> .
	
24.	In the Delete Volume window, select the checkbox labeled <b>OK to delete the volume(s) and its data</b> , and then click <b>Delete</b> .
	
25.	 In this exercise you have created an unscheduled Snapshot copy on the SnapMirror source volume. That Snapshot copy was replicated via SnapMirror software to the destination volume and used for a FlexClone operation. Now that you have deleted the FlexClone volume, it is a good practice to delete the original Snapshot copy from the source volume.
26.	On svl-nau, click the <b>Volumes</b> button, and then select the SnapMirror source volume.

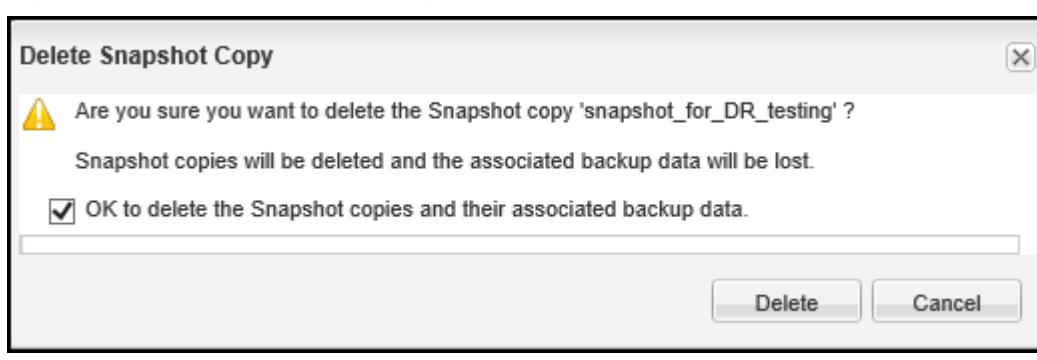
STEP	ACTION
27.	At the bottom of the window, click the <b>Snapshot Copies</b> tab.
28.	Right-click the Snapshot copy <b>snapshot_for_DR_testing</b> , and select <b>Delete</b> .
29.	In the Delete Snapshot Copy window, select the checkbox labeled <b>OK to delete the Snapshot copies and their associated backup data</b> , and click <b>Delete</b> .



The screenshot shows a table titled "Snapshot Copies for Volume yellow\_share\_CIFS\_volume". The table has columns for State, Name, and Created On. There are several rows of snapshot copies listed. A context menu is open over the row for "snapshot\_for\_DR\_testing". The menu options are: Create, Rename, Delete, Restore, and Refresh. The "Delete" option is highlighted with a blue oval, and an arrow points from it to the "Delete" button in the "Delete Snapshot Copy" dialog box.

Snapshot Copies for Volume yellow_share_CIFS_volume			
State	Name	Created On	
-NA-	snapmirror.bf06401b-4a43-1...	Jul/26/2016 10:58:06	
-NA-	hourly.2016-07-26_0805	Jul/26/2016 10:58:05	
-NA-	<b>snapshot_for_DR_testing</b>	Jul/26/2016 10:58:03	
-NA-	hourly.2016-07-26_0705	Jul/26/2016 10:58:00	
-NA-	hourly.2016-07-26_0605	Jul/26/2016 10:57:57	
-NA-	hourly.2016-07-26_0505	Jul/26/2016 10:57:54	

**Details**      **Space Allocation**      **Snapshot Copies**

The screenshot shows a "Delete Snapshot Copy" dialog box. It contains a warning message: "Are you sure you want to delete the Snapshot copy 'snapshot\_for\_DR\_testing'? Snapshot copies will be deleted and the associated backup data will be lost." Below the message is a checkbox labeled "OK to delete the Snapshot copies and their associated backup data." The checkbox is checked. At the bottom of the dialog are "Delete" and "Cancel" buttons.

STEP	ACTION
30.	<p>On rtp-nau, run another SnapMirror update.</p>  <p>The screenshot shows the 'Relationships' window in the NetApp ONTAP interface. A context menu is open over a row in the table, specifically over the 'svm_yellow' entry. The menu items listed are: Initialize, Update (which has a black arrow pointing to it), Quiesce, Resume, Restore, Break, Resync, Reverse Resync, and Abort. The 'Update' option is highlighted with a blue background.</p>

STEP	ACTION																														
31.	<p>Check the SnapMirror destination volume to see whether the unscheduled Snapshot copy has been deleted.</p> <p>You should not find the Snapshot copy named snapshot_for_DR_testing.</p> <p>The screenshot shows the NetApp ONTAP interface. In the top navigation bar, 'SVMs' is selected. Below it, a dropdown menu shows 'svm_blue'. The 'Volumes' tab is also highlighted. The main area displays a table of volumes:</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Aggregate</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>blue_vol1_CIFS_volume</td> <td>rtp01_fcsl_002</td> <td>Online</td> </tr> <tr> <td>svm_blue_root</td> <td>rtp01_fcsl_001</td> <td>Online</td> </tr> <tr> <td>svm_yellow_yellow_share_CIFS_volume_mirror</td> <td>rtp01_fcsl_001</td> <td>Online</td> </tr> </tbody> </table> <p>Below the volume table, a section titled 'Snapshot Copies for Volume svm_yellow_yellow_share_CIFS_volume_mirror' lists several snapshot copies:</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Created On</th> <th>Total Size</th> </tr> </thead> <tbody> <tr> <td>snapmirror.bf06401b-4a43-11...</td> <td>Jul/26/2016 10:58:09</td> <td>0 Byte</td> </tr> <tr> <td>snapmirror.bf06401b-4a43-11...</td> <td>Jul/26/2016 10:58:08</td> <td>84 KB</td> </tr> <tr> <td>hourly.2016-07-26_0805</td> <td>Jul/26/2016 10:58:05</td> <td>88 KB</td> </tr> <tr> <td>hourly.2016-07-26_0705</td> <td>Jul/26/2016 10:58:00</td> <td>88 KB</td> </tr> <tr> <td>hourly.2016-07-26_0605</td> <td>Jul/26/2016 10:57:57</td> <td>92 KB</td> </tr> </tbody> </table> <p>At the bottom of the screenshot, the 'Snapshot Copies' tab is circled with a blue oval.</p>	Name	Aggregate	Status	blue_vol1_CIFS_volume	rtp01_fcsl_002	Online	svm_blue_root	rtp01_fcsl_001	Online	svm_yellow_yellow_share_CIFS_volume_mirror	rtp01_fcsl_001	Online	Name	Created On	Total Size	snapmirror.bf06401b-4a43-11...	Jul/26/2016 10:58:09	0 Byte	snapmirror.bf06401b-4a43-11...	Jul/26/2016 10:58:08	84 KB	hourly.2016-07-26_0805	Jul/26/2016 10:58:05	88 KB	hourly.2016-07-26_0705	Jul/26/2016 10:58:00	88 KB	hourly.2016-07-26_0605	Jul/26/2016 10:57:57	92 KB
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END OF EXERCISE

## MODULE 4: DISASTER RECOVERY FOR STORAGE VIRTUAL MACHINES

### EXERCISE 1: CONFIGURE STORAGE VIRTUAL MACHINE DISASTER RECOVERY

In this exercise, you configure a disaster recovery relationship between two storage virtual machines (SVMs) in different clusters. You use the svm\_yellow SVM as the source SVM. You create a SVM to use as the destination SVM in the disaster-recovery relationship.

Also in this exercise, you explore the SnapMirror for SVM feature. In the first part of the exercise, you prepare the SVM for disaster recovery. This flow diagram shows the major steps involved in preparing the clusters for disaster recovery using SnapMirror SVM.



In the second part of the exercise, you use the SnapMirror SVM to run disaster-recovery failover and recovery. You practice failing over clients to the disaster-recovery cluster. After the clients have been updated to access the disaster-recovery SVM, you verify data access. You also modify the relationship so that the disaster-recovery SVM becomes the source and the primary SVM becomes the destination. (A system might need to use this reverse configuration for some time.) Finally, you recover the primary SVM and return to the original SVM SnapMirror relationship. This flow diagram shows the major steps involved in the second part of the activity.



### OBJECTIVES

This exercise focuses on enabling you to do the following:

- Configure a SnapMirror SVM disaster-recovery relationship that protects SVM-scoped resources
- Verify that changes to source-side elements are replicated to the disaster-recovery cluster
- Practice client failover to the SVM on the disaster-recovery cluster and verify data access
- Recover and resynchronize the source SVM after a disaster

## TASK 1: CHECK FOR SPACE REQUIREMENTS

In this task, you examine the primary SVM for used space and the destination aggregates for free space.

STEP	ACTION
1.	 You cannot configure a data-protection SVM from OnCommand System Manager 9.0. You must use either the CLI or the OnCommand Workflow Automaton tool.
2.	<p>Enter the following command on svl-nau to calculate the total aggregate size of the storage needed for the disaster-recovery cluster:</p> <pre>svl-nau::&gt; volume show -vserver svm_yellow -fields used</pre> <p>Sample output:</p> <pre>vserver      volume          used ----- svm_yellow  exp_yellow_NFS_volume  44.21MB svm_yellow  exp_yellow_NFS_volume_clone_14072016_164416_58                            9.21MB svm_yellow  svm_yellow_root     768KB svm_yellow  yellow_share_CIFS_volume                            485.4MB svm_yellow  yellow_thickvol    9.88MB svm_yellow  yellow_thinvol    536KB svm_yellow  yellow_usr_001     11.00MB svm_yellow  yellow_usr_002     10.82MB 8 entries were displayed.  svl-nau::&gt;</pre>
3.	 You need to determine the space required for the disaster-recovery SVM. You need to account for the space required for the replicated volumes and the space required for the SVM configuration data. In a production environment, the SVM configuration data requires at least one non-root aggregate with minimum free space of 10 GB.  The best practice for the SVM configuration data is to have at least two non-root aggregates with a minimum free space of 10 GB each.
4.	 By default, each of these volumes is protected (except the root volume). For this exercise, you are going to demonstrate selective protection and the following volumes are not protected: <code>exp_yellow_NFS_volume_clone_14072016_164416_58</code> and <code>yellow_share_CIFS_volume</code> . Your clone volume likely has a slightly different name because, by default, the volume adopts a date code in its name.  You should recall that the <code>svm_yellow_share_CIFS_volume</code> volume has already been configured in a SnapMirror relationship in a previous exercise.

STEP	ACTION
5.	<p>Enter the following command on rtp-nau to verify that the n1_aggr_main_dr aggregate can support the size of the volumes in svm_finance:</p> <pre>rtp-nau::&gt; storage aggregate show</pre> <p>Sample output:</p> <pre>Aggregate      Size Available Used% State    #Vols  Nodes          RAID Status -----        -----       -----   ----  -----   -----  -----        ----- aggr0_rtp1 16.70GB  11.51GB   31% online     1 rtp-nau-01    raid_dp,  normal rtp01_fc1_001                 28.12GB  26.04GB   7% online     4 rtp-nau-01    raid_dp,  normal rtp01_fc1_002                 28.12GB  26.81GB   5% online     2 rtp-nau-01    raid_dp,  normal 3 entries were displayed.  rtp-nau::&gt;</pre> <p>Based on the output of the command in Step 2, there is plenty of space on any of the aggregates on the rtp-nau cluster.</p>

## TASK 2: CREATE THE DISASTER-RECOVERY SVM

In this task, you create the disaster-recovery SVM on cluster2.

STEP	ACTION
1.	<p>From the clustershell on rtp-nau, enter the following command to create a disaster-recovery SVM:</p> <pre>rtp-nau::&gt; vserver create -vserver svm_yellow_dr -subtype dp-destination</pre> <p>Sample output:</p> <pre>[Job 34] Job succeeded: Vserver creation completed</pre>
2.	<p>Enter the following command to verify that the disaster-recovery SVM was created:</p> <pre>rtp-nau::&gt; vserver show -vserver svm_yellow_dr</pre> <p>Sample output:</p> <pre>rtp-nau::&gt; vserver show -vserver svm_yellow_dr           Vserver: svm_yellow_dr           Vserver Type: data           Vserver Subtype: dp-destination           Vserver Admin State: running           Vserver Operational State: stopped           Vserver Operational State Stopped Reason: dp-destination-not-started           Allowed Protocols: nfs, cifs, fcp, iscsi, ndmp           Disallowed Protocols: -           Is Vserver with Infinite Volume: false</pre> <p>In this abbreviated output, you can see that the operational status of the SVM is stopped because it is a disaster-recovery SVM. The SVM becomes active during failover to the disaster-recovery cluster.</p>
3.	<p> When the disaster-recovery SVM is initially created, no corresponding SVM root volume is created. The SVM root volume is created later, when the SnapMirror SVM relationship is initialized. The volumes that are created during the SnapMirror initialization process are mounted into the disaster-recovery namespace identically to the source namespace.</p>
4.	<p> The SVM root volume is not mirrored. No user data should be stored in the SVM root volume. Other than junction-paths, any data stored in the SVM root volume is unprotected.</p>

### TASK 3: CREATE AN SVM PEER RELATIONSHIP

In this task, you create you an SVM peer relationship between the primary SVM on svl-nau and the disaster-recovery SVM on rtp-nau.

STEP	ACTION																				
1.	 This task requires commands to be entered on both clusters. You should be aware of the cluster prompt (svl-nau::> and rtp-nau::>) on which each command is entered.																				
2.	From the clustershell on rtp-nau, enter the following command to create an SVM peer relationship between svm_yellow (on svl-nau) and svm_yellow_dr (on rtp-nau): <pre>rtp-nau::&gt; vserver peer create -vserver svm_yellow_dr -peer-cluster svl-nau -peer-vserver svm_yellow -applications snapmirror</pre> Sample output: <pre>Info: [Job 35] 'vserver peer create' job queued</pre>																				
3.	Enter the following command to check the status of the peer request specific to SVM svm_yellow_dr: <pre>rtp-nau::&gt; vserver peer show-all -vserver svm_yellow_dr</pre> Sample output: <table> <thead> <tr> <th>Vserver</th> <th>Peer</th> <th>Peer</th> <th>Peering</th> <th>Remote</th> </tr> <tr> <th>Vserver</th> <th>Vserver</th> <th>State</th> <th>Peer Cluster</th> <th>Applications Vserver</th> </tr> </thead> <tbody> <tr> <td>svm_yellow_dr</td> <td>svm_yellow</td> <td>initiated</td> <td>svl-nau</td> <td>snapmirror svm_yellow</td> </tr> </tbody> </table>	Vserver	Peer	Peer	Peering	Remote	Vserver	Vserver	State	Peer Cluster	Applications Vserver	svm_yellow_dr	svm_yellow	initiated	svl-nau	snapmirror svm_yellow					
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Vserver	Vserver	State	Peer Cluster	Applications Vserver																	
svm_yellow_dr	svm_yellow	initiated	svl-nau	snapmirror svm_yellow																	
4.	From the clustershell on svl-nau, enter the following command to check the status of the peer request specific to SVM svm_yellow: <pre>svl-nau::&gt; vserver peer show-all -vserver svm_yellow</pre> Sample output: <table> <thead> <tr> <th>Vserver</th> <th>Peer</th> <th>Peer</th> <th>Peering</th> <th>Remote</th> </tr> <tr> <th>Vserver</th> <th>Vserver</th> <th>State</th> <th>Peer Cluster</th> <th>Applications Vserver</th> </tr> </thead> <tbody> <tr> <td>svm_yellow</td> <td>svm_blue</td> <td>peered</td> <td>rtp-nau</td> <td>snapmirror svm_blue</td> </tr> <tr> <td>svm_yellow</td> <td>svm_yellow_dr</td> <td>pending</td> <td>rtp-nau</td> <td>snapmirror svm_yellow_dr</td> </tr> </tbody> </table>	Vserver	Peer	Peer	Peering	Remote	Vserver	Vserver	State	Peer Cluster	Applications Vserver	svm_yellow	svm_blue	peered	rtp-nau	snapmirror svm_blue	svm_yellow	svm_yellow_dr	pending	rtp-nau	snapmirror svm_yellow_dr
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svm_yellow	svm_yellow_dr	pending	rtp-nau	snapmirror svm_yellow_dr																	
5.	Enter the following command to accept the peer request from rtp-nau: <pre>svl-nau::&gt; vserver peer accept -vserver svm_yellow -peer-vserver svm_yellow_dr</pre> Sample output: <pre>Info: [Job 70] 'vserver peer accept' job queued</pre>																				

STEP	ACTION																					
6.	<p>Enter the following command to verify that the SVMs are peered:</p> <pre>svl-nau::&gt; vserver peer show-all -vserver svm_yellow</pre> <p>Sample output:</p> <table> <thead> <tr> <th>Vserver</th> <th>Peer</th> <th>Peer</th> <th>State</th> <th>Peer Cluster</th> <th>Peering</th> <th>Remote</th> </tr> </thead> <tbody> <tr> <td>svm_yellow</td> <td>svm_blue</td> <td>peered</td> <td></td> <td>rtp-nau</td> <td>snapmirror</td> <td>svm_blue</td> </tr> <tr> <td>svm_yellow</td> <td>svm_yellow_dr</td> <td>peered</td> <td></td> <td>rtp-nau</td> <td>snapmirror</td> <td>svm_yellow_dr</td> </tr> </tbody> </table>	Vserver	Peer	Peer	State	Peer Cluster	Peering	Remote	svm_yellow	svm_blue	peered		rtp-nau	snapmirror	svm_blue	svm_yellow	svm_yellow_dr	peered		rtp-nau	snapmirror	svm_yellow_dr
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7.	Repeat Step 6 on rtp-nau (svm_yellow_dr) to verify that rtp-nau also sees the SVMs as peered.																					

## TASK 4: CREATE THE SVM SNAPMIRROR RELATIONSHIP

In this task, you create a SnapMirror SVM relationship between the disaster-recovery SVM and the primary SVM. You then initialize the relationship. After the SVM data and configurations are mirrored, you verify that the configurations from the primary SVM have been applied to the disaster-recovery SVM.

STEP	ACTION																																																								
1.	<p>From the clustershell on rtp-nau, enter the following command to create the SnapMirror relationship with the primary SVM:</p> <pre>rtp-nau::&gt; snapmirror create -source-path svm_yellow: -destination-path svm_yellow_dr: -type DP -throttle unlimited -policy DPDefault -schedule hourly -identity-preserve true</pre>																																																								
2.	 <p>The source and disaster-recovery clusters share a Layer 2 network. To preserve the network configuration used by each client during a failover event, in Step 1, you used the identity-preserve mode of SnapMirror SVM. In some use cases for identity-preserve mode, the administrator might want to modify some of the network configuration settings after cutover.</p>																																																								
3.	 <p>For a full list of configuration items that are maintained when the <code>identity-preserve</code> flag is set to true, see the <i>ONTAP 9.0: SVM Disaster Recovery Preparation Express Guide</i>.</p>																																																								
4.	<p>Enter the following command to verify that the SnapMirror relationship was created and is in the uninitialized state:</p> <pre>rtp-nau::&gt; snapmirror show</pre> <p>Sample output:</p> <table border="1"> <thead> <tr> <th>Source Path</th> <th>Destination Path</th> <th>Mirror Type</th> <th>Relationship State</th> <th>Total Status</th> <th>Progress</th> <th>Last Healthy</th> <th>Updated</th> </tr> </thead> <tbody> <tr> <td>svm_red:red_share_CIFS_volume</td> <td>XDP svm_blue:svm_red_red_share_CIFS_volume_vault</td> <td></td> <td>Snapmirrored</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Idle</td> <td>-</td> <td>true</td> <td>-</td> <td></td> </tr> <tr> <td>svm_yellow: DP</td> <td>svm_yellow_dr:</td> <td></td> <td>Uninitialized</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Idle</td> <td>-</td> <td>true</td> <td>-</td> <td></td> </tr> <tr> <td>svm_yellow:yellow_share_CIFS_volume</td> <td>DP svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror</td> <td></td> <td>Snapmirrored</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Idle</td> <td>-</td> <td>true</td> <td>-</td> <td></td> </tr> </tbody> </table> <p>3 entries were displayed.</p>	Source Path	Destination Path	Mirror Type	Relationship State	Total Status	Progress	Last Healthy	Updated	svm_red:red_share_CIFS_volume	XDP svm_blue:svm_red_red_share_CIFS_volume_vault		Snapmirrored								Idle	-	true	-		svm_yellow: DP	svm_yellow_dr:		Uninitialized								Idle	-	true	-		svm_yellow:yellow_share_CIFS_volume	DP svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror		Snapmirrored								Idle	-	true	-	
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			Idle	-	true	-																																																			
5.	Return to the svl-nau PuTTY session.																																																								

STEP	ACTION
6.	<p>From the clustershell on svl-nau, enter the following command to check the vserver-dr-protection flag for each of the volumes associated with SVM svm_yellow:</p> <pre>svl-nau::&gt; volume show -vserver svm_yellow -fields vserver-dr-protection</pre> <p>Sample output:</p> <pre>vserver      volume          vserver-dr-protection ----- svm_yellow  exp_yellow_NFS_volume  protected svm_yellow  exp_yellow_NFS_volume_clone_14072016_164416_58                          protected svm_yellow  svm_yellow_root       unprotected svm_yellow  yellow_share_CIFS_volume                          protected svm_yellow  yellow_thickvol      protected svm_yellow  yellow_thinvol      protected svm_yellow  yellow_usr_001       protected svm_yellow  yellow_usr_002       protected 8 entries were displayed.</pre>
7.	 <p>As mentioned earlier, there are eight volumes in svm_yellow. Only five volumes should be mirrored. To remove a volume from mirroring considerations, set the vserver-dr-protection flag to unprotected.</p>
8.	<p>From the clustershell on svl-nau, enter the following command to remove the two volumes from mirroring consideration (your cloned volume might have a slightly different name).</p> <pre>svl-nau::&gt; volume modify -vserver svm_yellow -volume exp_yellow_NFS_volume_clone_14072016_164416_58,yellow_share_CIFS_volume -vserver-dr-protection unprotected</pre> <p>Sample output:</p> <pre>Volume modify successful on volume exp_yellow_NFS_volume_clone_14072016_164416_58 of Vserver svm_yellow. Volume modify successful on volume yellow_share_CIFS_volume of Vserver svm_yellow. 2 entries were modified.</pre>
9.	<p>From the clustershell on rtp-nau, enter the following command to initialize the SnapMirror relationship:</p> <pre>Rtp-nau::&gt; snapmirror initialize -destination-path svm_yellow_dr:</pre>

STEP	ACTION																																							
10.	<p>Enter the following command to review the progress of the SVM SnapMirror relationship transfer:</p> <pre>rtp-nau::&gt; snapmirror show -expand</pre> <p>Sample output:</p> <table> <thead> <tr> <th>Source</th> <th>Destination</th> <th>Mirror</th> <th>Relationship</th> <th>Total</th> <th>Last</th> <th>Progress</th> </tr> <tr> <th>Path</th> <th>Type</th> <th>Path</th> <th>State</th> <th>Status</th> <th>Progress</th> <th>Healthy</th> <th>Updated</th> </tr> </thead> <tbody> <tr> <td>svm_red:red_share_CIFS_volume</td> <td>XDP</td> <td>svm_blue:svm_red_red_share_CIFS_volume_vault</td> <td>Snapmirrored</td> <td>Idle</td> <td>-</td> <td>true</td> <td>-</td> </tr> <tr> <td>svm_yellow: DP</td> <td>svm_yellow_dr:</td> <td></td> <td>Uninitialized</td> <td>Transferring</td> <td>-</td> <td>true</td> <td>-</td> </tr> <tr> <td>svm_yellow:yellow_share_CIFS_volume</td> <td>DP</td> <td>svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror</td> <td>Snapmirrored</td> <td>Idle</td> <td>-</td> <td>true</td> <td>-</td> </tr> </tbody> </table> <p>3 entries were displayed.</p>	Source	Destination	Mirror	Relationship	Total	Last	Progress	Path	Type	Path	State	Status	Progress	Healthy	Updated	svm_red:red_share_CIFS_volume	XDP	svm_blue:svm_red_red_share_CIFS_volume_vault	Snapmirrored	Idle	-	true	-	svm_yellow: DP	svm_yellow_dr:		Uninitialized	Transferring	-	true	-	svm_yellow:yellow_share_CIFS_volume	DP	svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror	Snapmirrored	Idle	-	true	-
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STEP	ACTION
11.	<p>Continue to check the status until the state changes to Snapmirrored:</p> <pre>rtp-nau::&gt; snapmirror show -expand</pre> <p>Sample output:</p> <pre>Source          Destination Mirror Relationship Total           Last Path           Type   Path       State    Status      Progress Healthy Updated -----        -----  -----  ----- svm_red:red_share_CIFS_volume           XDP  svm_blue:svm_red_red_share_CIFS_volume_vault                       Snapmirrored                       Idle      -      true     - svm_yellow: DP  svm_yellow_dr:                       Snapmirrored                       Idle      -      true     - svm_yellow:exp_yellow_NFS_volume           DP    svm_yellow_dr:exp_yellow_NFS_volume                       Snapmirrored                       Idle      -      true     - svm_yellow:yellow_share_CIFS_volume           DP    svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror                       Snapmirrored                       Idle      -      true     - svm_yellow:yellow_thickvol           DP    svm_yellow_dr:yellow_thickvol                       Snapmirrored                       Idle      -      true     - svm_yellow:yellow_thinvol           DP    svm_yellow_dr:yellow_thinvol                       Snapmirrored                       Idle      -      true     - svm_yellow:yellow_usr_001           DP    svm_yellow_dr:yellow_usr_001                       Snapmirrored                       Idle      -      true     - svm_yellow:yellow_usr_002           DP    svm_yellow_dr:yellow_usr_002                       Snapmirrored                       Idle      -      true     - 8 entries were displayed.</pre>

STEP	ACTION
12.	 The SnapMirror transfer can take several minutes, so you might need to issue the command several times before the state reaches <code>Snapmirrored</code> for all volumes.
13.	 The <code>snapmirror show -expand</code> command shows the SnapMirror relationships between SVMs and volumes of SVMs, but you can act on only the SnapMirror relationship at the SVM level.
14.	Enter the following command to examine the name of the Snapshot copy that was created for the SVM SnapMirror transfer: <pre>rtp-nau::&gt; snapmirror show -vserver svm_yellow_dr -fields newest-snapshot,state</pre> Sample output: <pre>source-path destination-path state      newest-snapshot ----- ----- svm_yellow: svm_yellow_dr:  Snapmirrored vserverdr.1.b9e09f6a-54fc-11e6-9b32-0050560b40cd.2016-07-29_060513</pre>
15.	 The names of Snapshot copies for an SVM SnapMirror relationship start with <code>vserverdr</code> .
16.	Enter the following command to examine the namespace of the <code>svm_finance_dr</code> SVM: <pre>rtp-nau::&gt; volume show -vserver svm_yellow_dr -fields junction-path,policy</pre> Sample output: <pre>vserver           volume           policy   junction-path ----- ----- svm_yellow_dr    exp_yellow_NFS_volume default /exp_yellow_NFS_volume svm_yellow_dr    svm_yellow_root     default / svm_yellow_dr    yellow_thickvol   default /vol_14072016_160139_42 svm_yellow_dr    yellow_thinvol   default /yellow_thinvol svm_yellow_dr    yellow_usr_001    default /usr001 svm_yellow_dr    yellow_usr_002    default /yellow_usr_002 6 entries were displayed.</pre>
17.	Notice that a new root volume is created automatically for the SVM.

STEP	ACTION																																																
18.	<p>Enter the following command to examine the export-policy rules of the svm_yellow_dr SVM:</p> <pre>rtp-nau::&gt; vserver export-policy rule show -vserver svm_yellow_dr</pre> <p>Sample output:</p> <table> <thead> <tr> <th>Vserver</th> <th>Policy Name</th> <th>Rule Index</th> <th>Access Protocol</th> <th>Client Match</th> <th>RO Rule</th> </tr> </thead> <tbody> <tr> <td>svm_yellow_dr</td> <td>default</td> <td>1</td> <td>any</td> <td>0.0.0.0/0</td> <td>any</td> </tr> </tbody> </table>	Vserver	Policy Name	Rule Index	Access Protocol	Client Match	RO Rule	svm_yellow_dr	default	1	any	0.0.0.0/0	any																																				
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19.	<p>Enter the following command to examine the SMB shares of the svm_yellow_dr SVM:</p> <pre>rtp-nau::&gt; vserver cifs share show -vserver svm_yellow_dr</pre> <p>Sample output:</p> <table> <thead> <tr> <th>Vserver</th> <th>Share</th> <th>Path</th> <th>Properties</th> <th>Comment</th> <th>ACL</th> </tr> </thead> <tbody> <tr> <td>svm_yellow_dr</td> <td>admin\$</td> <td>/</td> <td>browsable</td> <td>-</td> <td>-</td> </tr> <tr> <td>svm_yellow_dr</td> <td>c\$</td> <td>/</td> <td>oplocks</td> <td>-</td> <td></td> </tr> <tr> <td>BUILTIN\Administrators</td> <td></td> <td>/ Full Control</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>browsable</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>changenotify</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>show-previous-versions</td> <td></td> <td></td> </tr> <tr> <td>svm_yellow_dr</td> <td>ipc\$</td> <td>/</td> <td>browsable</td> <td>-</td> <td>-</td> </tr> </tbody> </table> <p>3 entries were displayed.</p>	Vserver	Share	Path	Properties	Comment	ACL	svm_yellow_dr	admin\$	/	browsable	-	-	svm_yellow_dr	c\$	/	oplocks	-		BUILTIN\Administrators		/ Full Control							browsable						changenotify						show-previous-versions			svm_yellow_dr	ipc\$	/	browsable	-	-
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svm_yellow_dr	ipc\$	/	browsable	-	-																																												
20.	<p>Enter the following command to examine the data logical interface (LIF) of the svm_yellow_dr SVM:</p> <pre>rtp-nau::&gt; network interface show -vserver svm_yellow_dr</pre> <p>Sample output:</p> <table> <thead> <tr> <th>Vserver</th> <th>Logical Interface</th> <th>Status Admin/Oper</th> <th>Network Address/Mask</th> <th>Current Node</th> <th>Current Port</th> <th>Is Home</th> </tr> </thead> <tbody> <tr> <td>svm_yellow_dr</td> <td>svm_yellow_cifs_nfs_lif1</td> <td>up/down</td> <td>192.168.0.62/24</td> <td>rtp-nau-01</td> <td>e0c</td> <td>true</td> </tr> <tr> <td></td> <td>svm_yellow_cifs_nfs_lif2</td> <td>up/down</td> <td>192.168.0.63/24</td> <td>rtp-nau-01</td> <td>e0c</td> <td>true</td> </tr> </tbody> </table> <p>2 entries were displayed.</p>	Vserver	Logical Interface	Status Admin/Oper	Network Address/Mask	Current Node	Current Port	Is Home	svm_yellow_dr	svm_yellow_cifs_nfs_lif1	up/down	192.168.0.62/24	rtp-nau-01	e0c	true		svm_yellow_cifs_nfs_lif2	up/down	192.168.0.63/24	rtp-nau-01	e0c	true																											
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21.	 <p>The data LIF should have the same IP address and network mask as the svm_yellow SVM on the primary cluster. However, the home port for the LIF might be different from the home port on the source cluster and might be different from what is shown in this guide. This difference might exist because the SnapMirror SVM feature does a best effort at LIF placement and has its own set of rules for home-port selection of the LIF.</p>																																																

STEP	ACTION
22.	 From the disaster-recovery SVM, you cannot access or view the contents of the shares and volumes because you are using <code>identity-preserve</code> mode. If you need to be able to access the data in a read-only capacity while the primary cluster is actively serving data, you must set <code>identity-preserve</code> mode to false.

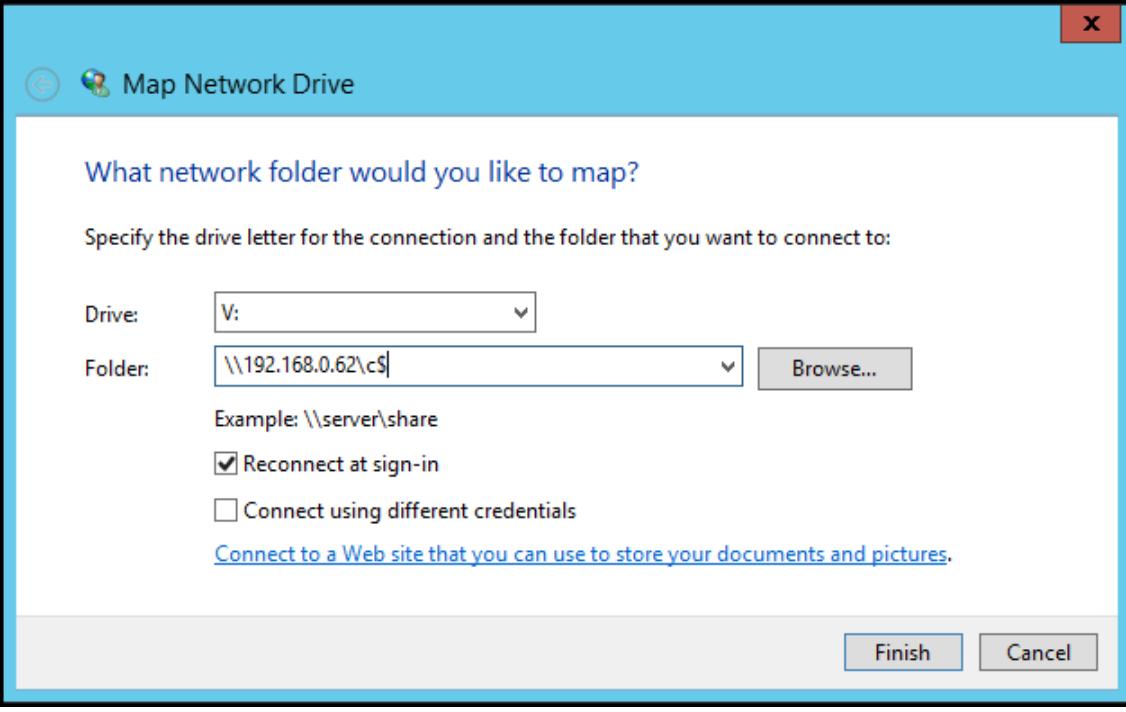
## TASK 5: FAILOVER TO THE DISASTER-RECOVERY SVM

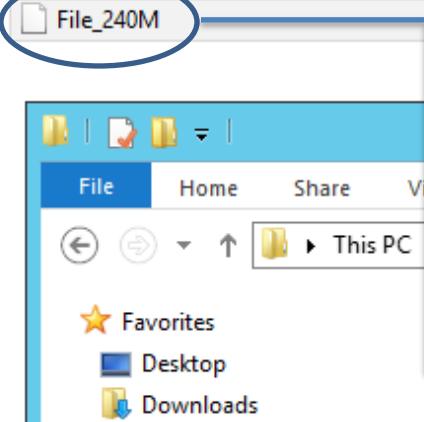
In this task, you recover a system from a disaster on the primary cluster by activating the disaster-recovery SVM. This activation involves the following steps:

1. Quiescing the scheduled SnapMirror transfers and any ongoing transfers
2. Breaking the SVM disaster-recovery relationship
3. Stopping the primary SVM
4. Starting the disaster-recovery SVM
5. Verifying the status of the disaster-recovery SVM

STEP	ACTION																																																							
1.	 This task requires commands be entered on both svl-nau and rtp-nau. You should be aware of the cluster prompt (svl-nau::> and rtp-nau::>) on which each command is entered.																																																							
2.	From the clustershell on rtp-nau, enter the following command to quiesce SnapMirror transfers: <code>rtp-nau::&gt; snapmirror quiesce -destination-path svm_yellow_dr:</code>																																																							
3.	Enter the following command to verify that the SnapMirror software was quiesced: <code>cluster2::&gt; snapmirror show</code> Sample output: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Source</th> <th style="text-align: left;">Destination</th> <th style="text-align: left;">Mirror</th> <th style="text-align: left;">Relationship</th> <th style="text-align: left;">Total</th> <th style="text-align: right;">Last</th> <th style="text-align: right;">Progress</th> </tr> <tr> <th style="text-align: left;">Path</th> <th style="text-align: left;">Type</th> <th style="text-align: left;">Path</th> <th style="text-align: left;">State</th> <th style="text-align: left;">Status</th> <th style="text-align: right;">Progress</th> <th style="text-align: right;">Healthy</th> <th style="text-align: right;">Updated</th> </tr> </thead> <tbody> <tr> <td>-----</td> <td>-----</td> <td>-----</td> <td>-----</td> <td>-----</td> <td>-----</td> <td>-----</td> <td>-----</td> </tr> <tr> <td>svm_red:red_share_CIFS_volume</td> <td>XDP</td> <td>svm_blue:svm_red_red_share_CIFS_volume_vault</td> <td>Snapmirrored</td> <td>Idle</td> <td>-</td> <td>true</td> <td>-</td> </tr> <tr> <td>svm_yellow: DP</td> <td>svm_yellow_dr:</td> <td>Snapmirrored</td> <td>Quiesced</td> <td>-</td> <td>true</td> <td>-</td> <td>-</td> </tr> <tr> <td>svm_yellow:yellow_share_CIFS_volume</td> <td>DP</td> <td>svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror</td> <td>Snapmirrored</td> <td>Idle</td> <td>-</td> <td>true</td> <td>-</td> </tr> <tr> <td colspan="8">3 entries were displayed.</td></tr> </tbody> </table>	Source	Destination	Mirror	Relationship	Total	Last	Progress	Path	Type	Path	State	Status	Progress	Healthy	Updated	-----	-----	-----	-----	-----	-----	-----	-----	svm_red:red_share_CIFS_volume	XDP	svm_blue:svm_red_red_share_CIFS_volume_vault	Snapmirrored	Idle	-	true	-	svm_yellow: DP	svm_yellow_dr:	Snapmirrored	Quiesced	-	true	-	-	svm_yellow:yellow_share_CIFS_volume	DP	svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror	Snapmirrored	Idle	-	true	-	3 entries were displayed.							
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svm_yellow:yellow_share_CIFS_volume	DP	svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror	Snapmirrored	Idle	-	true	-																																																	
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4.	Enter the following command to break the SnapMirror relationship before you activate the disaster recovery SVM: <code>rtp-nau::&gt; snapmirror break -destination-path svm_yellow_dr:</code>																																																							

STEP	ACTION
5.	<p>Enter the following command to verify that the SnapMirror relationship is in the Broken-off state:</p> <pre>rtp-nau::&gt; snapmirror show</pre> <p>Sample output:</p> <pre>   Progress Source          Destination Mirror Relationship Total      Last Path           Type   Path       State    Status     Progress Healthy Updated -----  ----- svm_red:red_share_CIFS_volume         XDP   svm_blue:svm_red_red_share_CIFS_volume_vault                     Snapmirrored                     Idle      -      true      - svm_yellow: DP   svm_yellow_dr:                     Broken-off                     Idle      -      true      - svm_yellow:yellow_share_CIFS_volume         DP     svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror                     Snapmirrored                     Idle      -      true      - 3 entries were displayed.</pre>
6.	<p>From the clustershell on svl-nau, stop the source SVM:</p> <pre>svl-nau::&gt; vserver stop -vserver svm_yellow</pre> <p>Sample output:</p> <pre>[Job 73] Job succeeded: DONE</pre>
7.	 <p>This exercise uses the identity-preserve mode for the SnapMirror SVM relationship, and the primary and disaster-recovery SVMs are on the same network subnet. Therefore, you must stop the source SVM before you activate the destination SVM.</p>
8.	<p>Enter the following command to verify that the SVM stopped:</p> <pre>svl-nau::&gt; vserver show -vserver svm_yellow -fields admin-state,operational-state</pre> <p>Sample output:</p> <pre>vserver      admin-state operational-state ----- svm_yellow stopped      stopped</pre>

STEP	ACTION
9.	<p>From the clustershell on rtp-nau, enter the following command to activate the disaster-recovery SVM:</p> <pre>rtp-nau::&gt; vserver start -vserver svm_yellow_dr</pre> <p>Sample output:</p> <pre>[Job 41] Job succeeded: DONE</pre>
10.	<p>Enter the following command to verify that the SVM started:</p> <pre>rtp-nau::&gt; vserver show svm_yellow_dr -fields admin-state,operational-state</pre> <p>Sample output:</p> <pre>vserver      admin-state operational-state ----- svm_yellow_dr running     running</pre>
11.	 Because the same subnet is used, no LIFs need to be updated. When the SVM is activated, the client can access the CIFS share. You verify client access in the following steps.
12.	 You must unmount and remount NFS clients to access the volumes from the disaster-recovery SVM.
13.	<p>On the Windows Server desktop, use Windows File Explorer to map a drive letter to the CIFS share on svm_yellow_dr on rtp-nau.</p> 

STEP	ACTION																		
14.	 <p>The c\$ share is the administrative hidden share of the root of the namespace. You should see folders representing the junction paths to the other volumes involved in the SVM DR SnapMirror relationship.</p> <div style="border: 1px solid black; padding: 5px;"> <p>This PC ▶ c\$ (\\"192.168.0.62) (V:)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Name</th> <th>Date modified</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>exp_yellow_NFS_volume</td> <td>7/29/2016 5:54 AM</td> <td>File folder</td> </tr> <tr> <td>usr001</td> <td>7/29/2016 5:54 AM</td> <td>File folder</td> </tr> <tr> <td>vol_14072016_160139_42</td> <td>7/29/2016 5:54 AM</td> <td>File folder</td> </tr> <tr> <td>yellow_thinvol</td> <td>7/29/2016 5:54 AM</td> <td>File folder</td> </tr> <tr> <td>yellow_usr_002</td> <td>7/29/2016 5:54 AM</td> <td>File folder</td> </tr> </tbody> </table> </div>	Name	Date modified	Type	exp_yellow_NFS_volume	7/29/2016 5:54 AM	File folder	usr001	7/29/2016 5:54 AM	File folder	vol_14072016_160139_42	7/29/2016 5:54 AM	File folder	yellow_thinvol	7/29/2016 5:54 AM	File folder	yellow_usr_002	7/29/2016 5:54 AM	File folder
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exp_yellow_NFS_volume	7/29/2016 5:54 AM	File folder																	
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yellow_thinvol	7/29/2016 5:54 AM	File folder																	
yellow_usr_002	7/29/2016 5:54 AM	File folder																	
15.	<p>Enter the following command to view the svm_yellow_dr junction paths and policy:</p> <pre>rtp-nau::&gt; volume show -vserver svm_yellow_dr -fields junction-path,policy</pre> <p>Sample output:</p> <pre>vserver          volume           policy   junction-path ----- svm_yellow_dr  exp_yellow_NFS_volume  default  /exp_yellow_NFS_volume svm_yellow_dr  svm_yellow_root      default  / svm_yellow_dr  yellow_thickvol     default  /vol_14072016_160139_42 svm_yellow_dr  yellow_thinvol      default  /yellow_thinvol svm_yellow_dr  yellow_usr_001      default  /usr001 svm_yellow_dr  yellow_usr_002      default  /yellow_usr_002 6 entries were displayed.</pre>																		
16.	<p>Verify that you can write data to the volume by copying the File_240M from the CourseFiles folder to the yellow_usr_002 folder (volume).</p> <div style="border: 1px solid black; padding: 5px;"> <p>Local Disk (C:) ▶ CourseFiles</p> <div style="display: flex; align-items: center;"> <div style="flex-grow: 1;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Name</th> <th>Date modified</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>File_240M</td> <td>12/1/2014 7:32 AM</td> <td>File</td> </tr> </tbody> </table> </div> <div style="margin-left: 20px;">  <p>The screenshot shows a Windows File Explorer window with the path "Local Disk (C:) &gt; CourseFiles". A blue oval highlights the file "File_240M". The status bar at the bottom shows the full path: "This PC ▶ c\$ (\\"192.168.0.62) (V:) ▶ yellow_usr_002".</p> </div> </div> </div>	Name	Date modified	Type	File_240M	12/1/2014 7:32 AM	File												
Name	Date modified	Type																	
File_240M	12/1/2014 7:32 AM	File																	

## TASK 6: REVERSE THE SNAMIRROR RELATIONSHIP

In this task, you reverse the SnapMirror relationship so that the disaster-recovery SVM becomes the source. For these activities, assume that the source SVM is recoverable.

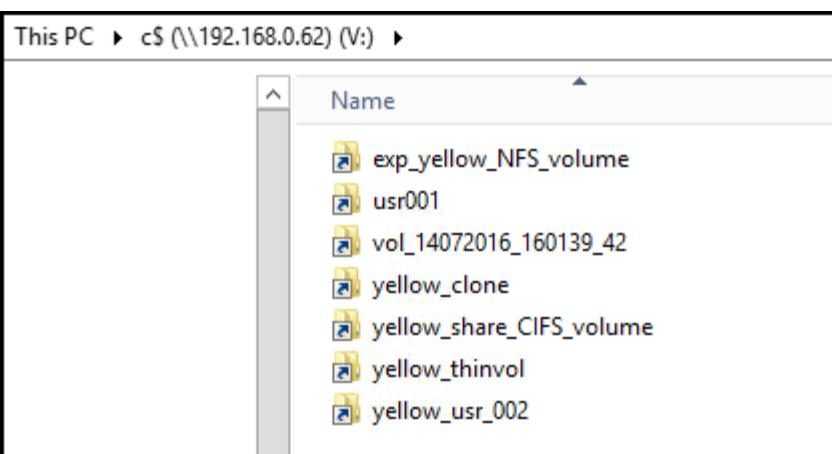
STEP	ACTION																
1.	 On a live production system, you need to verify all of the items that you did when you first created the SnapMirror SVM relationship. For example, on the primary cluster you must verify the existence of the following: <ul style="list-style-type: none"><li>▪ All required feature licenses and protocols</li><li>▪ Any required custom schedules</li><li>▪ A non-root aggregate with minimum free space of 10 GB</li></ul>																
2.	Enter the following command to create a reverse SnapMirror relationship so that the primary SVM becomes the destination and the disaster-recovery SVM becomes the source: <pre>svl-nau::&gt; snapmirror create -source-path svm_yellow_dr: -destination-path svm_yellow: -type DP -throttle unlimited -policy DPDefault -schedule hourly -identity-preserve true</pre>																
3.	Enter the following command to verify that the SnapMirror relationship was created (the state is Broken-off): <pre>svl-nau::&gt; snapmirror show -vserver svm_yellow</pre> Sample output: <table><thead><tr><th>Source Path</th><th>Destination Type</th><th>Mirror Path</th><th>Relationship State</th><th>Total Progress</th><th>Last Healthy</th><th>Updated</th><th>Progress</th></tr></thead><tbody><tr><td>svm_yellow_dr:</td><td>DP</td><td>svm_yellow:</td><td>Broken-off</td><td>Idle</td><td>-</td><td>true</td><td>-</td></tr></tbody></table>	Source Path	Destination Type	Mirror Path	Relationship State	Total Progress	Last Healthy	Updated	Progress	svm_yellow_dr:	DP	svm_yellow:	Broken-off	Idle	-	true	-
Source Path	Destination Type	Mirror Path	Relationship State	Total Progress	Last Healthy	Updated	Progress										
svm_yellow_dr:	DP	svm_yellow:	Broken-off	Idle	-	true	-										
4.	Enter the following command to resynchronize all changes (configuration and data) that have occurred on the disaster-recovery SVM since it became the active SVM: <pre>svl-nau::&gt; snapmirror resync svm_yellow:</pre>																

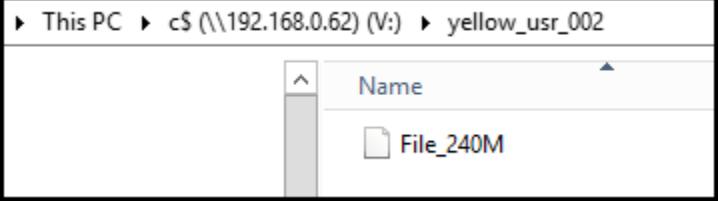
STEP	ACTION														
5.	<p>Enter the following command to verify that the SnapMirror resynchronization has finished:</p> <pre>svl-nau::&gt; snapmirror show -vserver svm_yellow</pre> <p>Sample output:</p> <table> <thead> <tr> <th>Source Path</th> <th>Destination Type</th> <th>Mirror Path</th> <th>Relationship State</th> <th>Total Status</th> <th>Progress</th> <th>Last Healthy Updated</th> </tr> </thead> <tbody> <tr> <td>svm_yellow_dr:</td> <td>DP</td> <td>svm_yellow:</td> <td>Snapmirrored</td> <td>Idle</td> <td>-</td> <td>true -</td> </tr> </tbody> </table>	Source Path	Destination Type	Mirror Path	Relationship State	Total Status	Progress	Last Healthy Updated	svm_yellow_dr:	DP	svm_yellow:	Snapmirrored	Idle	-	true -
Source Path	Destination Type	Mirror Path	Relationship State	Total Status	Progress	Last Healthy Updated									
svm_yellow_dr:	DP	svm_yellow:	Snapmirrored	Idle	-	true -									
6.	 <p>You might need to enter this command several times for the state to reach the final Snapmirrored state. Before reaching the Snapmirrored state, the resynchronization is in the Transferring state.</p>														

## TASK 7: RECOVER THE PRIMARY SVM

In this task, you activate the primary SVM. To activate the primary SVM, you must stop the disaster-recovery SVM and perform a final SnapMirror update to get any changes since the most recent transfer. You then reestablish the original SnapMirror SVM relationship and start the primary SVM.

STEP	ACTION																
1.	 The system might need to operate in the reverse relationship for some time before switching back to the original configuration. In that configuration, the primary SVM again is the active SVM for the clients. You must plan this activity because there is a short client outage during switchback. Also, during this time, an administrator might apply SVM configuration changes based on new business requirements.  In the next steps, you switch the primary and disaster-recovery SVMs back to their original configuration, in which the primary SVM is the active SVM.																
2.	From the clustershell on rtp-nau, enter the following command to stop the disaster-recovery SVM: <pre>rtp-nau::&gt; vserver stop -vserver svm_yellow_dr</pre> Sample output: <pre>[Job 42] Job succeeded: DONE</pre>																
3.	Enter the following command to verify that the SVM is stopped: <pre>rtp-nau::&gt; vserver show -vserver svm_yellow_dr -fields admin-state,operational-state</pre> Sample output: <pre>vserver      admin-state operational-state ----- svm_yellow_dr stopped      stopped</pre>																
4.	From the clustershell on svl-nau, enter the following command to make one final update to transfer all of the most recent data changes and configuration changes to the primary SVM: <pre>svl-nau::&gt; snapmirror update -destination-path svm_yellow:</pre>																
5.	Enter the following command to verify that the SnapMirror update has finished: <pre>svl-nau::&gt; snapmirror show -vserver svm_yellow</pre> Sample output: <table border="1"> <thead> <tr> <th>Source Path</th> <th>Destination Type</th> <th>Mirror Path</th> <th>Relationship State</th> <th>Total Status</th> <th>Progress</th> <th>Last Healthy</th> <th>Updated</th> </tr> </thead> <tbody> <tr> <td>svm_yellow_dr:</td> <td>DP</td> <td>svm_yellow:</td> <td>Snapmirrored</td> <td>Idle</td> <td>-</td> <td>true</td> <td>-</td> </tr> </tbody> </table>	Source Path	Destination Type	Mirror Path	Relationship State	Total Status	Progress	Last Healthy	Updated	svm_yellow_dr:	DP	svm_yellow:	Snapmirrored	Idle	-	true	-
Source Path	Destination Type	Mirror Path	Relationship State	Total Status	Progress	Last Healthy	Updated										
svm_yellow_dr:	DP	svm_yellow:	Snapmirrored	Idle	-	true	-										
6.	Enter the following command to break the SnapMirror relationship: <pre>svl-nau::&gt; snapmirror break -destination-path svm_yellow:</pre>																

STEP	ACTION
7.	<p>Enter the following command to verify that the SnapMirror relationship is in the Broken-off state:</p> <pre>svl-nau::&gt; snapmirror show -vserver svm_yellow</pre> <p>Sample output:</p> <pre>Source          Destination Mirror  Relationship  Total          Progress Path           Type    Path        State   Status      Progress  Healthy Updated -----  ----- svm_yellow_dr:          DP      svm_yellow:  Broken-off  Idle      -       true      -</pre>
8.	<p>Enter the following command to restore the original relationship and to delete the SnapMirror relationship:</p> <pre>svl-nau::&gt; snapmirror delete -destination-path svm_yellow:</pre>
9.	<p>Enter the following command to verify that the SnapMirror relationship was removed:</p> <pre>svl-nau::&gt; snapmirror show -vserver svm_yellow</pre> <p>Sample output:</p> <pre>There are no entries matching your query.</pre>
10.	<p>Enter the following command to restart the primary SVM:</p> <pre>svl-nau::&gt; vserver start -vserver svm_yellow</pre> <p>Sample output:</p> <pre>[Job 74] Job succeeded: DONE</pre>
11.	<p>On the Windows Server, verify the SMB access, open Windows File Explorer, and navigate to the drive letter mapped to c\$ (<a href="http://192.168.0.62">\\192.168.0.62</a>) (V):</p>  <p>The screenshot shows a Windows File Explorer window with the path 'This PC &gt; c\$ (\\"192.168.0.62) (V:)'. The right pane displays a list of files and folders with the following names:</p> <ul style="list-style-type: none"> <li>exp_yellow_NFS_volume</li> <li>usr001</li> <li>vol_14072016_160139_42</li> <li>yellow_clone</li> <li>yellow_share_CIFS_volume</li> <li>yellow_thinvol</li> <li>yellow_usr_002</li> </ul>

STEP	ACTION
12.	<p>Verify that the file File_240M exists.</p> 
13.	<p>From the clustershell on rtp-nau, enter the following command to verify that the original SnapMirror relationship exists and is in the <b>Broken-off</b> state:</p> <pre>rtp-nau::&gt; snapmirror show</pre> <p>Sample output:</p> <pre>          Progress Source      Destination Mirror Relationship Total      Last Path        Type   Path       State    Status     Progress Healthy Updated -----  -----  -----  ----- svm_red:red_share_CIFS_volume           XDP  svm_blue:svm_red_red_share_CIFS_volume_vault           Snapmirrored           Idle      -      true      - svm_yellow: DP  svm_yellow_dr:           Broken-off           Idle      -      true      - svm_yellow:yellow_share_CIFS_volume           DP    svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror           Snapmirrored           Idle      -      true      - 3 entries were displayed.</pre>
14.	<p>Enter the following command to resynchronize the SnapMirror relationship:</p> <pre>rtp-nau::&gt; snapmirror resync -destination-path svm_yellow_dr:</pre>

STEP	ACTION
15.	<p>Enter the following command to verify that the SnapMirror resynchronization has finished:</p> <pre>rtp-nau::&gt; snapmirror show</pre> <p>Sample output:</p> <pre>   Progress Source          Destination Mirror Relationship Total      Last Path           Type   Path       State    Status     Progress Healthy Updated ----- svm_red:red_share_CIFS_volume         XDP  svm_blue:svm_red_red_share_CIFS_volume_vault                   Snapmirrored                   Idle      -      true      - svm_yellow: DP  svm_yellow_dr:         Snapmirrored                   Idle      -      true      - svm_yellow:yellow_share_CIFS_volume         DP    svm_blue:svm_yellow_yellow_share_CIFS_volume_mirror                   Snapmirrored                   Idle      -      true      - 3 entries were displayed.</pre>
16.	 <p>You might need to enter this command several times for the state to reach the final Snapmirrored state. Before reaching the Snapmirrored state, the resynchronization is in the Transferring state.</p>

END OF EXERCISE

## MODULE 5: DISK-TO-DISK BACKUP WITH SNAPVAULT SOFTWARE

### EXERCISE 1: CONFIGURE SNAPVAULT

In this exercise, you create and initialize a SnapVault relationship that meets the following requirements:

- Daily scheduled SnapVault backups
- A retention policy of seven Snapshot copies

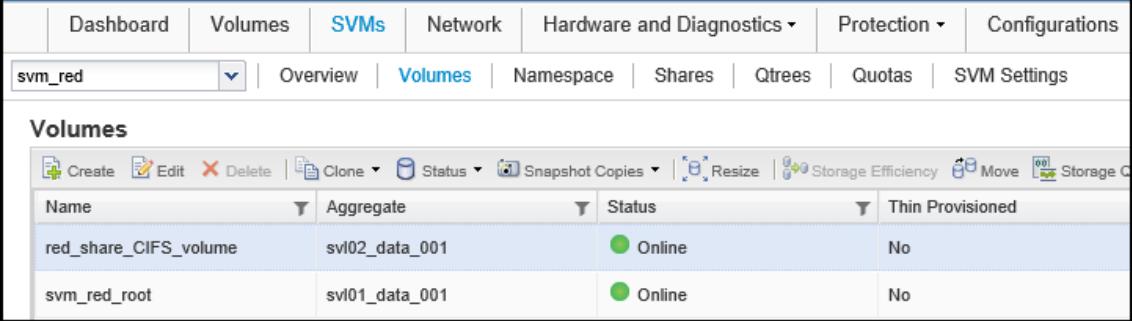
### OBJECTIVES

This exercise focuses on enabling you to do the following:

- Create a schedule job to be used to automate SnapVault updates
- Use an existing Snapshot policy
- Create and initialize a SnapVault relationship with the SnapVault policy and schedule
- Update the SnapVault secondary manually
- Verify data transfer
- Restore data using SnapVault

### TASK 1: CREATE THE SNAPVAULT RELATIONSHIP

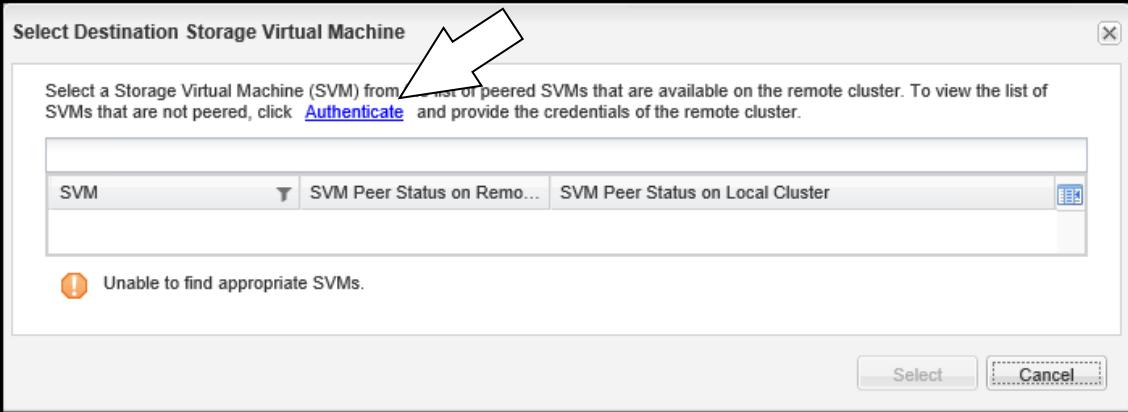
In this task, you create a SnapVault relationship between the primary volume on the svl-nau cluster and the secondary volume on the rtp-nau cluster.

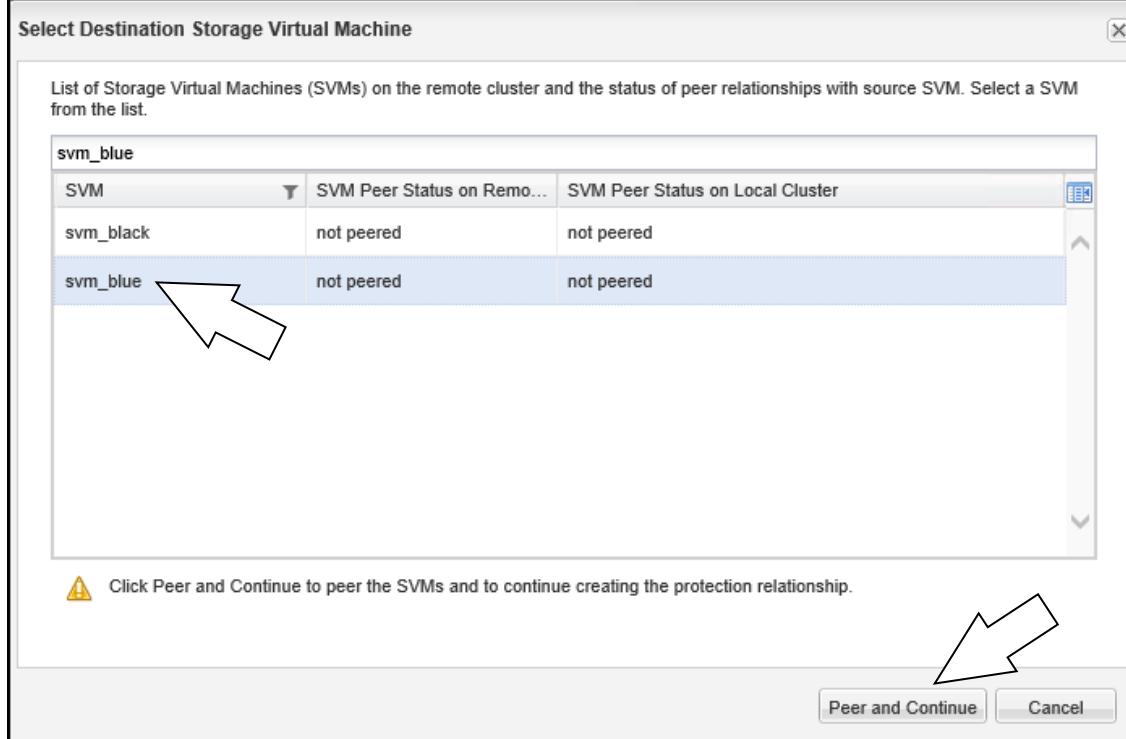
STEP	ACTION												
1.	<p>On svl-nau, click the <b>SVMs</b> button, select the <b>svm_red</b> link, and then click the <b>Volumes</b> button.</p>  <table border="1"><thead><tr><th>Name</th><th>Aggregate</th><th>Status</th><th>Thin Provisioned</th></tr></thead><tbody><tr><td>red_share_CIFS_volume</td><td>svl02_data_001</td><td>Online</td><td>No</td></tr><tr><td>svm_red_root</td><td>svl01_data_001</td><td>Online</td><td>No</td></tr></tbody></table>	Name	Aggregate	Status	Thin Provisioned	red_share_CIFS_volume	svl02_data_001	Online	No	svm_red_root	svl01_data_001	Online	No
Name	Aggregate	Status	Thin Provisioned										
red_share_CIFS_volume	svl02_data_001	Online	No										
svm_red_root	svl01_data_001	Online	No										

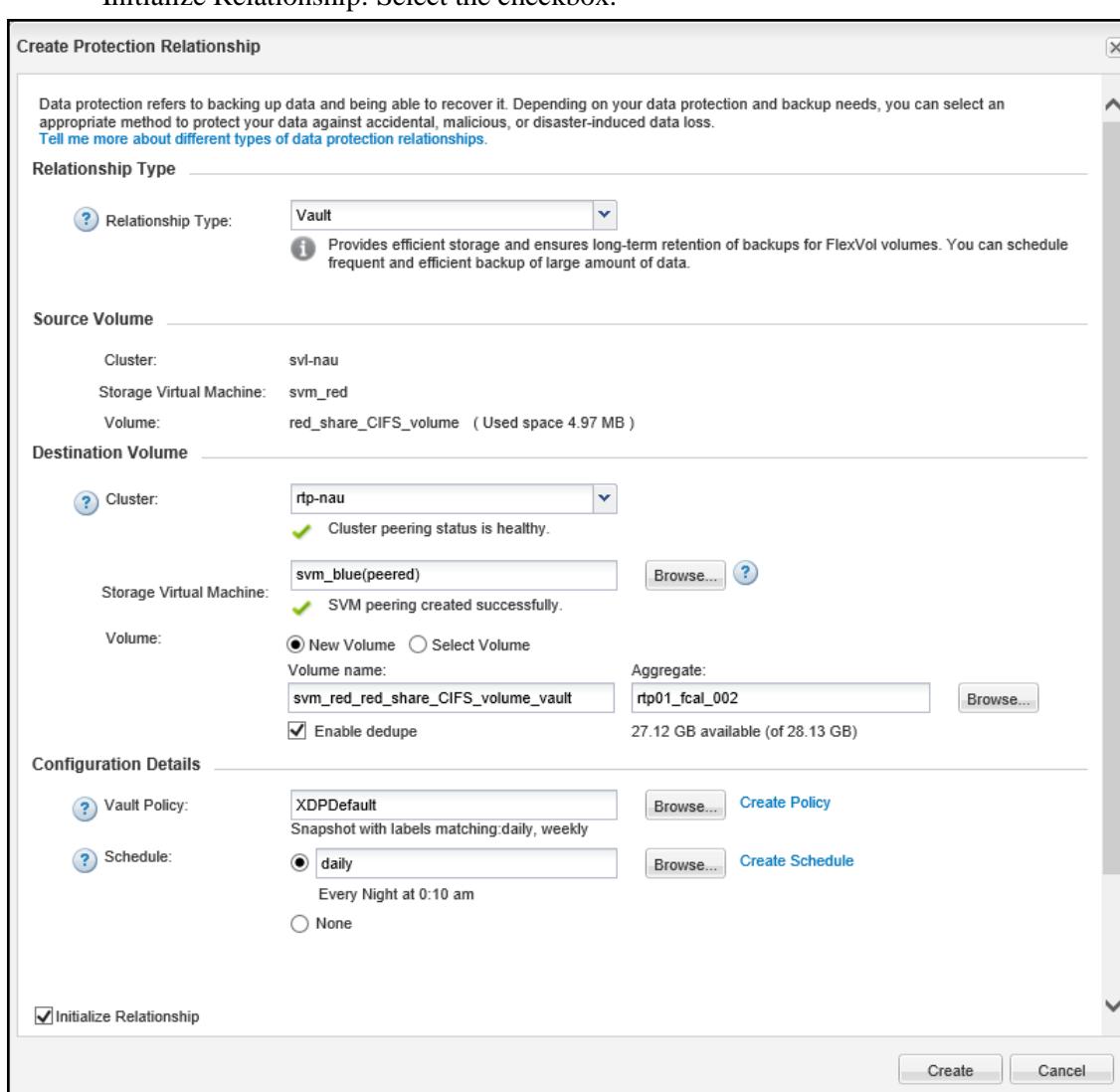
STEP	ACTION
2.	Right-click <b>red_share_CIFS_volume</b> (the primary volume), and then select <b>Protect</b> .

The screenshot shows the 'Volumes' interface in the NetApp ONTAP Data Protection Administration tool. A context menu is open over the 'red\_share\_CIFS\_volume'. The menu items are: Edit, Delete, Refresh, Clone, Status, Snapshot Copies, Resize, Move, Storage Efficiency, Storage QoS, and Protect. The 'Protect' option is highlighted with a blue selection bar at the bottom of the menu.

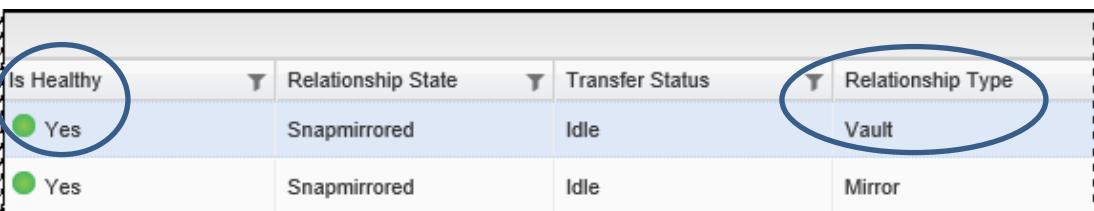
STEP	ACTION
3.	<p>In the Create Protection Relationship window, enter the following configurations:</p> <p>Relationship Type Relationship Type: <b>Vault</b></p> <p>Primary Volume (no changes)</p> <p>Destination Volume Cluster: <b>rtp-nau</b></p>
4.	<p>In the Destination Volume area, next to Storage Virtual Machine, click <b>Browse</b>.</p>
5.	 <p>The two clusters are currently in a peer relationship. The svm_red storage virtual machine (SVM) is not in a peer relationship with any SVM on the rtp-nau cluster. You must create the peer relationship between SVMs before a SnapVault relationship can be created.</p>

STEP	ACTION
6.	In the Select Destination Storage Virtual Machine window, click the <b>Authenticate</b> link. 
7.	In the Authentication window, enter the admin credentials of remote cluster rtp-nau, and click <b>OK</b> .
8.	In the Remote cluster certificate not trusted window, click <b>Yes</b> . 

STEP	ACTION									
9.	<p>In the Select Destination Storage Virtual Machine window, select the <b>svm_blue</b> SVM, and then click the <b>Peer and Continue</b> button.</p>  <p>Select Destination Storage Virtual Machine</p> <p>List of Storage Virtual Machines (SVMs) on the remote cluster and the status of peer relationships with source SVM. Select a SVM from the list.</p> <table border="1"> <thead> <tr> <th>SVM</th> <th>SVM Peer Status on Remote Cluster</th> <th>SVM Peer Status on Local Cluster</th> </tr> </thead> <tbody> <tr> <td>svm_black</td> <td>not peered</td> <td>not peered</td> </tr> <tr style="background-color: #d9e1f2;"> <td>svm_blue</td> <td>not peered</td> <td>not peered</td> </tr> </tbody> </table> <p>⚠ Click Peer and Continue to peer the SVMs and to continue creating the protection relationship.</p> <p><b>Peer and Continue</b> <b>Cancel</b></p>	SVM	SVM Peer Status on Remote Cluster	SVM Peer Status on Local Cluster	svm_black	not peered	not peered	svm_blue	not peered	not peered
SVM	SVM Peer Status on Remote Cluster	SVM Peer Status on Local Cluster								
svm_black	not peered	not peered								
svm_blue	not peered	not peered								

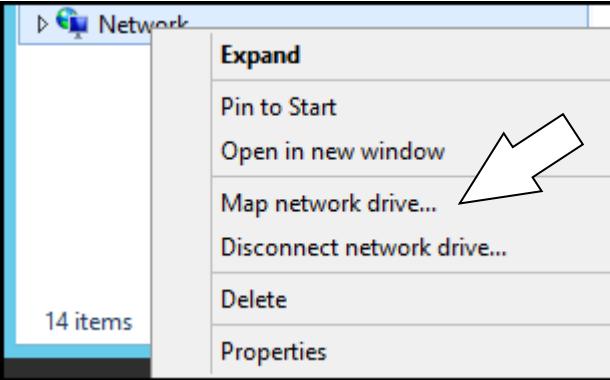
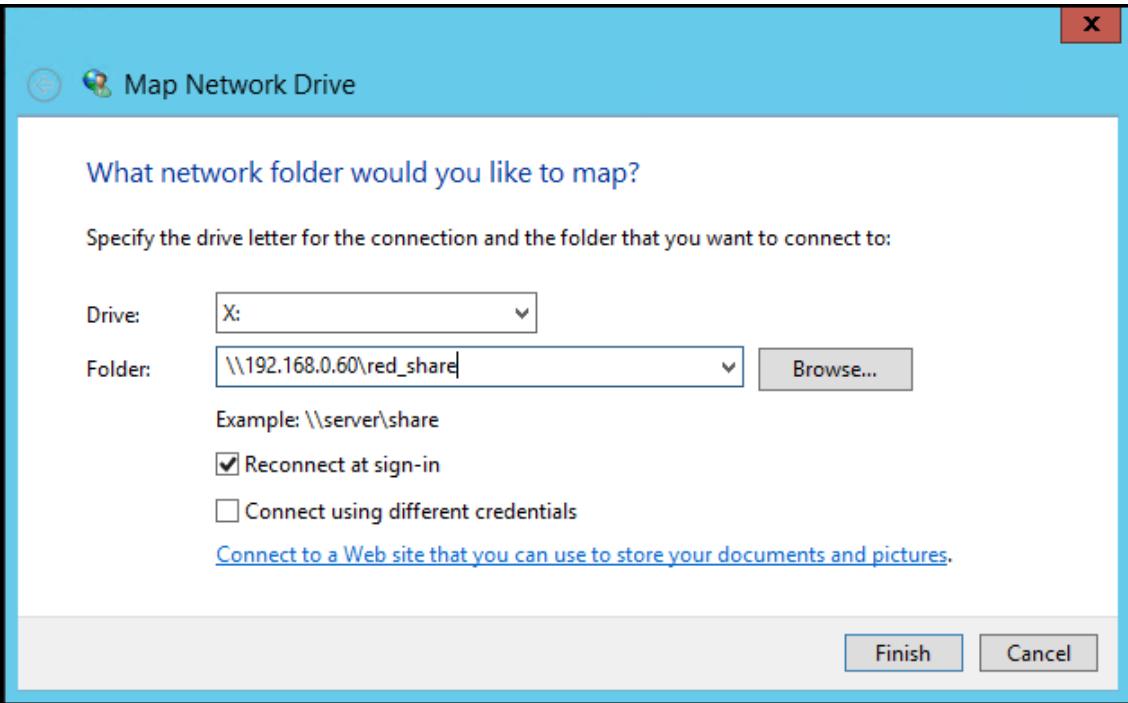
STEP	ACTION
10.	<p>In the Create Protection Relationship window, complete the configuration as follows:</p> <p><b>Destination Volume</b></p> <ul style="list-style-type: none"> <li>Select the <b>New Volume</b> radio button.</li> <li>Volume Name: Keep the default name.</li> <li>Aggregate: <b>rtp01_fcal_002</b></li> <li>Enable dedupe: Select the checkbox.</li> </ul> <p><b>Configuration Details</b></p> <ul style="list-style-type: none"> <li>Vault Policy: <b>XDPDefault</b></li> <li>Schedule: <b>daily</b></li> <li>Initialize Relationship: Select the checkbox.</li> </ul> 
11.	Click <b>Create</b>
12.	<p>ONTAP software automatically selects a schedule with a SnapMirror label and matches that SnapMirror label for the new SnapVault policy.</p> <p>To change the schedule, you can create another schedule with the same SnapMirror label and then you edit the SnapVault policy to use the new schedule.</p>

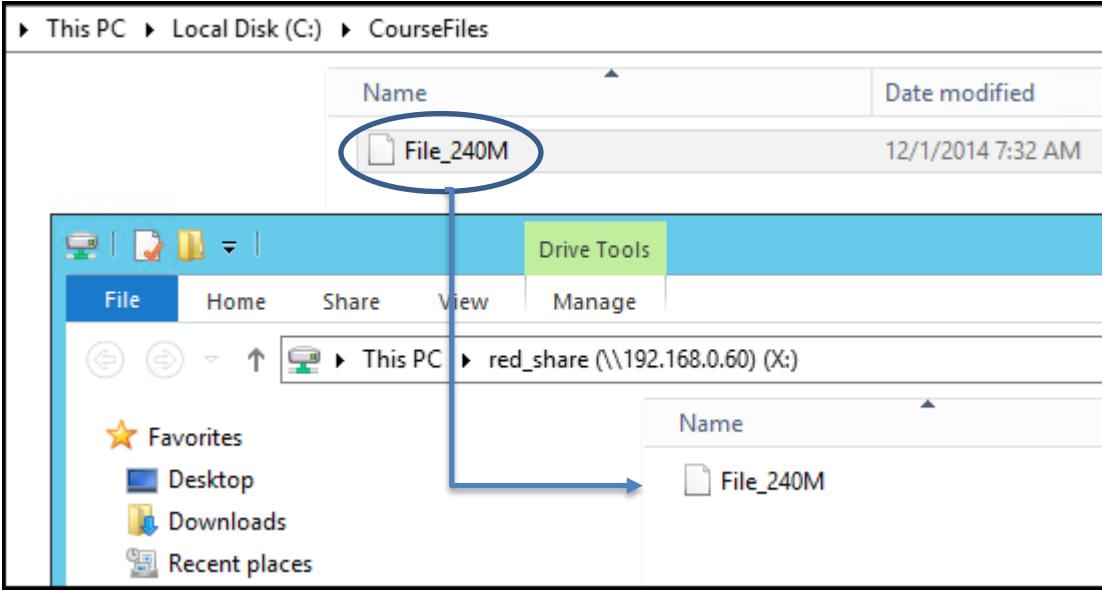
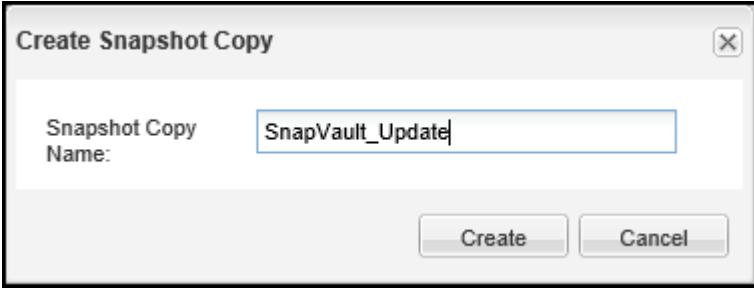
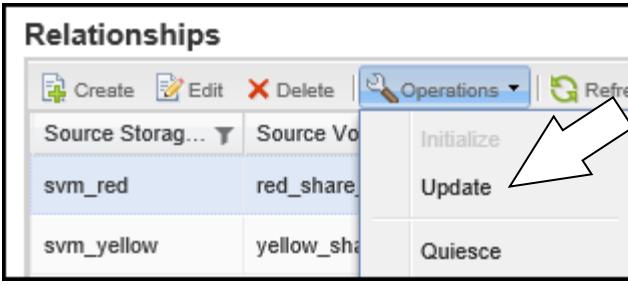
STEP	ACTION												
13.	<p>In the Create Protection Relationship window, ensure that the status items have all finished or started successfully, and then click <b>OK</b>.</p> <table border="1"> <thead> <tr> <th>Action</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>Create volume</td> <td>Completed successfully</td> </tr> <tr> <td>Enable dedupe</td> <td>Completed successfully</td> </tr> <tr> <td>Create relationship</td> <td>Completed successfully</td> </tr> <tr> <td>Initialize relationship</td> <td>Started successfully</td> </tr> </tbody> </table>	Action	Status	Create volume	Completed successfully	Enable dedupe	Completed successfully	Create relationship	Completed successfully	Initialize relationship	Started successfully		
Action	Status												
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Create relationship	Completed successfully												
Initialize relationship	Started successfully												
14.	<p>On the rtp-nau cluster, click <b>Protection &gt; Relationships</b>. The svm_red SVM is shown in the Relationships window with the previously created SnapMirror relationship.</p> <table border="1"> <thead> <tr> <th>Source Storage Virtual Machine</th> <th>Source Volume</th> <th>Destination Volume</th> <th>Destination Storage Virtual Machine</th> </tr> </thead> <tbody> <tr> <td>svm_red</td> <td>red_share_CIFS_volume</td> <td>svm_red_red_share_CIFS...</td> <td>svm_blue</td> </tr> <tr> <td>svm_yellow</td> <td>yellow_share_CIFS_volum...</td> <td>svm_yellow_yellow_shar...</td> <td>svm_blue</td> </tr> </tbody> </table>	Source Storage Virtual Machine	Source Volume	Destination Volume	Destination Storage Virtual Machine	svm_red	red_share_CIFS_volume	svm_red_red_share_CIFS...	svm_blue	svm_yellow	yellow_share_CIFS_volum...	svm_yellow_yellow_shar...	svm_blue
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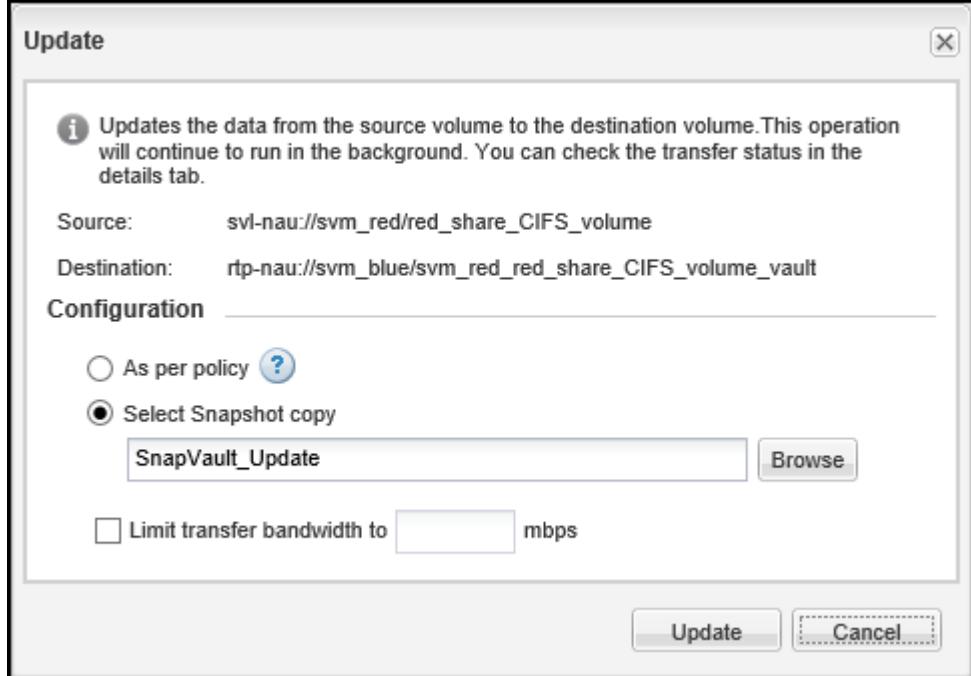
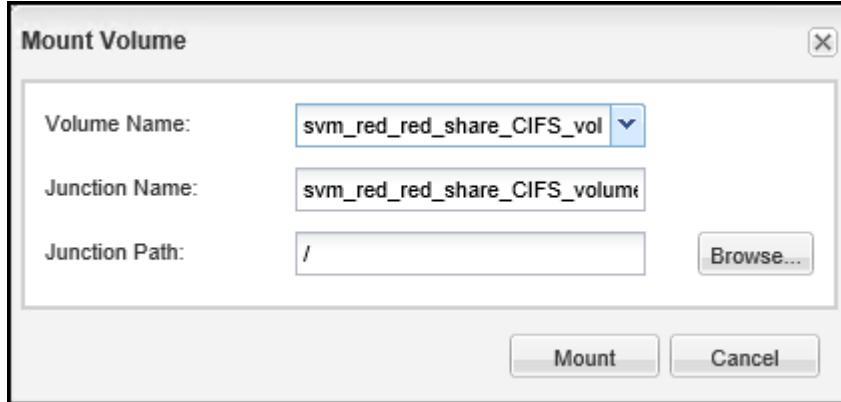
STEP	ACTION																					
15.	<p>Ensure that the newly created SnapVault relationship is healthy and has a relationship type and policy type of Vault.</p>  <table border="1"> <thead> <tr> <th>Is Healthy</th> <th>Relationship State</th> <th>Transfer Status</th> <th>Relationship Type</th> </tr> </thead> <tbody> <tr> <td>Yes</td> <td>Snapmirrored</td> <td>Idle</td> <td>Vault</td> </tr> <tr> <td>Yes</td> <td>Snapmirrored</td> <td>Idle</td> <td>Mirror</td> </tr> </tbody> </table>  <table border="1"> <thead> <tr> <th>Lag Time</th> <th>Policy Name</th> <th>Policy Type</th> </tr> </thead> <tbody> <tr> <td>3 min(s)</td> <td>XDPDefault</td> <td>Vault</td> </tr> <tr> <td>1 day(s) 2 hr(s)</td> <td>Yellow_Share_Mirror</td> <td>Asynchronous Mirror</td> </tr> </tbody> </table>	Is Healthy	Relationship State	Transfer Status	Relationship Type	Yes	Snapmirrored	Idle	Vault	Yes	Snapmirrored	Idle	Mirror	Lag Time	Policy Name	Policy Type	3 min(s)	XDPDefault	Vault	1 day(s) 2 hr(s)	Yellow_Share_Mirror	Asynchronous Mirror
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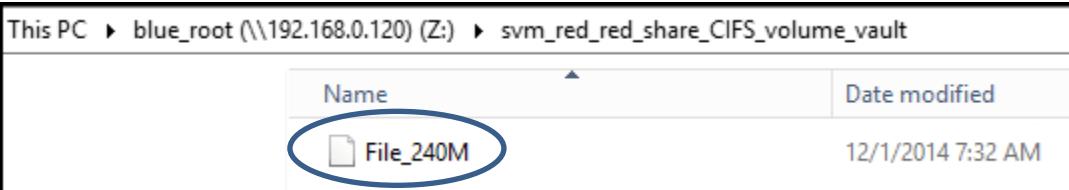
## TASK 2: VERIFY DATA TRANSFER

In this task, you verify that the SnapVault relationship can successfully transfer data from the primary volume to the secondary volume.

STEP	ACTION
1.	 You need to test the SnapVault replication, so you open Windows File Explorer, and you map a drive letter to the share on the svm_red SVM.
2.	In Windows File Explorer, right-click <b>Network</b> , and then select <b>Map network drive</b> . 
3.	In the Map Network Drive window, in the Folder field, enter the path to the share. The format for the folder path is \\<data_lif_for_smb_red>\<share_name> 
4.	Click <b>Finish</b> .

STEP	ACTION
5.	In the CourseFiles folder on the Windows Desktop, copy the <b>File_240M</b> file into the red_share folder.
	
6.	<p>Instead of waiting for the SnapVault update schedule, create a Snapshot copy to use for the manual update:</p> <ol style="list-style-type: none"> <li>On svl-nau, click the <b>Volumes</b> button.</li> <li>Select the <b>red_share_CIFS_volume</b>, and then click <b>Snapshot Copies &gt; Create</b>.</li> <li>In the Create Snapshot Copy window, enter the Snapshot Copy Name: <b>SnapVault_Update</b>.</li> <li>Click <b>Create</b>.</li> </ol> 
7.	<p>Begin a manual SnapVault update:</p> <ol style="list-style-type: none"> <li>On rtp-nau, click <b>Protection &gt; Relationships</b>.</li> <li>With the SnapVault relationship selected, click <b>Operations &gt; Update</b>.</li> </ol> 

STEP	ACTION
8.	<p>Continue the manual SnapVault update:</p> <ol style="list-style-type: none"> <li>In the Update window, select the <b>Select Snapshot copy</b> radio button.</li> <li>Browse and select the Snapshot copy created in Step 6.</li> <li>Click <b>Update</b>.</li> </ol> 
9.	Wait for the Transfer Status to change from Transferring to Idle.
10.	Click the <b>Refresh</b> button to update the status.
11.	<p>Mount the volume created on the svm_blue SVM by the Vault relationship into the SVM namespace:</p> <ol style="list-style-type: none"> <li>Click the <b>SVMs</b> button, and then click the <b>svm_blue</b> link.</li> <li>Click the <b>Namespace</b> button.</li> <li>In the Namespace window, click <b>Mount</b>.</li> <li>In the Mount Volume window, click the down-arrow in the Volume Name field and select the <b>svm_red_red_share_CIFS_volume_vault</b> volume.</li> <li>Accept the default settings for Junction Name and Junction Path.</li> <li>Click <b>Mount</b>.</li> </ol> 

STEP	ACTION				
12.	Using Windows File Explorer, click the drive letter mapped to the blue_root share (Z:).				
13.	Double-click the <b>svm_red_red_share_CIFS_volume_vault</b> folder. You should see that the <b>File_240M</b> file has been transferred.   <table border="1"> <thead> <tr> <th>Name</th> <th>Date modified</th> </tr> </thead> <tbody> <tr> <td>File_240M</td> <td>12/1/2014 7:32 AM</td> </tr> </tbody> </table>	Name	Date modified	File_240M	12/1/2014 7:32 AM
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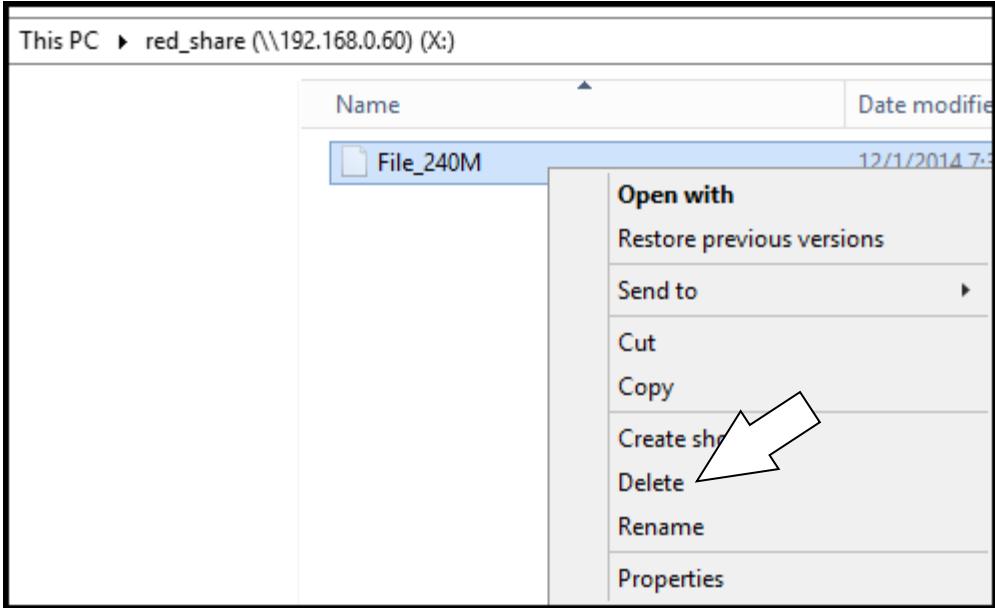
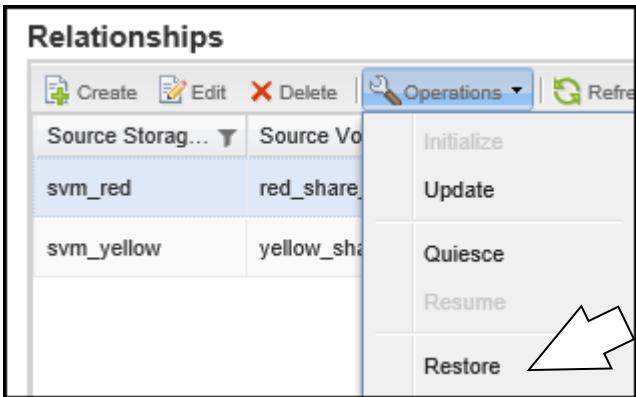
END OF EXERCISE

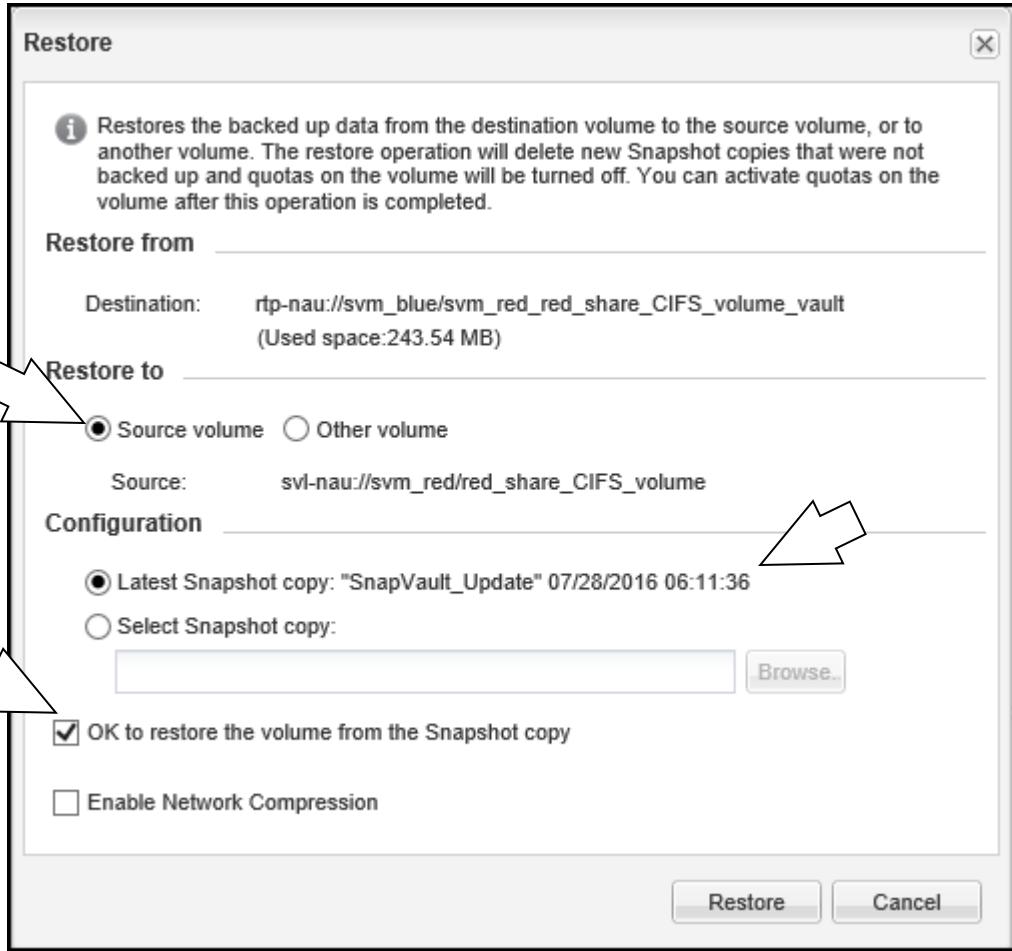
## EXERCISE 2: RESTORE DATA USING SNAPVAULT

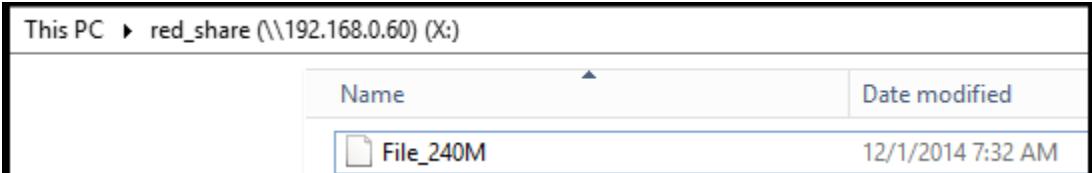
In this exercise, you restore an entire volume to the most recent SnapVault Snapshot copy.

### TASK 1: SIMULATE A DISASTER AND RECOVER DATA

In this task, you verify that the SnapVault relationship can successfully transfer data from the primary volume to the secondary volume.

STEP	ACTION
1.	To simulate data loss, delete the File_240M file from the red_share (X:). 
2.	On rtp-nau, on the Protection > Relationships window, select the vault relationship, and click Operations > Restore. 

STEP	ACTION
3.	<p>On the Restore window, enter the following settings:</p> <ol style="list-style-type: none"> <li>Restore to: <b>Source volume</b> (You accept the default and restore to the same volume location.)</li> <li>Configuration: <b>Latest Snapshot copy</b></li> <li>Select the checkbox labeled <b>OK to restore the volume from the Snapshot copy</b>.</li> <li>Click <b>Restore</b>.</li> </ol> 
4.	 <p>Because the policy assigned to this SnapVault relationship has a job schedule configured for daily updates, it is necessary to restore from the Snapshot copy taken more recently.</p>

STEP	ACTION				
5.	In the Restore informational dialog box, click <b>OK</b> . 				
6.	With Windows File Explorer, return to the red_share folder, and ensure that the file deleted in Step 1 has been restored.  <table border="1"> <thead> <tr> <th>Name</th> <th>Date modified</th> </tr> </thead> <tbody> <tr> <td>File_240M</td> <td>12/1/2014 7:32 AM</td> </tr> </tbody> </table>	Name	Date modified	File_240M	12/1/2014 7:32 AM
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File_240M	12/1/2014 7:32 AM				
7.	Verify that you successfully restored the red_share_CIFS_volume volume.				

END OF EXERCISE

## MODULE 6: SYNCMIRROR AND METROCLUSTER SOFTWARE

There are no hands-on exercises for Module 6.

## MODULE 7: NDMP AND TAPE BACKUP

There are no hands-on exercises for Module 7.