Technical Report

HCI File Services Powered by ONTAP Select

Quick Start Guide

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Abstract

NetApp® ONTAP® Select extends the NetApp HCI product, adding a rich set of file and data services to the platform. This technical report details how to successfully install and configure a basic ONTAP Select high-availability (HA) pair for NetApp HCI by using the Select Deploy appliance.

Detailed information about the advanced configuration of the ONTAP Select appliance can be found in the ONTAP Select Documentation Center and the ONTAP Select Product Architecture and Best Practices documents.

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1 Introduction

NetApp ONTAP Select is a NetApp solution for the software-defined storage (SDS) market. ONTAP Select brings enterprise-class storage management features to the software-defined data center. ONTAP Select extends the NetApp Data Fabric solution to the commodity server offerings likely existing in a customer's data center.

This document describes the install process for deploying a ONTAP Select HA pair through the Select Deploy appliance. Basic configuration of the Select instance is also covered including the creation of a single multi-protocol file share. For advanced cluster setup topics, see the ONTAP Select product documentation.

1.1 Software-Defined Infrastructure

The implementation and delivery of IT services through software provides administrators with the ability to rapidly provision resources with a level of speed and agility that was previously impossible.

Modern data centers are moving toward software-defined infrastructures as a mechanism to provide IT services with greater agility and efficiency. Separating IT value from the underlying physical infrastructure allows IT services to react quickly to changing IT needs by dynamically shifting infrastructure resources to where they are needed most.

Software-defined infrastructures are built on three tenets:

- Flexibility
- Scalability
- Programmability

Software-Defined Storage

The shift toward software-defined infrastructures might be having its greatest impact in an area that has traditionally been one of the least affected by the virtualization movement: storage. Software-only solutions that separate storage management services from the physical hardware are becoming more common. This fact is especially evident in private cloud environments: enterprise-class service-oriented architectures designed from the ground up with software-defined in mind. Many of these environments are being built on commodity hardware: white box servers with locally attached storage, with software controlling the placement and management of user data.

This approach is also seen in the emergence of hyper converged infrastructures (HCIs), a building-block style of IT design based on the premise of bundling compute, storage, and networking services. The rapid adoption of hyper converged solutions over the past several years has highlighted the desire for simplicity and flexibility. However, as companies make the decision to replace enterprise-class storage arrays with a more customized, make your own model by building storage management solutions on top of homegrown components, a new set of problems emerges.

In a commodity world where data lives fragmented across silos of direct-attached storage, data mobility and data management become complex problems that need to be solved. NetApp can help.

1.2 ONTAP Feature Support

ONTAP Select offers full support for most of the ONTAP functionality, except for those features that have hardware-specific dependencies.

The supported functionalities include:

- NFS, CIFS, and iSCSI
- NetApp SnapMirror® and NetApp SnapVault®

- NetApp FlexClone® technology
- NetApp SnapRestore® technology
- NetApp Volume Encryption (NVE)
- SnapLock Enterprise (separate license)
- FabricPool (separate license)
- FlexCache (separate license)
- SyncMirror (separate license)
- NetApp Data Availability Services (separate license)
- MetroCluster SDS (formerly called an ONTAP Select two-node stretched cluster; ONTAP Select Premium license)

In addition, support for the NetApp OnCommand® management suite is included. This suite includes most tooling used to manage NetApp FAS arrays, such as OnCommand Unified Manager, OnCommand Insight, OnCommand Workflow Automation, and NetApp SnapCenter®. Using SnapCenter, NetApp SnapManager®, or NetApp SnapDrive® with ONTAP Select requires server-based licenses.

Consult the NetApp Interoperability Matrix Tool (IMT) for a complete list of supported management applications.

The following ONTAP features are not supported by ONTAP Select:

- Interface groups (ifgroups)
- Service Processor
- Hardware-centric features such as the traditional FAS/AFF MetroCluster architecture that requires dedicated hardware infrastructure between sites, Fibre Channel (FC/FCoE), and full disk encryption (FDE)
- NetApp Storage Encryption drives
- SnapLock Compliance

1.3 Use Cases

The primary use cases for ONTAP Select on NetApp HCI include providing utility and departmental file services, VM template storage over NFS, and home directories for midsized virtual desktop deployments. Replication of data in and out of cloud service providers is also supported.

1.4 Prerequisites

ONTAP Select is installed as part of a post NetApp Deployment Engine (NDE), customer-driven workflow. To ensure a smooth and successful installation of ONTAP Select within the NetApp HCI environment, the following prerequisites are required:

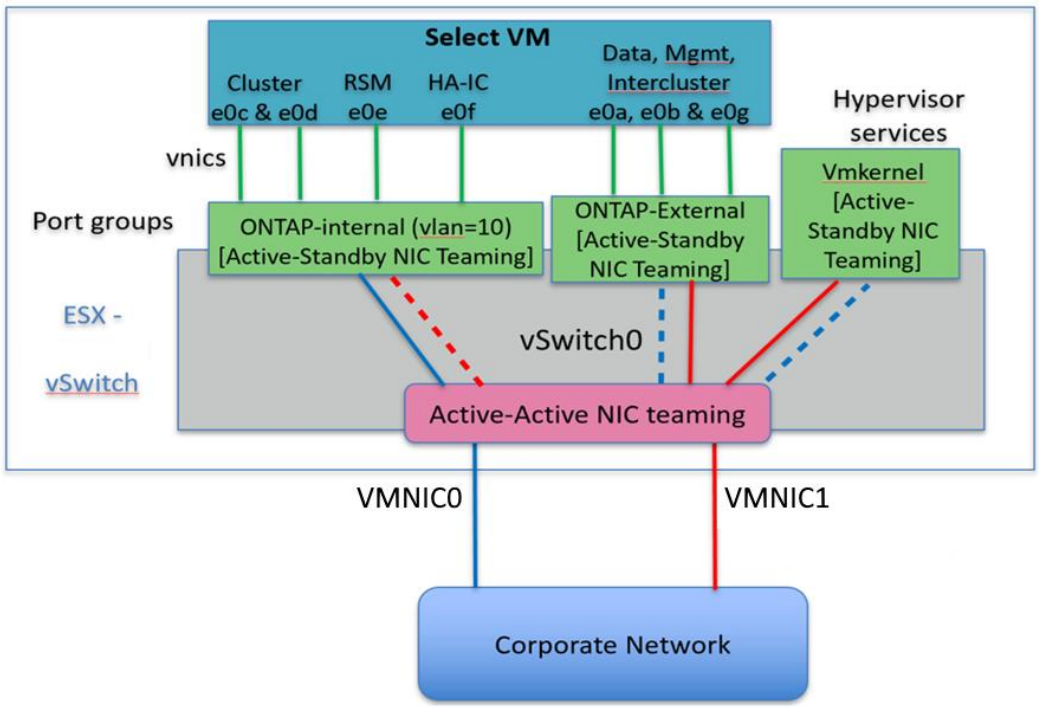
- Software and credentials:
  - Installation OVA of ONTAP Select 9.5 or later
  - A valid Capacity Tier or Capacity Pool license; optionally, a 90-day evaluation can be deployed with the option to install a Capacity Tier license at a later time
  - vCenter and ESXi host information including credentials and IP addresses
- Compute:
  - Adequate resources available for reservation per ONTAP Select node
  - vCPU: 4 vCPUs (small instance), 8 vCPUs (medium instance), 16 vCPUs (large instance)
  - Physical memory: 16GB (small instance), 64GB (medium instance), 128GB (large instance)

  - For 2-node ONTAP Select installations, the Deploy appliance should reside on a different compute node from the nodes hosting the ONTAP Select nodes, due to the Deploy appliance's mediator role in 2-node ONTAP Select clusters.
- Storage:
  - One datastore provisioned for each ONTAP Select node; a minimum of 3TB each if deploying a multinode cluster
- Network:
  - Virtual network port groups preprovisioned for ONTAP Select management, data traffic, and intracluster traffic. One port group can be used for both management and data traffic.
  - All port groups must reside on the same virtual switch.
  - Active-active NIC teaming the physical network adapters is recommended
  - Intracluster traffic must be on an isolated, nonrouted layer-2 network with end-to-end support for jumbo frames (configurable from 7500 to 9000 MTU during or post deployment).
  - Two physical port configurations for multinode clusters. A NetApp best practice is for each port group to have an active adapter and a standby adapter configured opposite each other, as shown in the example in Table 1.

Table 1) Recommend vSwitch port group configuration with two physical ports

Port Group	OTS-External	OTS-Internal
Active	vmnic0	vmnic1
Standby 1	vmnic1	vmnic0

Figure 1) vSwitch with two physical port logical view.



- Single node clusters do not need an internal network port group and all physical adapters can be added to the external port group as active.

- While ONTAP Select management traffic can be assigned a separate port group it is generally recommended to assign it to the same port group as the data traffic.
- Intracluster traffic must have a separate port group and support end-to-end jumbo frames.
- Consult the Supported network configurations and VMware vSphere vSwitch Configuration sections of the ONTAP Select documentation for additional information, requirements, and best practice guidelines, including configuration for 4 port configurations.

For more information, see the ONTAP Select documentation.

Review the following recommendations for a turnkey ONTAP Select setup on a standard NetApp HCI deployment using a distributed switch:

- Datastore for Deploy VM (created by NDE): `NetApp-HCI-Datastore-02`
- Datastore for Select nodes: One Element based datastore per Select node, each sized equal or greater than the desired licensed storage pool capacity plus an additional 300GB for ONTAP system disks and equal in size to each other. It is recommended to not host any other VMs on these datastores.
  - Example: For a two-node deployment needing 2TB of storage pool capacity per node the admin would create two Element based datastores each at least 2.3TB in size.
- VM Network for Deploy VM (created by NDE): `NetApp HCI VDS 01-VM_Network`
- VM Network for Select nodes external and management traffic: `OTS-External`
  - Active uplink: `Uplink 1`
  - Standby uplink: `Uplink 2`
- VM Network for Select nodes internal traffic: `OTS-Internal`
  - Active uplink: `Uplink 2`
  - Standby uplink: `Uplink 1`
  - Set to isolated VLAN
  - For example:

Figure 2) Virtual port group example.

2 Install File Services Powered by ONTAP Select

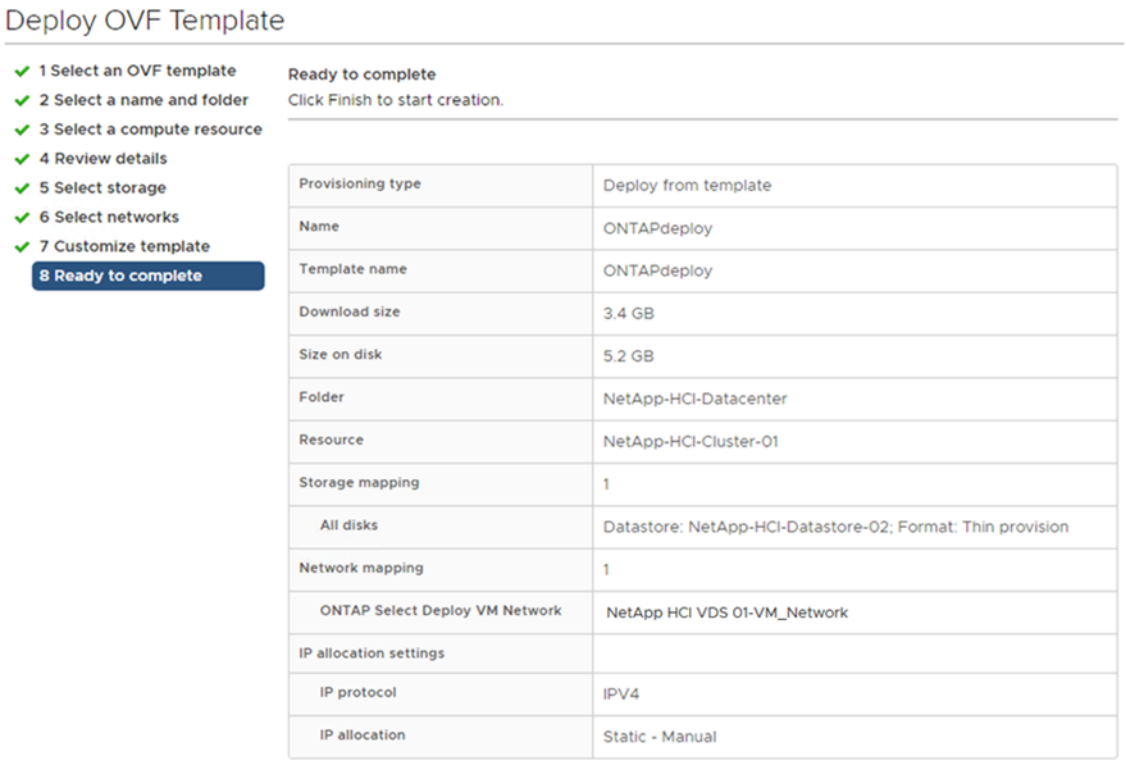
Installing ONTAP Select requires two primary actions:

- Provisioning the ONTAP Deploy appliance
- Creating the ONTAP Select cluster using the Deploy appliance

2.1 Provision the ONTAP Deploy Appliance

Download the ONTAP Select Deploy utility virtual machine image from the NetApp Support Site to your local workstation. In the VMware vSphere client, select File > Deploy OVF Template. Complete the wizard specifying appropriate values for your installation. Verify that all values are entered correctly on the final page of the wizard then deploy the appliance.

Figure 3) Deploy template values.



2.2 Create an ONTAP Select Cluster Using the Deploy Appliance

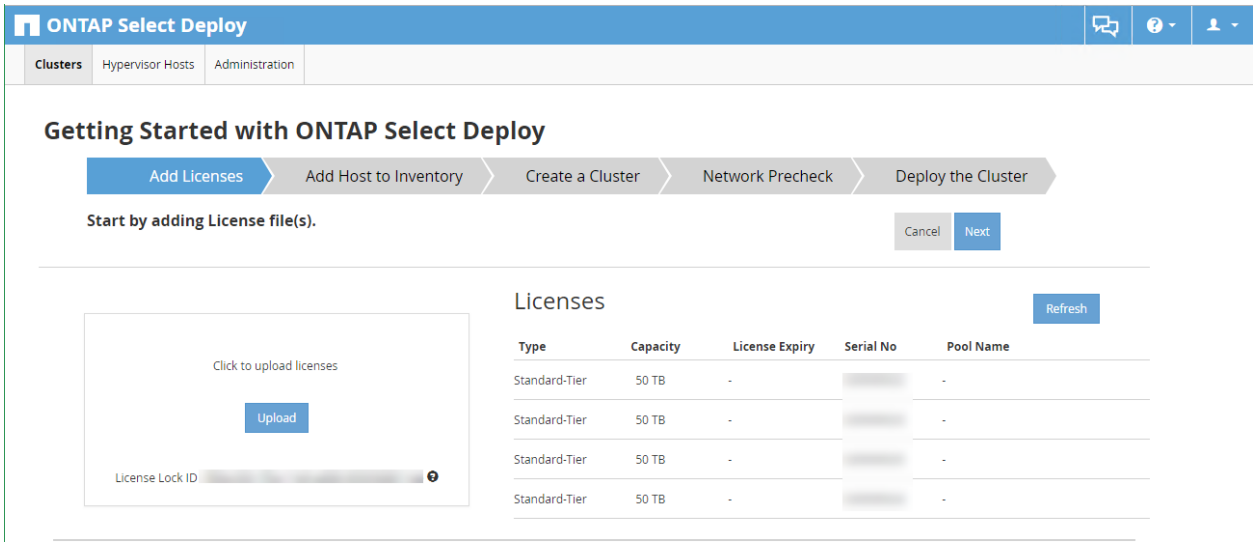
To create an ONTAP Select cluster by using the Deploy appliance, compete the following steps:

Note: The example in this section illustrates the deployment of a two-node, highly available cluster.

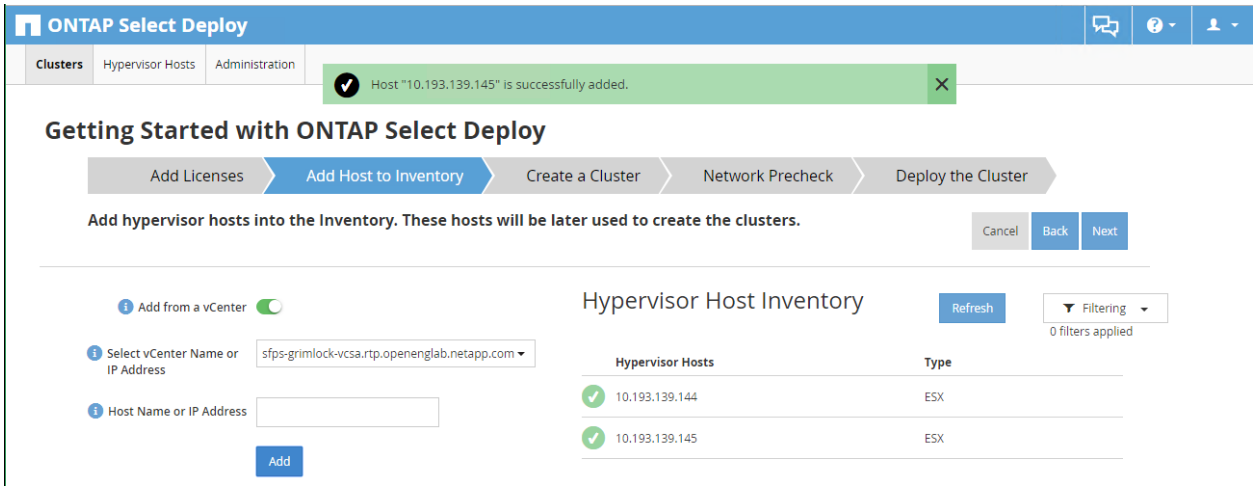
1. Log into the ONTAP Deploy appliance by using the information entered in the deployment wizard. The Getting Started with ONTAP Select Deploy wizard should open automatically. Uploading licenses is optional at this stage. If no license is added, the OTS VMs will operate in a 90-day evaluation mode. Clusters deployed in the 90-day evaluation mode can be upgraded to capacity tier licenses at a later time.

   If you are planning a future evaluation to capacity tier conversion, consider the following:

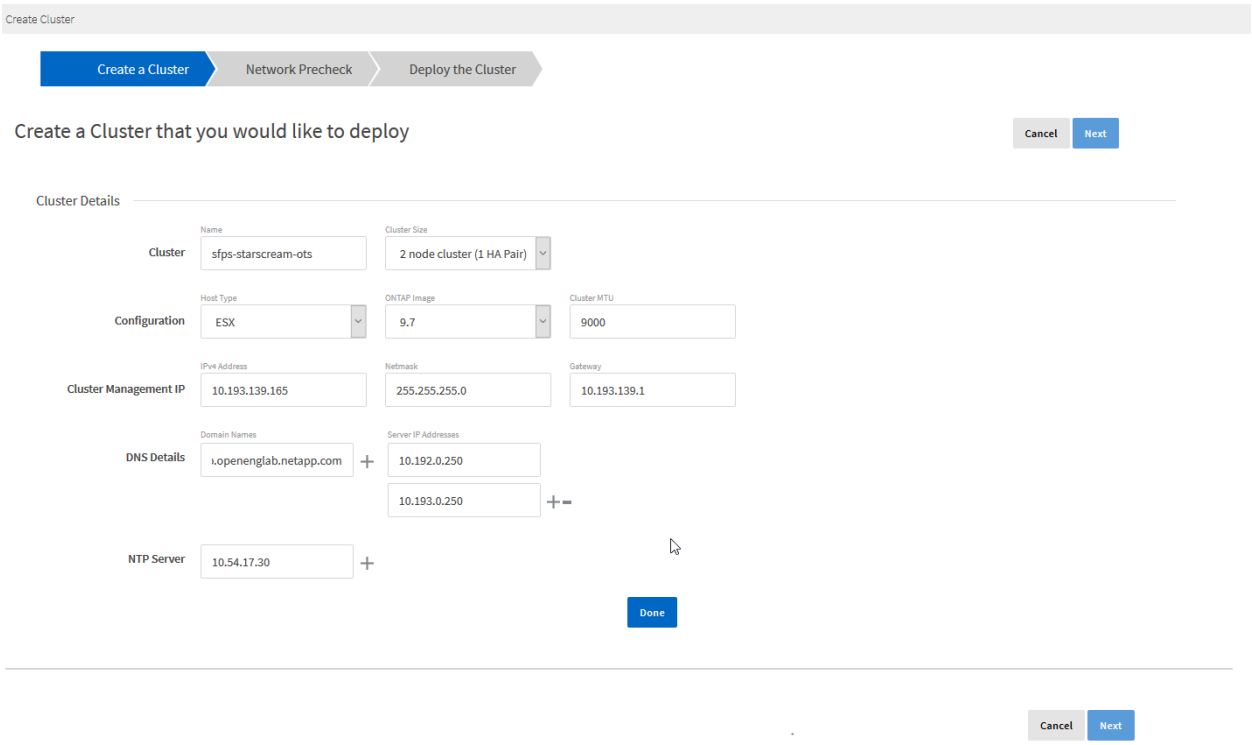
   - One capacity tier license is required per node.
   - Each capacity tier license must be equal or larger in capacity than the storage capacity provisioned for each node.
   - Clusters or nodes cannot be decreased in size prior to the license conversion.



2. In the Add Host to Inventory step, select the vCenter instance to be used and then add the ESXi hosts that will receive the ONTAP Select VMs during deployment.

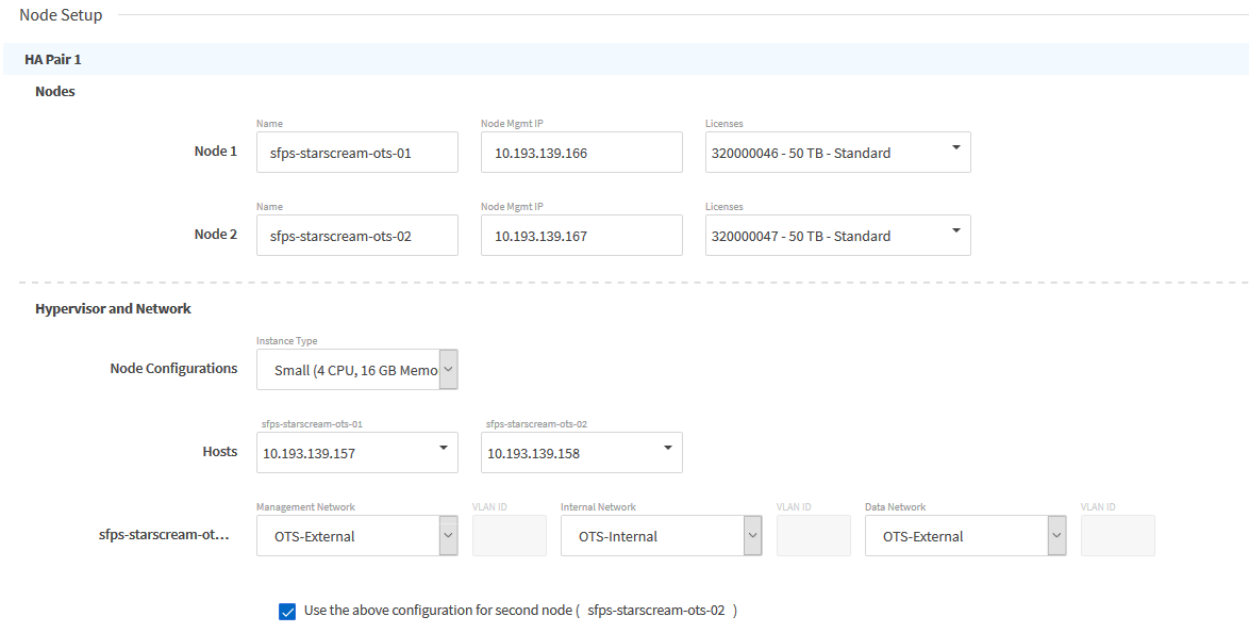


3. In the Create a Cluster step, fill out the wizard with relevant information for your deployment. In this example, a two-node HA pair is being deployed. Click Done after you entered all the data.

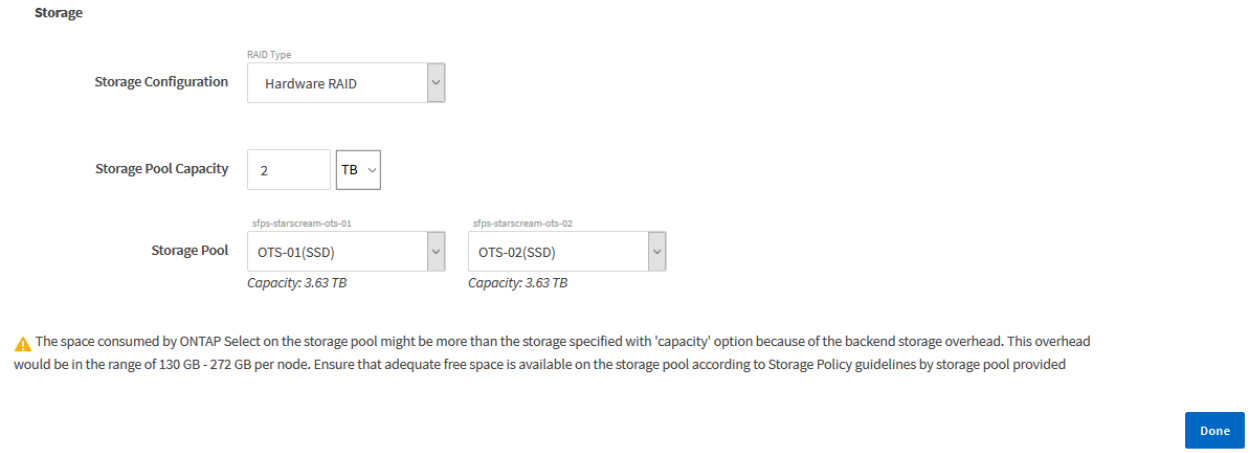


4. The wizard asks for information related to the node setup for ONTAP Select.
   In the Nodes section, provide the following information:
   - Node names
   - IP addresses
   - Licenses (if applicable)

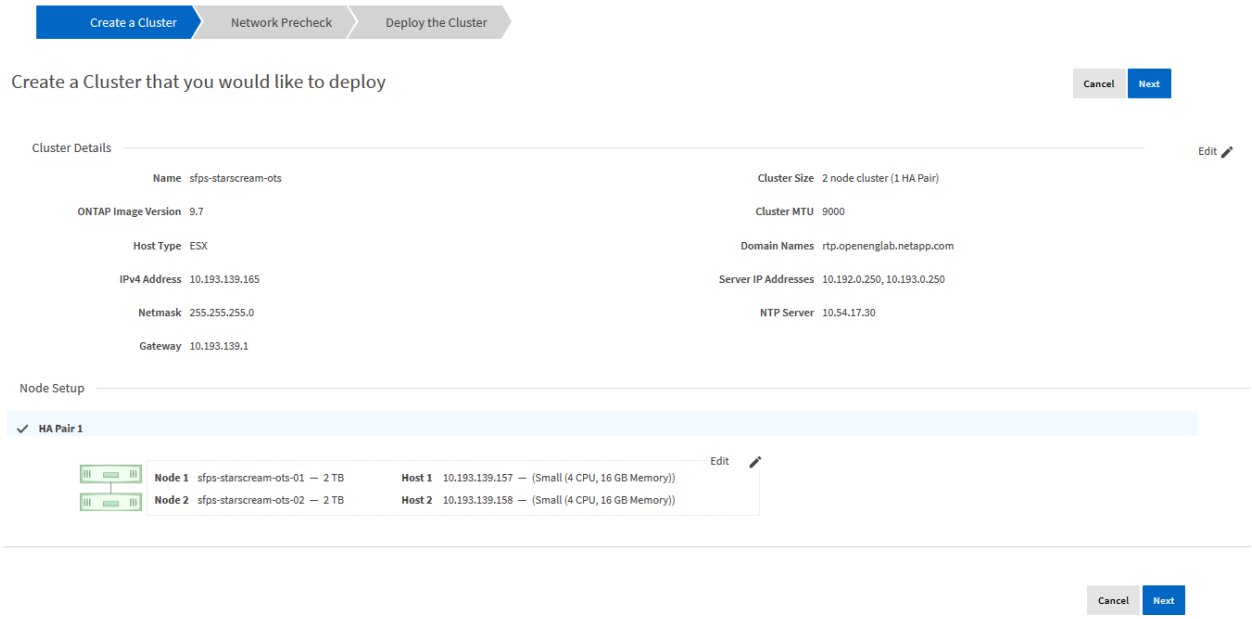
   In the Hypervisor and Network section, provide the following information:
   - Select the node size
   - The ESXi hosts to run the Select VMs
   - The networks to be used for management, cluster interconnect (internal), and data traffic



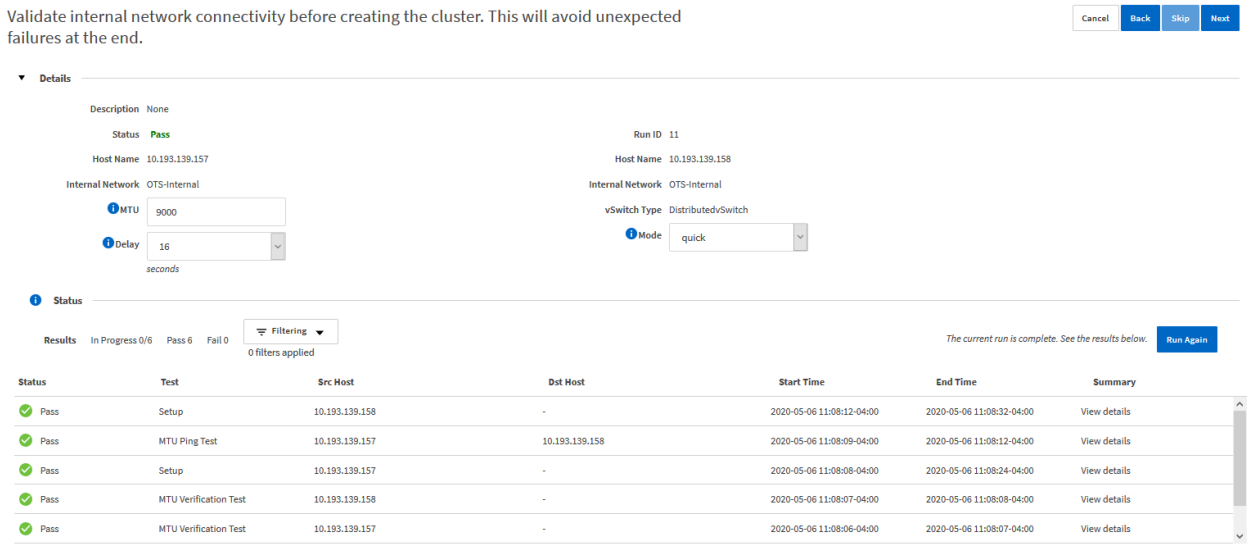
5. In the Storage section, select the desired storage pool capacity and the storage pool for each ONTAP Select node. Click Done.



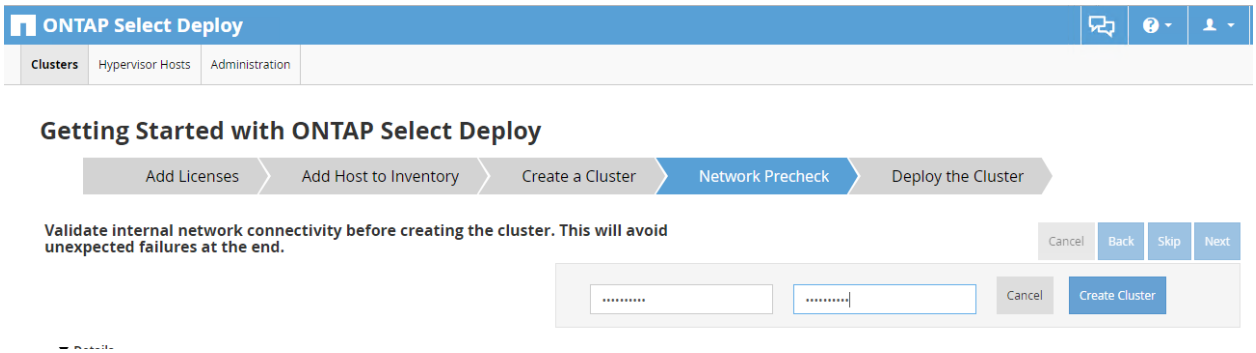
6. Verify the cluster information and click Next.



7. Verify the network information and click Run to execute a network precheck. Make sure all the tests pass and then click Next.



8. Specify the password for the cluster and click Create Cluster.



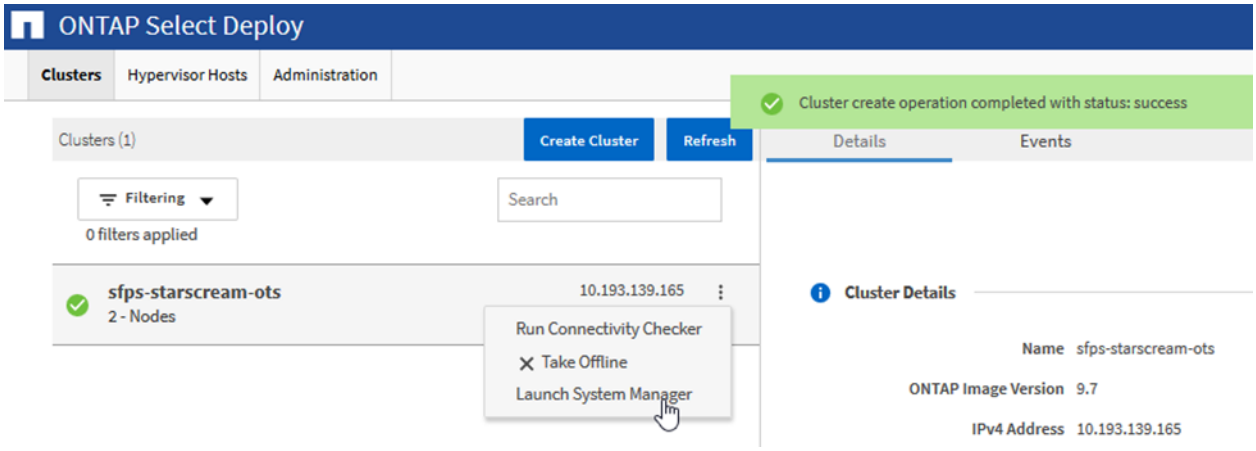
9. The wizard deploys the ONTAP Select VMs. At the completion of the wizard, log into System Manager to continue the cluster configuration.

3 Configure ONTAP Select

3.1 Prepare ONTAP Select for Use

To configure and manage ONTAP Select, you must prepare the storage. This involves the creation of a Storage Virtual Machine (SVM) and allocating storage to the SVM. ONTAP 9.7 introduces an enhanced version of System Manager that greatly simplifies this process of preparing storage, creating an SVM, and configuring protocol access. The previous version of System Manager is still available if that integrates better with existing workflows.

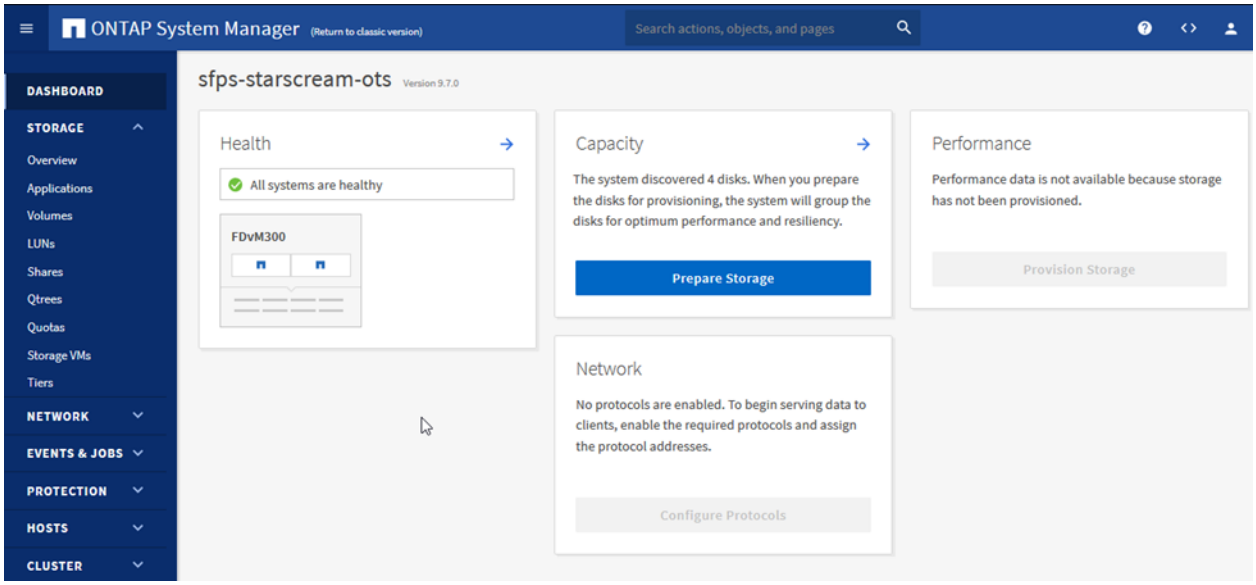
Figure 4) Launch System Manager.



3.2 Allocate Capacity

To allocate capacity, complete the following steps:

1. When System Manager launches, select the Prepare Storage option.



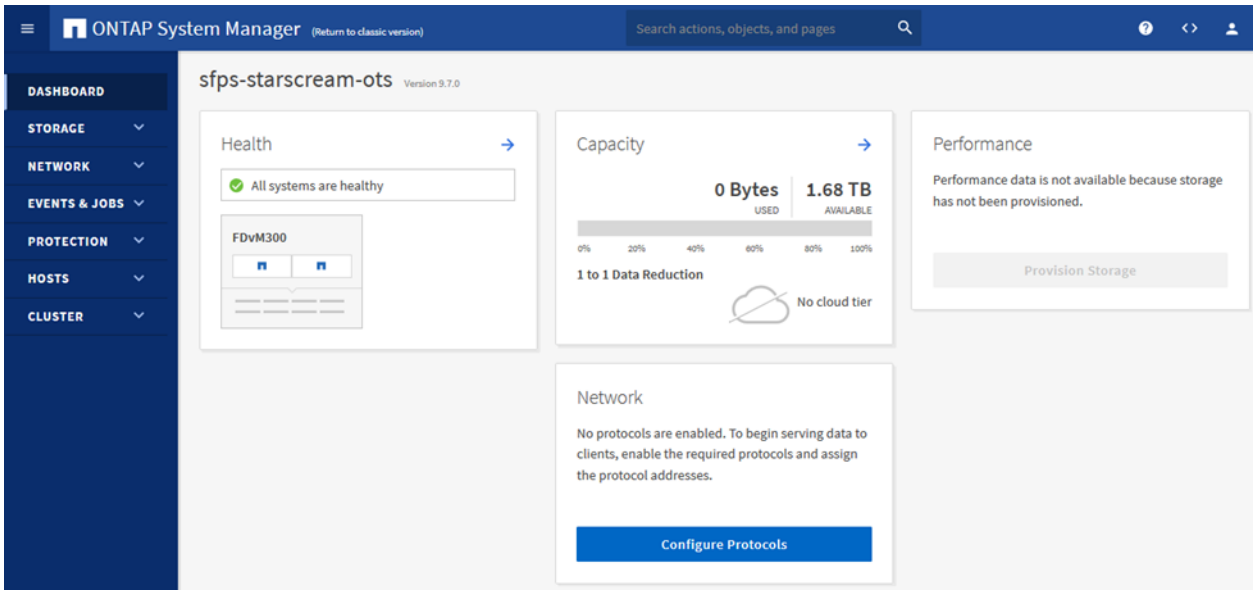
2. In this example, we are not using encryption on the storage tiers.

3. You are returned to the dashboard—the Capacity tile now reflects an available capacity. This created a storage aggregate from the virtual disks that belong to the ONTAP Select VM. The created aggregates can be viewed under Storage > Tiers.

3.3 Configure Network Protocol

To configure the network protocol, complete the following steps:

1. To access the allocated capacity, create and configure the SVM with the protocols that are required. Click Configure Protocols to create an SVM and configure its protocols.



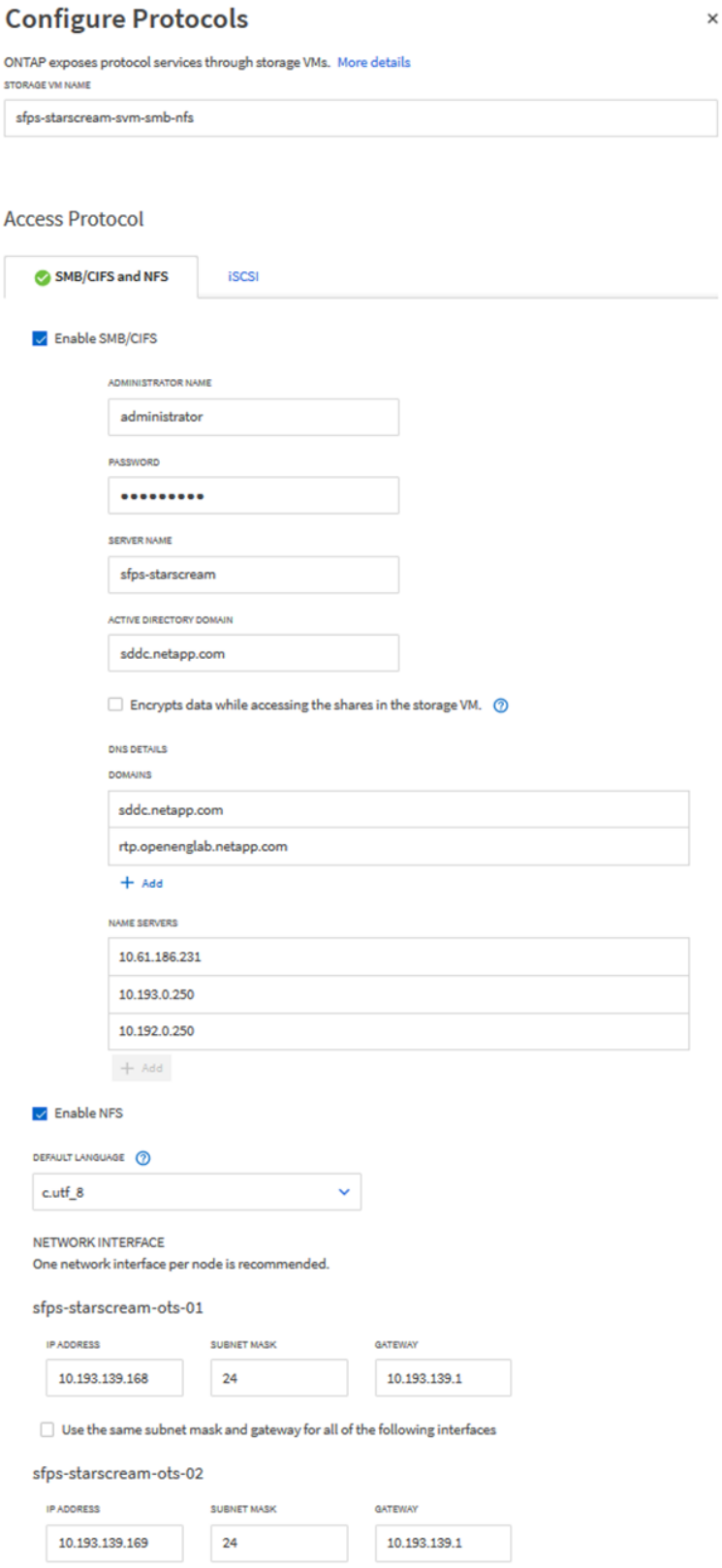
2. In the first field, specify an SVM name.

   There are two tabs: SMB/CIFS and NFS and iSCSI. Under the SMB/CIFS and NFS tab, there are options for SMB/CIFS and NFS. You can select one or both options to be served from this SVM and an IP address per ONTAP Select node specified to serve data over.

   To configure an SMB/CIFS share, you need the following information:

   - Active Directory Administrator name
   - Administrator password
   - Desired server name
   - Active Directory Domain

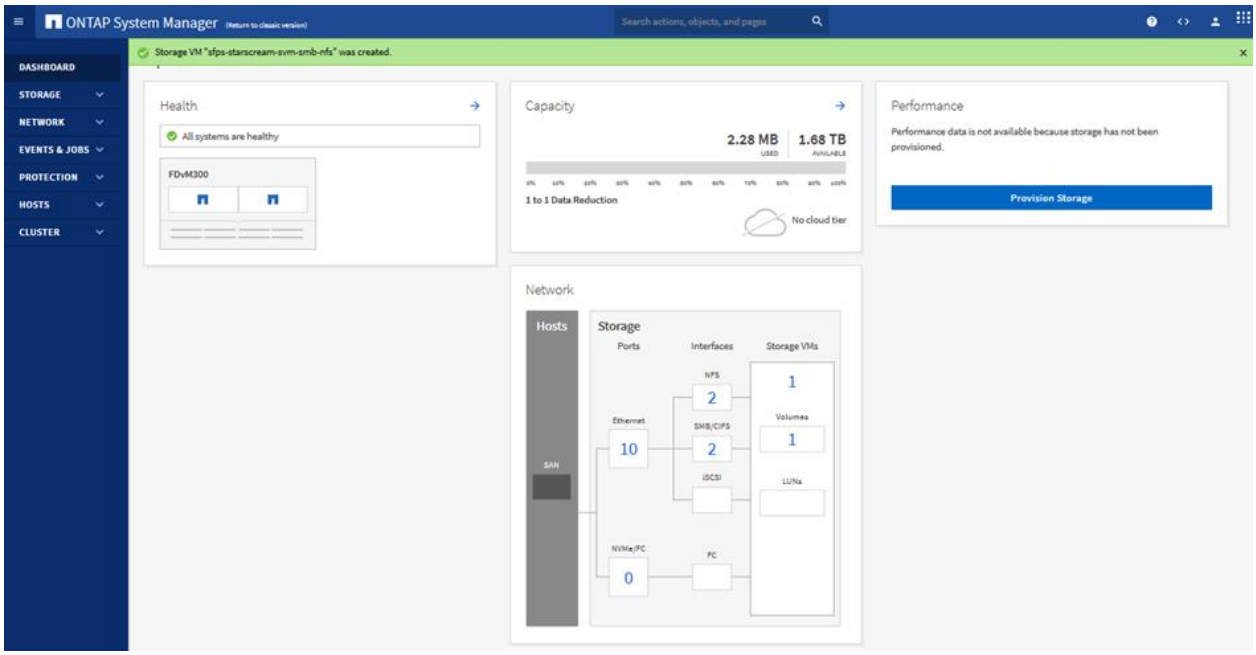
Note: If this will be using different DNS domains than the Select cluster was created in, the search domain and name servers are also required.



3.4 Provision Storage

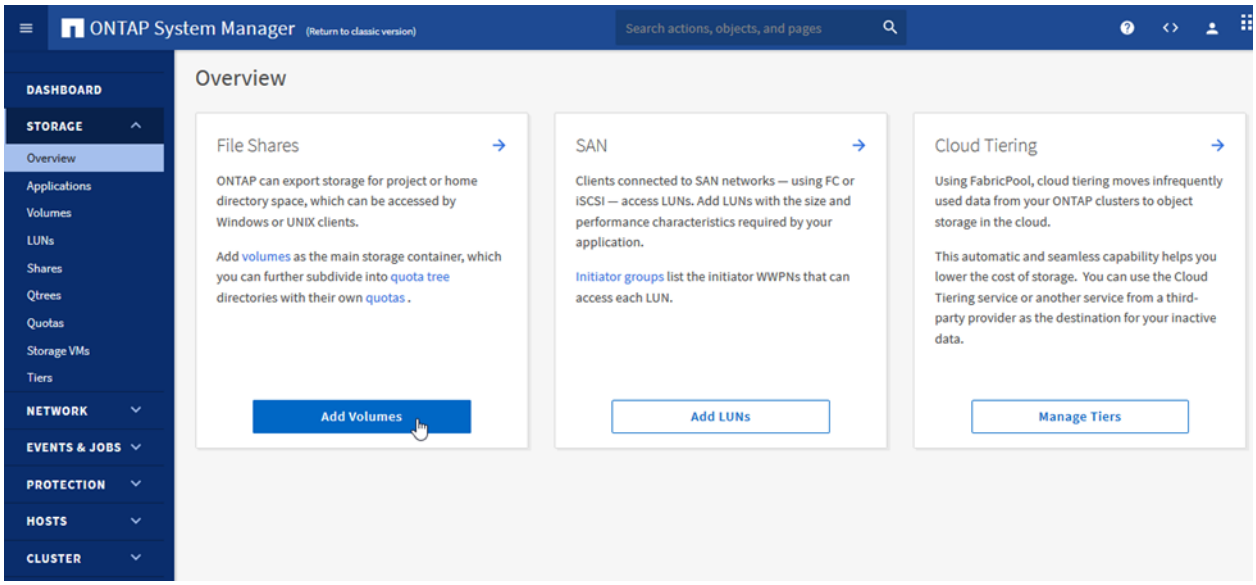
After the SVM and protocols are configured, you can provision a volume. To provision the storage, complete the following steps:

1. Select the Provision Storage option.

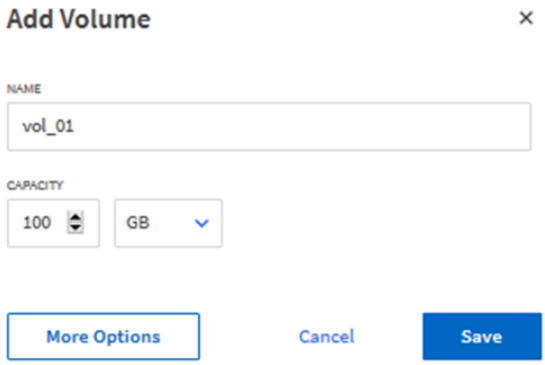


2. There are multiple options presented. In this example, we will only focus on CIFS/SMB and NFS NAS File Shares.

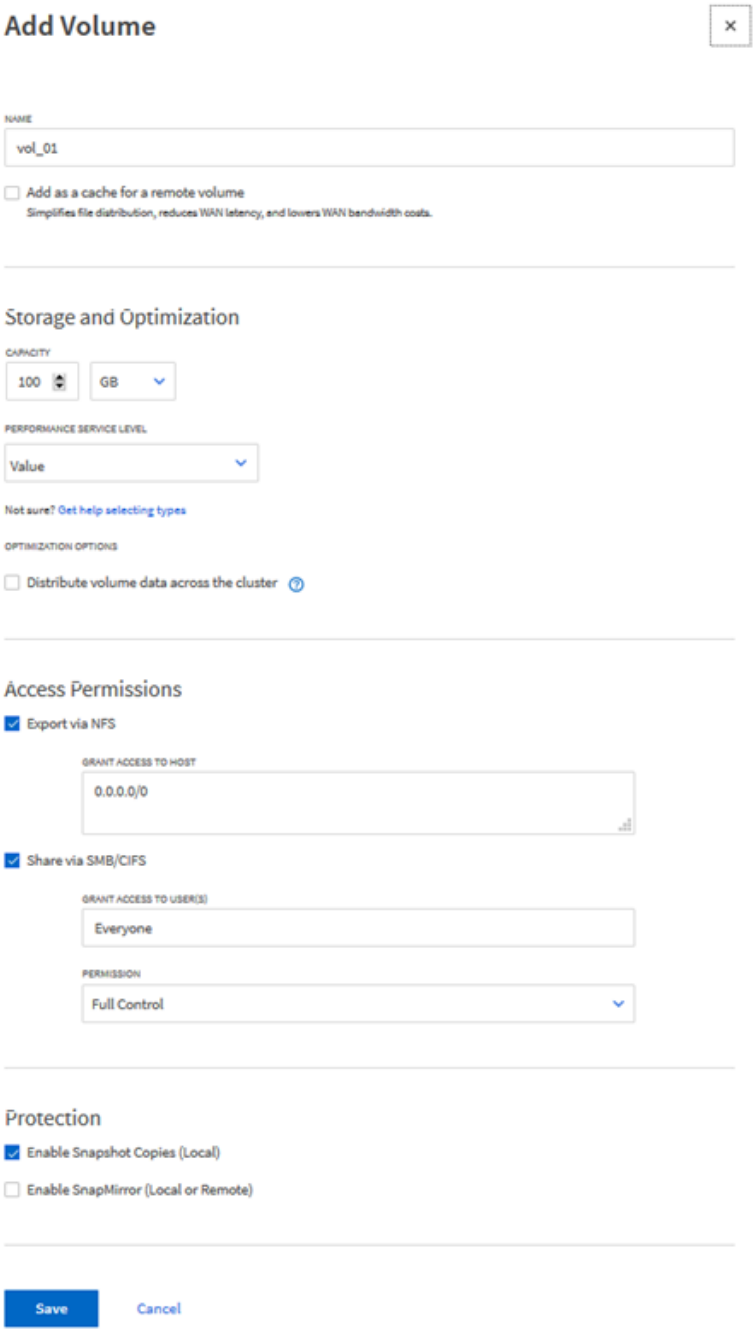
   Select Add Volumes.



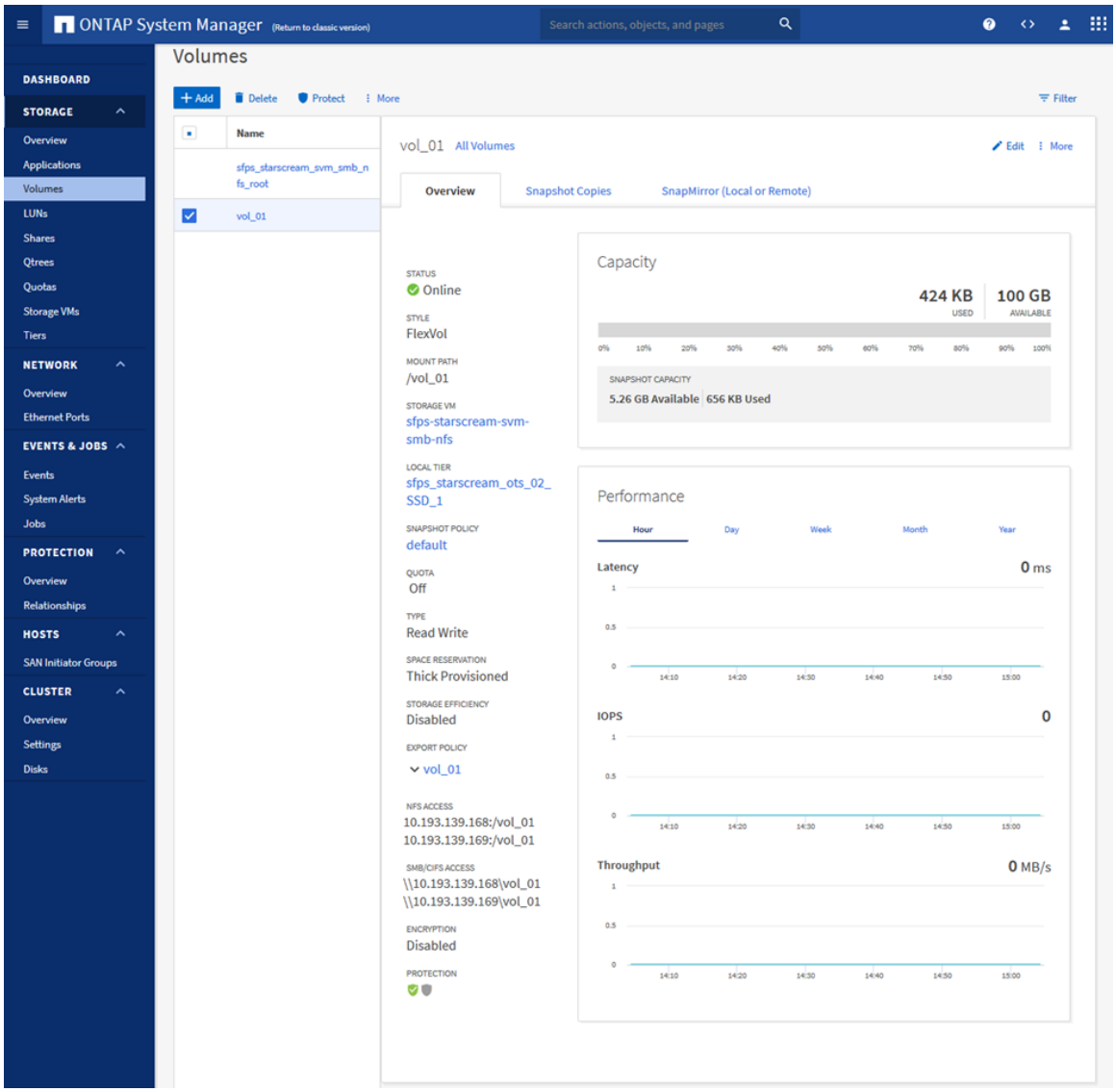
3. You can quickly create a volume by using the default options. This SVM was created with both NFS and CIFS/SMB access; therefore, this creates a volume with an NFS export and CIFS/SMB share—both with full control permissions for all users.



4. To make the following volume changes, click More Options:
   - Disable CIFS/SMB share
   - Disable NFS export
   - CIFS/SMB share access and permissions
   - NFS export access
   - Disable SnapShot copies
   - SnapMirror configuration
   - Distributed volume (FlexGroup volume)



5. System Manager displays the Volumes information page, displaying which volumes are present on the system. Selecting a volume displays additional details regarding the volume, including the NFS and SMB paths, if available.



3.5 Mount Storage

At this point, the volume is available to be mounted. Refer to Microsoft's documentation for the appropriate procedure for your Windows version to mount a CIFS/SMB share.

Linux distribution uses the `mount` command to connect to NFS exports, as seen in the example in Figure 21. To ensure that the Linux client reconnects to the export at start up, ensure that the `mount` command has been added to the `/etc/fstab` file. An example of this procedure can be found here. Refer to the documentation for your specific Linux distribution to ensure the proper mount options are being used.

Figure 5) Linux host.

```
root@sfps-grafana-dev:~# mkdir -p /mnt/iso
root@sfps-grafana-dev:~# mount -t nfs -o nfsvers=3,hard 10.193.140.40:/iso /mnt/iso
root@sfps-grafana-dev:~# ls /mnt/iso
testfile.txt
root@sfps-grafana-dev:~# echo "written in linux!" >> /mnt/iso/testfile.txt
root@sfps-grafana-dev:~# cat /mnt/iso/testfile.txt
written in windows!!written in linux!
```

For more information about securing your fire shares and more advanced configuration of ONTAP Select, visit the ONTAP Select Documentation Center.

4 Conclusion

NetApp HCI is the embodiment of an API-driven, scale-out, multiworkload platform for the next-generation data center. This combination enables several key capabilities, including:

- Making automation and orchestration first-class citizens in the data center
- Scaling the scarcest resources without overprovisioning the entire stack
- Driving true consolidation of workloads by pushing better system utilization
- Reducing go-forward capex and opex costs
- Integrating into the NetApp Data Fabric to leverage all NetApp products, increase data mobility, and reduce data silos

Where to Find Additional Information

To learn more about the information described in this document, refer to the following documents and/or websites:

- NetApp HCI Documentation Resources
  https://www.netapp.com/us/documentation/hci.aspx
- TR-4517: ONTAP Select on VMware Product Architecture and Best Practices
  https://www.netapp.com/us/media/tr-4517.pdf
- SMB/CIFS and NFS Multiprotocol Configuration Express Guide
  https://docs.netapp.com/ontap-9/topic/com.netapp.doc.exp-multp-cg/home.html
- ONTAP Select Documentation Center
  https://docs.netapp.com/us-en/ontap-select/

Version History

Version	Date	Document Version History
Version 1.0	March 2018	Initial release.
Version 1.1	November 2018	Update for ONTAP Select 9.4 and NetApp HCI 1.4
Version 1.2	July 2019	Update for ONTAP Select 9.5 and NetApp HCI 1.6
Version 1.3	May 2020	Update for ONTAP Select 9.7 and NetApp HCI 1.7

Refer to the Interoperability Matrix Tool (IMT) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

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