Module 9: Storage Efficiency

Exercise 1: Managing Storage Efficiency

In this exercise, you manage storage-efficiency features.

Objectives

This exercise focuses on enabling you to do the following:

- Explore thin provisioning
- Enable storage efficiency

Case Study

Mr. Zarrot is shocked to learn how much of the storage space that is allocated to applications is not being used to store data. Mr. Zarrot demands that the storage space is used more efficiently.

You disable reservations for storage space and allocate the space dynamically by enabling thin provisioning.

You enable the deduplication and compaction features to reduce the amount of physical storage that is needed to store data.

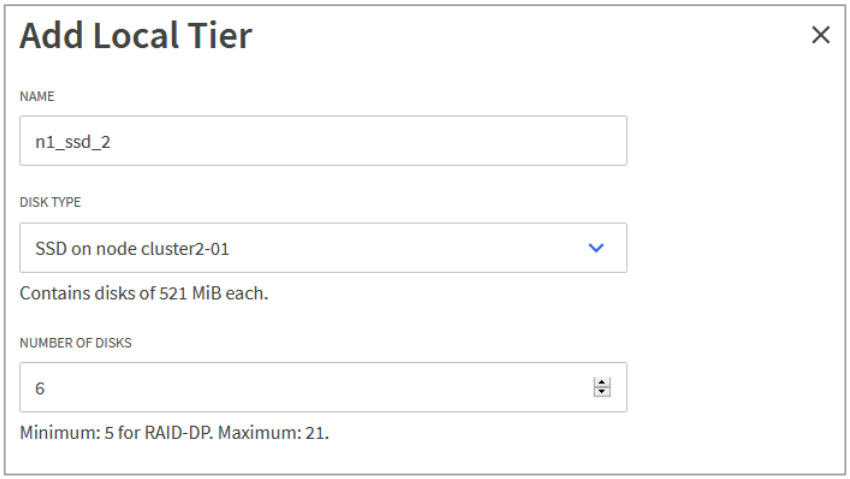
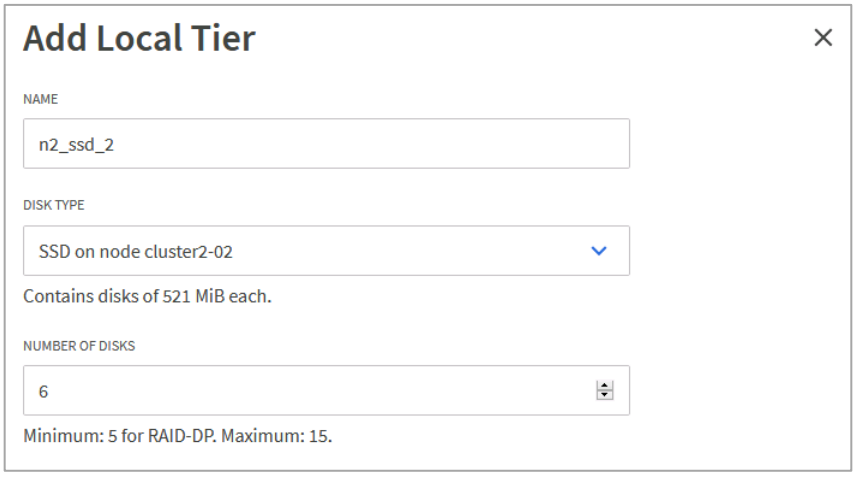
Lab Equipment

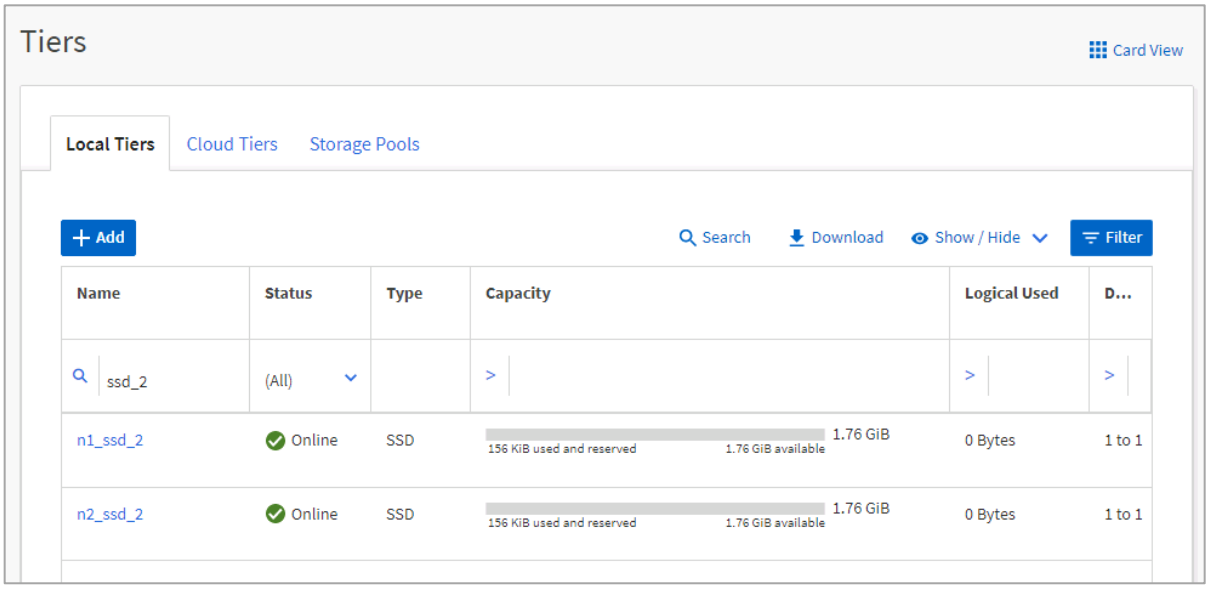
Use the following equipment to complete the exercise:

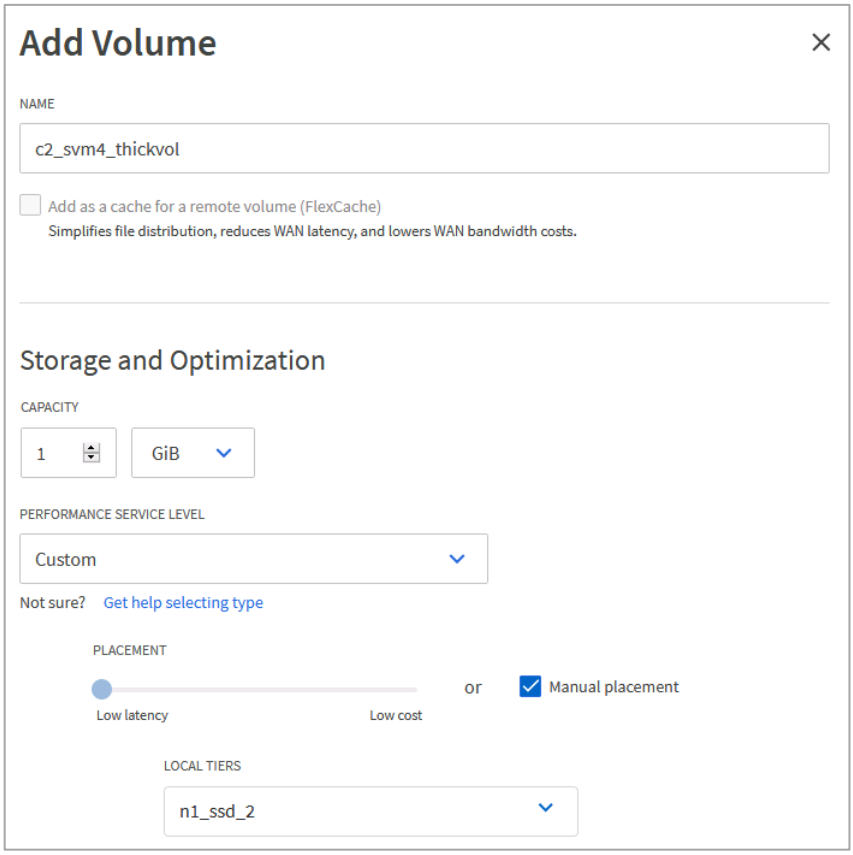
System	Host Name	IP Addresses	User Name	Password
Windows Server	jumphost	192.168.0.5	DEMO\Administrator	Netapp1!
ONTAP cluster-management LIF (cluster1)	cluster1	192.168.0.101	admin (case sensitive)	Netapp1!
ONTAP cluster-management LIF (cluster2)	cluster2	192.168.0.102	admin (case sensitive)	Netapp1!

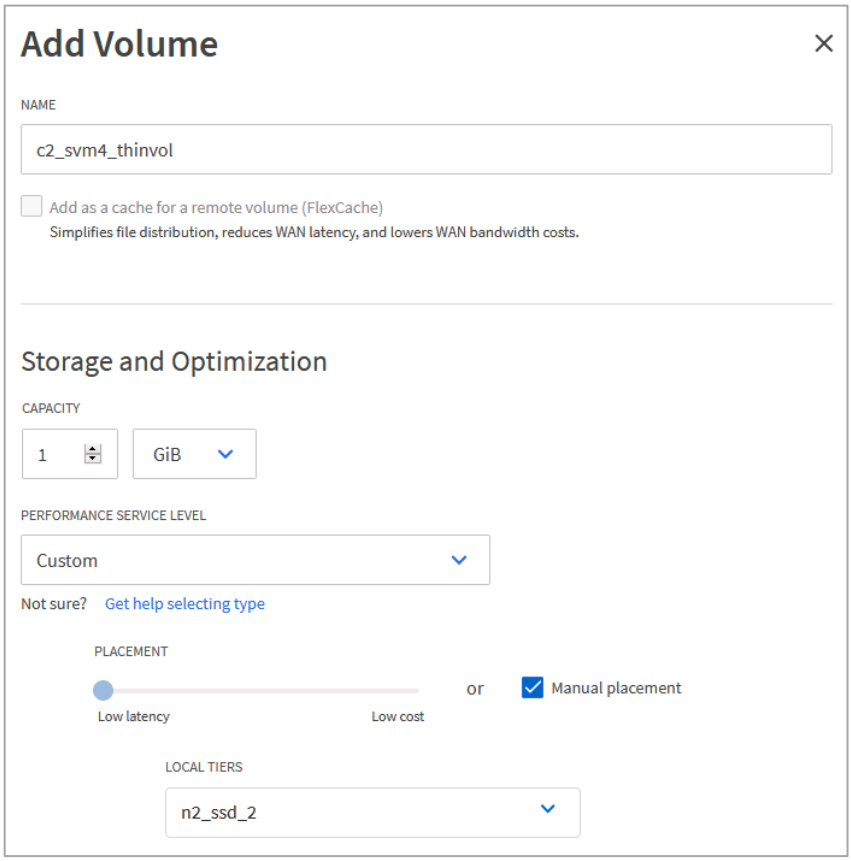
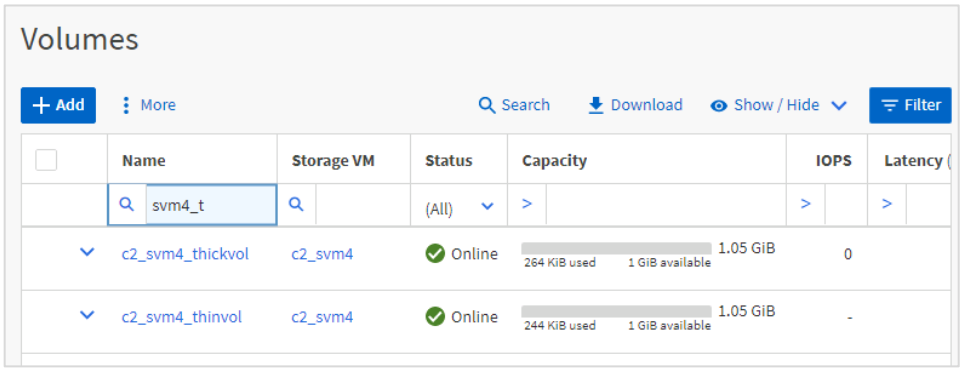
Task 1: Explore Thin Provisioning

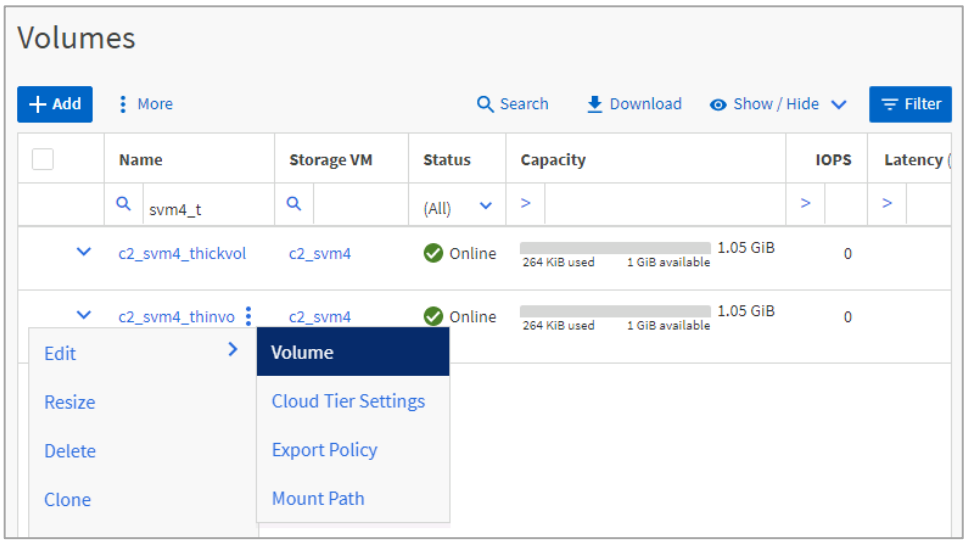
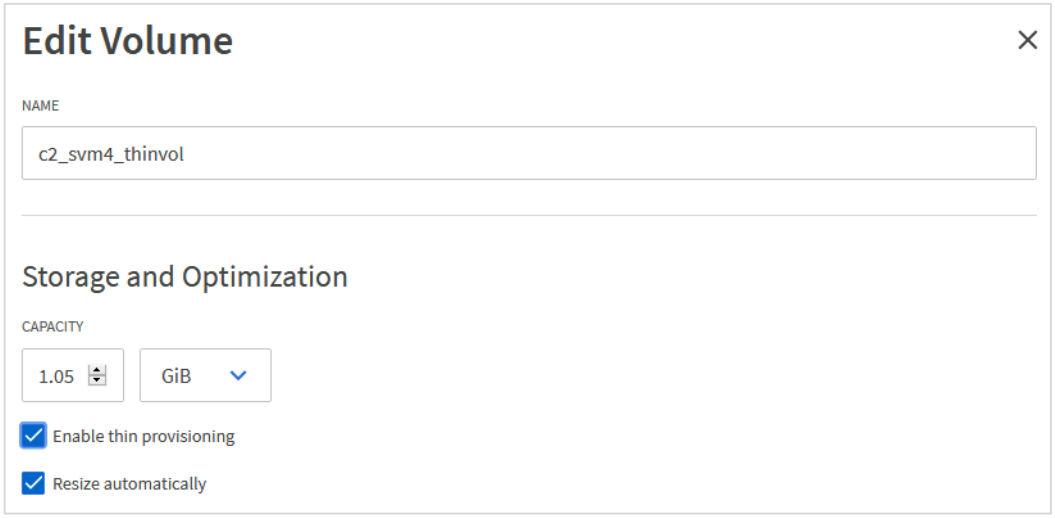
Step	Action
1-1	Log in to NetApp ONTAP System Manager for **cluster2**.
1-2	From the System Manager navigation menu, select **Storage > Tiers**.
1-3	Click **Add Local Tier** to create a new local data aggregate.
1-4	In the Add Local Tier dialog box, expand the **Recommendation details**.
1-5	Click **Switch to Manual Local Tier Creation**.

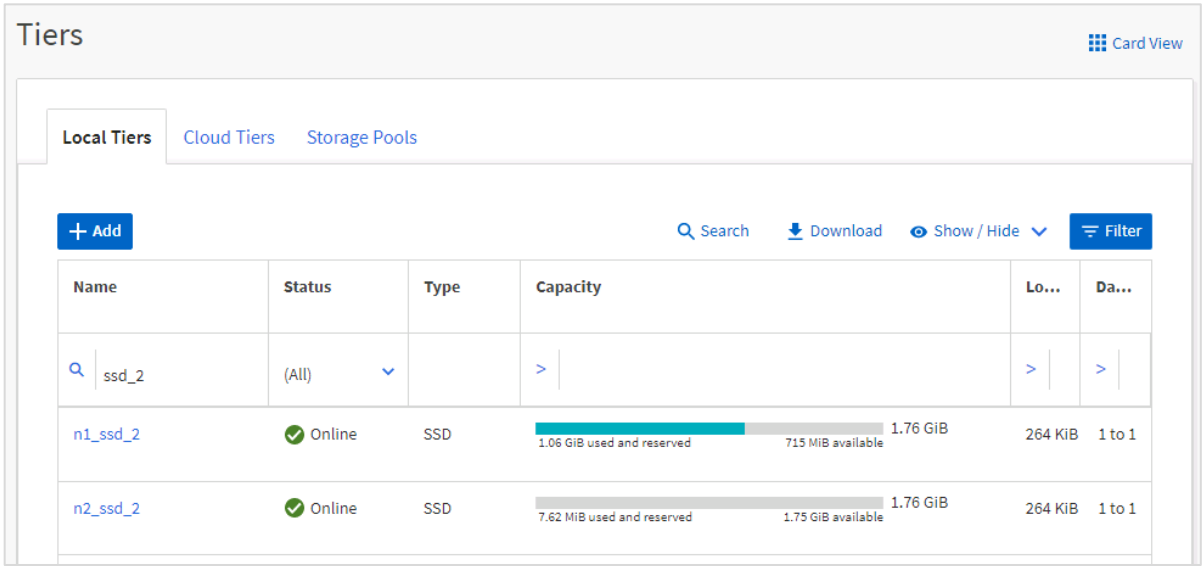
Step	Action
1-6	In the Add Local Tier window, define an aggregate that is comprised of SSDs on node 1, with the following settings: • Name: **n1_ssd_2** • Disk Type: **SSD on node cluster2-01** • Number of Disks: **6** 
1-7	Unselect the Configure Onboard Key Manager for encryption checkbox. 
1-8	Accept the default values for the remaining settings and click **Save**.
1-9	Repeat steps 1-3 through 1-8 to create another aggregate with the following settings: • Name: **n2_ssd_2** • Disk Type: **SSD on node cluster2-02** • Number of Disks: **6** 

Step	Action
1-10	Verify that aggregates n1_ssd_2 and n2_ssd_2 are both at 0% usage: 
1-11	From the System Manager Dashboard menu, select **Storage > Volumes**.
1-12	Click **Add**.
1-13	Click **More options**.

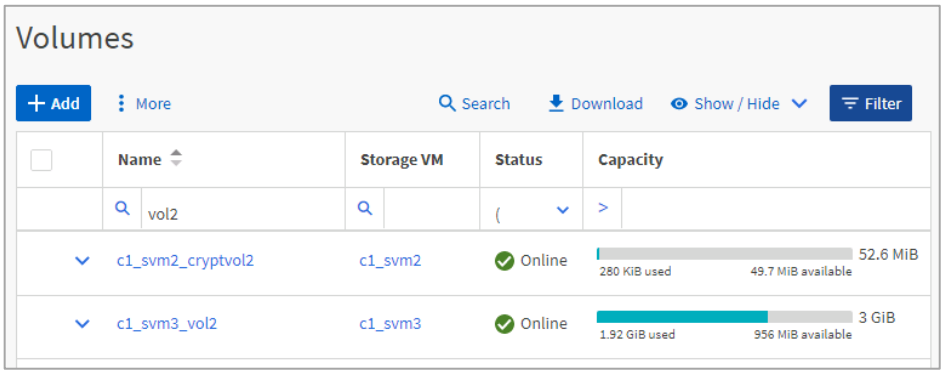
Step	Action
1-14	Create a volume that has the following attributes: • Name: **c2_svm4_thickvol** • Capacity: **1 GiB** • Performance service level: **custom** • Manual placement: **<selected>** • Local tiers: **n1_ssd_2** 
1-15	In the Access Permissions section, unselect **Export via NFS**. 
1-16	Click **Save**.

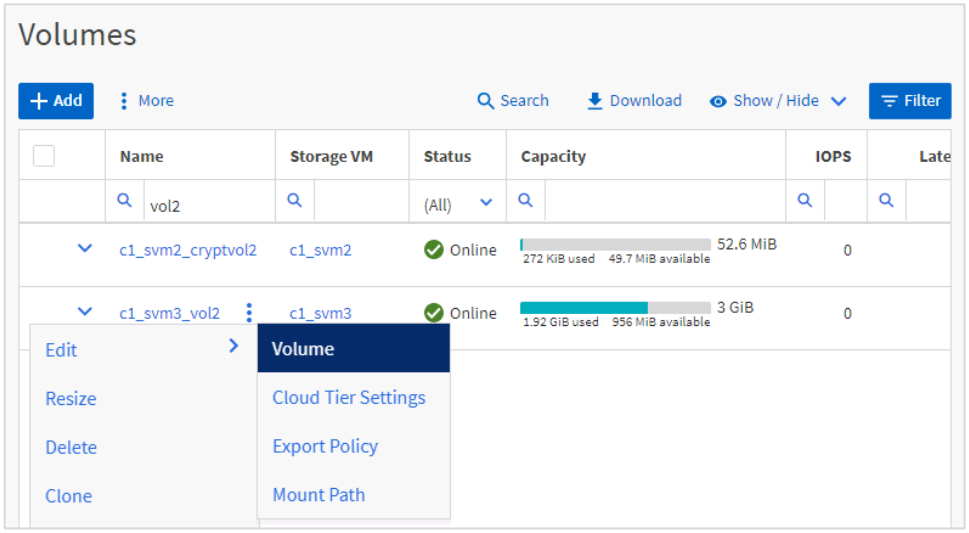
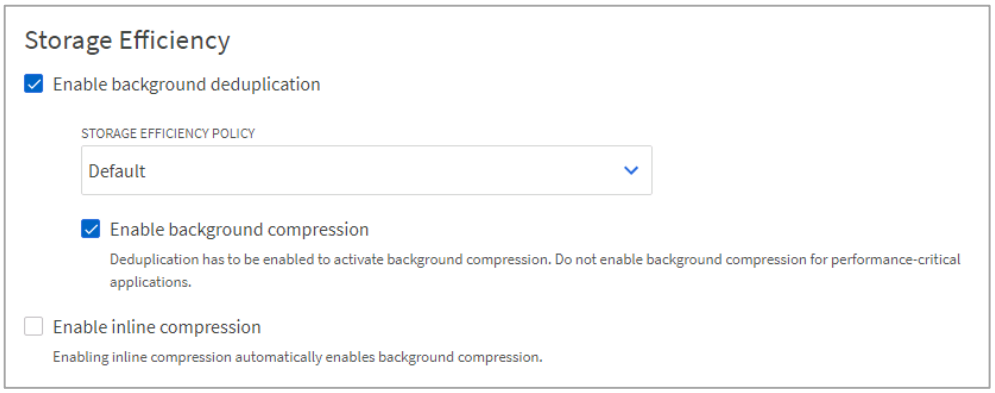
Step	Action
1-17	Repeat steps 1-12 through 1-16 to create another volume with the following settings: • Name: **c2_svm4_thinvol** • Capacity: **1 GiB** • Performance service level: **custom** • Manual placement: **<selected>** • Local tiers: **n2_ssd_2** 
1-18	Use the Filter function to show only the newly created volumes: 

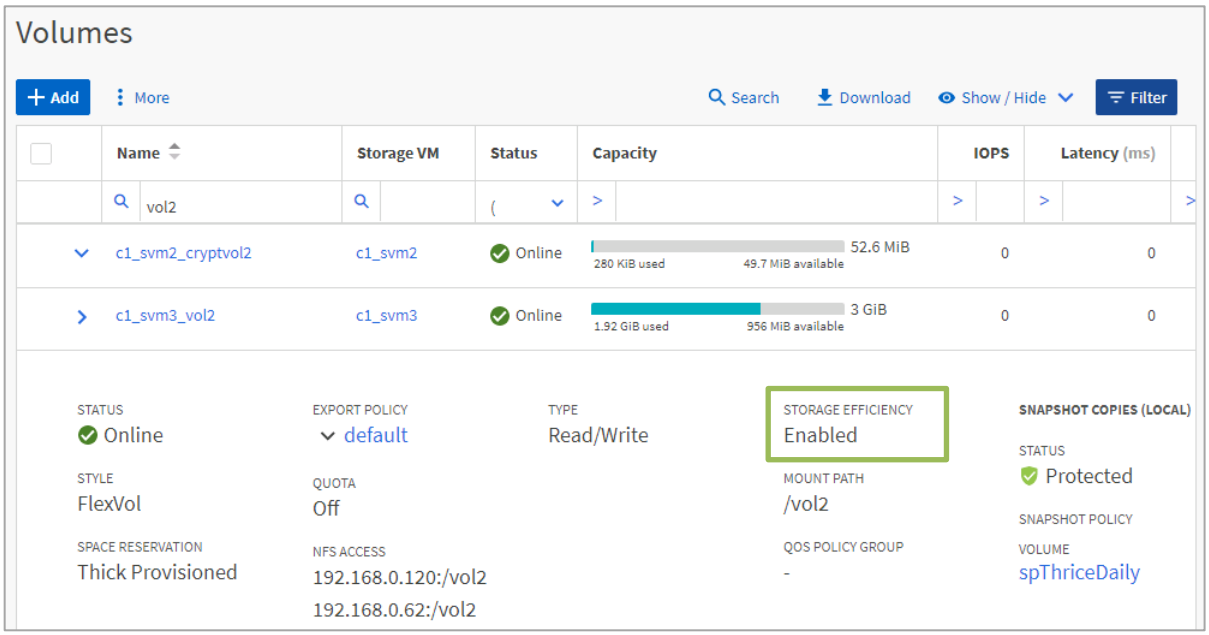
Step	Action
1-19	Select volume **c2_svm4_thinvol** and then choose **Edit > Volume** from the More menu. 
1-20	On the Edit volume page, select **Enable thin provisioning**, then click **Save**. 
1-21	From the System Manager Dashboard menu, select **Storage > Tiers**.

Step	Action
1-22	Compare the capacity and usage of aggregates n1_ssd_2 and n2_ssd_2: 
1-23	Review the following facts: • Each aggregate contains one volume. • The two volumes are identical, except that only one volume is thin-provisioned. Neither volume contains user data.

Task 2: Enable Storage Efficiency

Step	Action
2-1	Log in to NetApp ONTAP System Manager for **cluster1**.
2-2	From the System Manager Dashboard menu, select **Storage > Volumes**.
2-3	Record the capacity and space use of volume c1_svm3_vol2. 
2-4	Volume c1_svm3_vol2 contains the 2GB file named hugefile.

Step	Action
2-5	Select **c1_svm3_vol2**, and then from the More menu, select **Edit > Volume**. 
2-6	On the Edit Volume page, scroll to the Storage Efficiency section, and then specify the following settings: • Enable background deduplication: **<selected>** • Storage Efficiency Policy: **Default** • Enable background compression: **<selected>** (default) 
2-7	Click **Save**.

Step	Action
2-8	Expand the **c1_svm3_vol2** volume and verify that storage efficiency is enabled. 
2-9	Return to the PuTTY session to cluster1.

2-10	Display information about the `default` storage efficiency policy:
	`volume efficiency policy show -vserver c1_svm3 -policy default`
	Sample output:
	`Vserver: c1_svm3`
	`Efficiency Policy Name: default`
	`Policy Type: scheduled`
	`Job Schedule Name: daily`
	`Duration: -`
	`Threshold Percentage: -`
	`QoS Policy: best_effort`
	`Enabled: true`
	`Comment: Default policy`
	`Owner of the Policy: vserver-admin`

2-11	Answer the following question: When is the storage efficiency task scheduled to run? _____

2-12	Display the used capacity of volume c1_svm3_vol2:
	`vol show -volume c1_svm3_vol2`
	Sample output:
	`Vserver Volume Aggregate State Type Size Available Used%`
	`--- --- --- --- --- --- --- ---`
	`c1_svm3 c1_svm3_vol2 n1_hdd_2 online RW 3GB 956.1MB 67%`

2-13	Start the storage efficiency task for the c1_svm3_vol2: **`volume efficiency start -vserver c1_svm3 -volume c1_svm3_vol2`**

Step	Action

2-14	Display the used capacity of volume c1_svm3_vol2:
	vol show -volume c1_svm3_vol2
	Sample output:
	`Vserver Volume Aggregate State Type Size Available Used%`
	`--------- ------------ ----------- --------- ---- --------- ---------- -----`
	`c1_svm3 c1_svm3_vol2 n1_hdd_2 online RW 3GB 956.1MB 67%`

2-15	Answer the following questions: Did the storage efficiency task reduce the space that c1_svm3_vol2 consumed? ____ Why or why not? ____
2-16	Start the storage efficiency task for the c1_svm3_vol2 again, but this time, examine existing data: **set advanced** **volume efficiency start -vserver c1_svm3 -volume c1_svm3_vol2 -scan-old-data true -dedupe true -compression true** Type **y** to confirm the launch of a storage efficiency scan of the existing data in the volume. **set admin**
2-17	Display the used capacity of volume c1_svm3_vol2: **vol show -volume c1_svm3_vol2**
2-18	Answer the following question: Did the storage efficiency task reduce the space that c1_svm3_vol2 consumed? ____
2-19	Display the amount of space saved in the volume c1_svm3_vol2. **vol show -volume c1_svm3_vol2 -fields dedupe-space-saved,dedupe-space-saved-percent**

2-20	After several minutes, review the Storage Efficiency information again and compare the statistics.
	Sample output:
	`cluster1::> vol show -volume c1_svm3_vol2`
	`Vserver Volume Aggregate State Type Size Available Used%`
	`--------- ------------ ----------- --------- ---- --------- ---------- -----`
	`c1_svm3 c1_svm3_vol2 n1_hdd_2 online RW 3GB 1.06GB 62%`
	
	`cluster1::> vol show -volume c1_svm3_vol2 -fields dedupe-space-saved,dedupe-space-saved-percent`
	`vserver volume dedupe-space-saved dedupe-space-saved-percent`
	`------- ------------ ------------------ -------------------------`
	`c1_svm3 c1_svm3_vol2 1.39GB 44%`

End of exercise