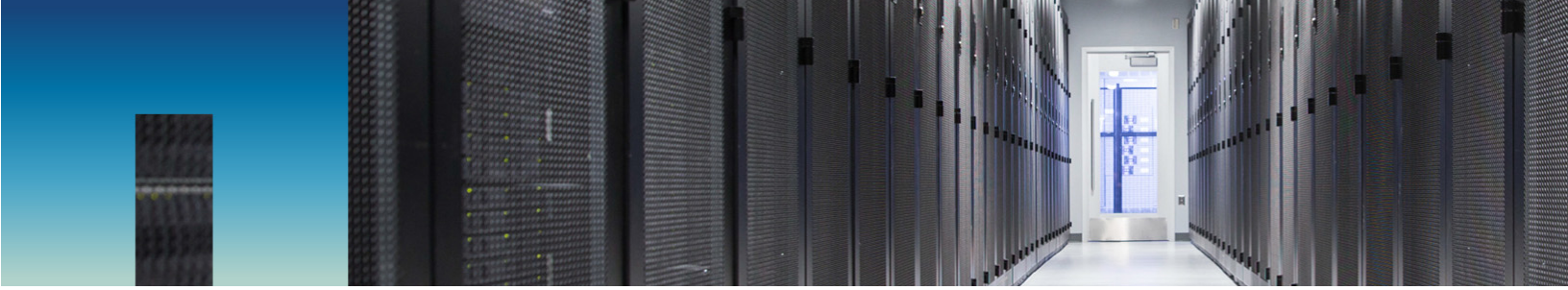

Technical Report

NetApp HCI File Services Powered by ONTAP Select

Quick Start Guide

Aaron Patten, NetApp
November 2018 | TR-4669

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 execute postinstallation tasks to configure an ONTAP Select instance for NetApp HCI.

Detailed information about the advanced configuration of the ONTAP Select appliance can be found in the ONTAP Select 9 Installation and Cluster Deployment Guide and the ONTAP Select Product Architecture and Best Practices documents.

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1 Introduction

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

This document describes the postinstallation configuration steps you must execute after ONTAP Select has been deployed by the NetApp Deployment Engine (NDE). 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 gives administrators 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, 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 is 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 functionality includes:

- NFS, CIFS, and iSCSI
- NetApp SnapMirror® and SnapVault® software
- NetApp FlexClone® technology
- NetApp SnapRestore® technology

- NetApp Volume Encryption (NVE)
- NetApp SnapLock® Enterprise
- FabricPool
- NetApp MetroCluster™ SDS (formerly ONTAP Select two-node stretched cluster)

Support for the NetApp OnCommand® management suite is also 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.

For a complete list of supported management applications, consult the Interoperability Matrix Tool on the NetApp Support site.

The following ONTAP features are not supported by ONTAP Select in NetApp HCI:

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

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. ONTAP Select, as deployed by NDE, is not positioned as a primary storage platform for virtual machines hosted on NetApp HCI.

1.4 ONTAP Select as Deployed by the NetApp Deployment Engine

When you select the option to install file services powered by ONTAP, the following are prerequisites:

- Installation of ONTAP Select 9.3 or later
- A valid capacity license; evaluation licenses are not supported
- Provisioning of at least two NetApp SolidFire® volumes
  - One 537GB volume for the ONTAP Select VM root file system
  - One 3.1TB volume for every 2TB of licensed capacity for data storage (Figure 1 shows an 8TB configuration.)

Figure 1) Volumes for ONTAP Select.

Name	Account	Access Groups	Access	Used	Size
NetApp-HCI-Select-Data-04	NetApp-HCI	NetApp-HCI	Read / Write	0.00%	3.1 TB
NetApp-HCI-Select-Data-03	NetApp-HCI	NetApp-HCI	Read / Write	0.00%	3.1 TB
NetApp-HCI-Select-Data-02	NetApp-HCI	NetApp-HCI	Read / Write	0.00%	3.1 TB
NetApp-HCI-Select-Data-01	NetApp-HCI	NetApp-HCI	Read / Write	0.00%	3.1 TB
NetApp-HCI-Select-Install	NetApp-HCI	NetApp-HCI	Read / Write	2.53%	536.9 GB

By default, the quality of service (QoS) for all ONTAP Select volumes is set to the default 50/15000; that is, 15000 for minimum, maximum and burst IOPS respectively. For higher performance file shares, these values might need to be increased.

The following restrictions are in place for OTS deployments through NDE:

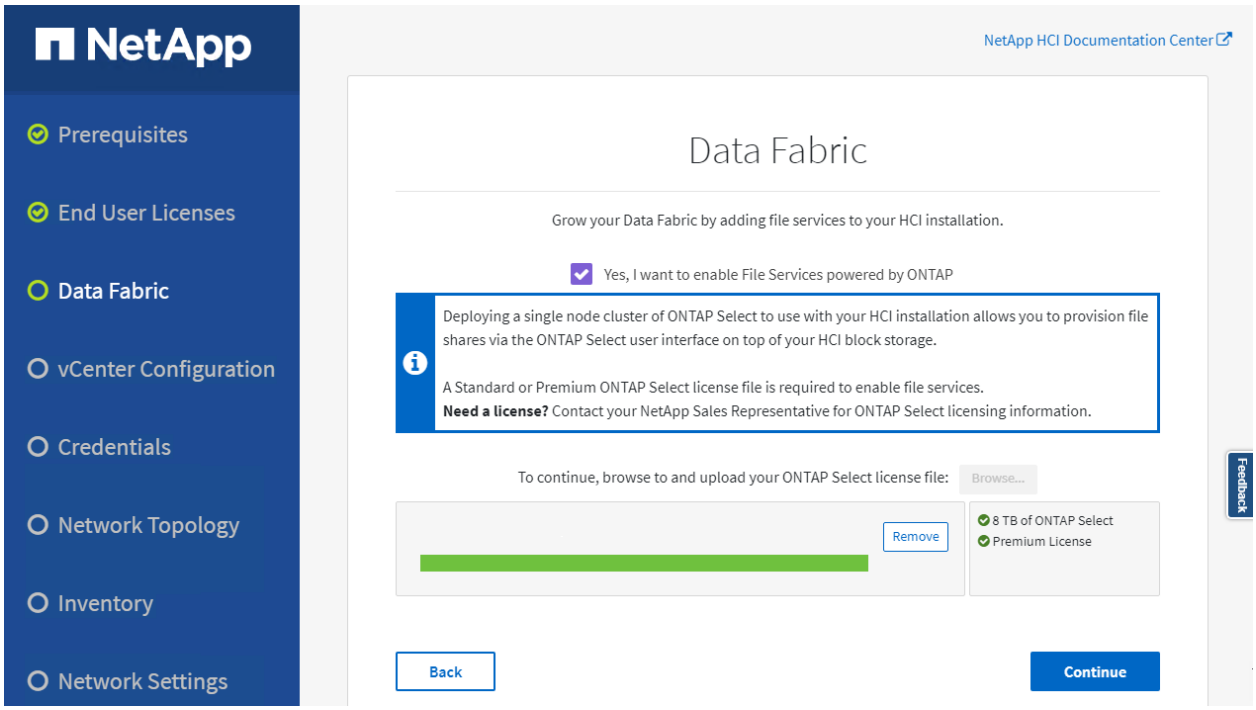
- The iSCSI protocol license is removed
- 8TB is the maximum license capacity
- Single-node deployments only – no ONTAP Select HA

For full-featured, multimode deployments with more than 8TB of capacity, ONTAP Select should be deployed through the Select Deploy appliance instead of through NDE. See the ONTAP Select 9.4 Installation and Cluster Deployment Guide for VMware on the NetApp ONTAP Select Resources page: https://www.netapp.com/us/documentation/ontap-select.aspx.

2 Installing File Services Powered by ONTAP

File Services powered by ONTAP is an optional component in NDE. To enable it, select the “Yes, I want to enable File Services powered by ONTAP” option in the Data Fabric section of the NDE. Selecting this option deploys a single, non-HA, ONTAP Select VM.

Figure 2) NDE Data Fabric.



Note: If a highly available ONTAP Select deployment is desired, the ONTAP Select Deploy appliance must be used to deploy ONTAP Select instead of NDE. Refer to the ONTAP Select 9 Installation and Cluster Deployment Guide for VMware for more information.

When you enable file services, you are required to provide a valid capacity license file before continuing. The NDE handles provisioning of the ONTAP Select VM by automating the following tasks:

- Installation of a single ONTAP Select appliance
- Application of the license file
- Application of the node and cluster management IPs
- Provision capacity to the ONTAP Select VM for file services

After the system is deployed, the ONTAP Select VM requires execution of some postconfiguration tasks.

3 Configuring ONTAP Select

You might need to execute several postconfiguration tasks to provide file services from the ONTAP Select VM. These tasks include:

- Modifying the network adapter configuration, if required
- Creating one or more aggregates
- Creating one or more storage virtual machines (SVMs)
- Configuring desired file services (NFS, SMB, and so on)

- (Optional) Configuring other services, such as SnapMirror

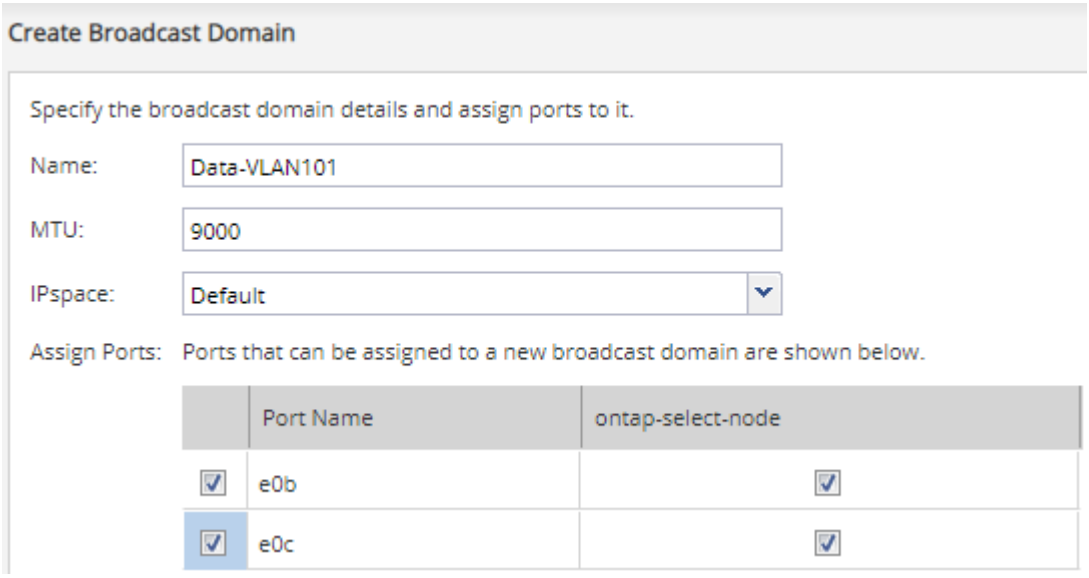
3.1 Deploy a Network

The ONTAP Select appliance is deployed with three network adapters. By default, all three network adapters for the Select VM are connected to the HCI_Internal_OTS_Network port. NetApp recommends moving network adapters 2 and 3 to a port group backed by 10Gb interfaces. This new port group might have to be created, depending on your desired configuration.

Figure 3) Select port groups.

When viewing the adapters through OnCommand System Manager, all network adapters are bound to the default IPspace and broadcast domain. Before making any further configuration changes, you should move ports e0b and e0c to a dedicated broadcast domain for serving data.

Figure 4) Broadcast domains.



If you're using a 10Gb network for data connections to ONTAP Select, you might also need to change the ethernet port speed and MTU to match the target network configuration.

Figure 5) Port details.

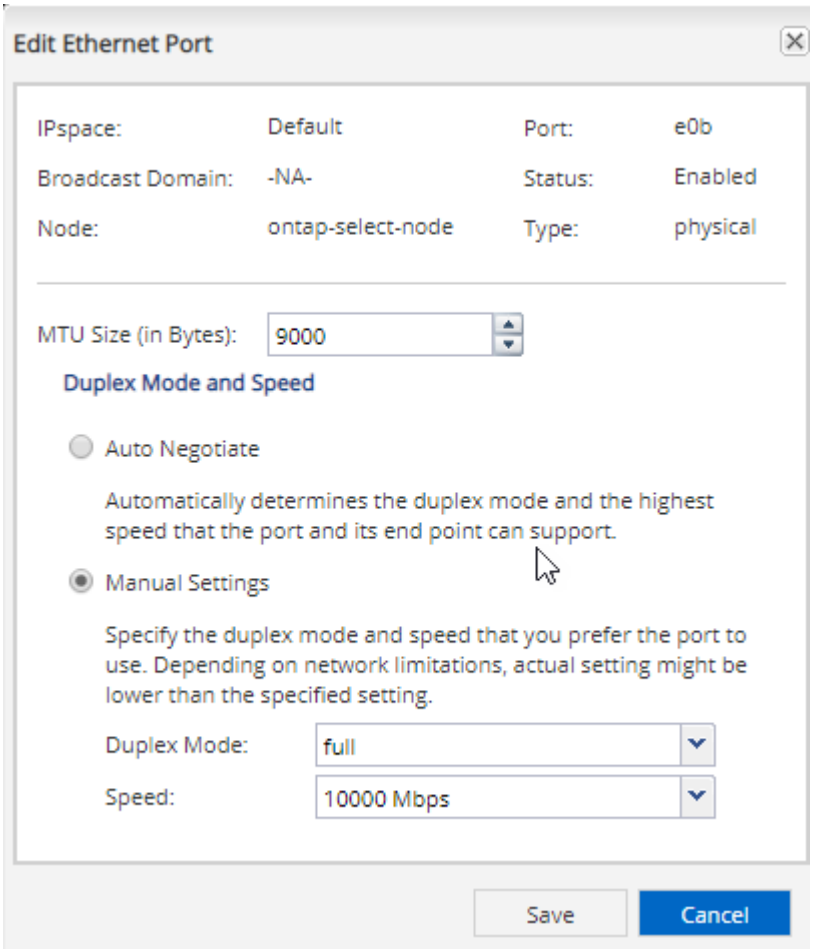
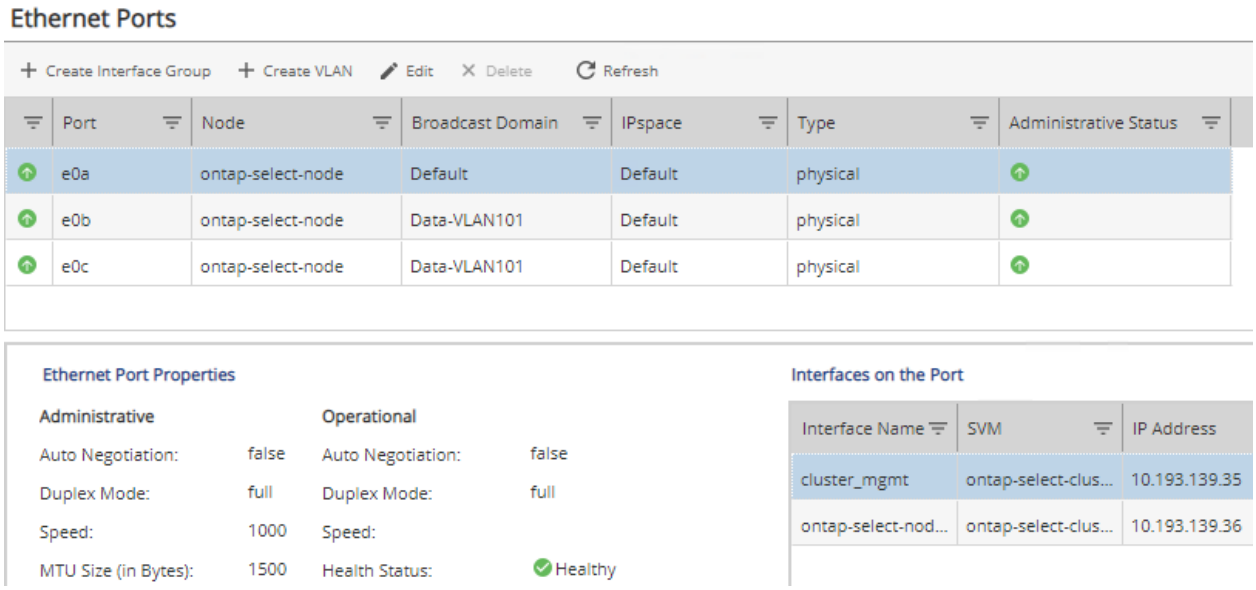
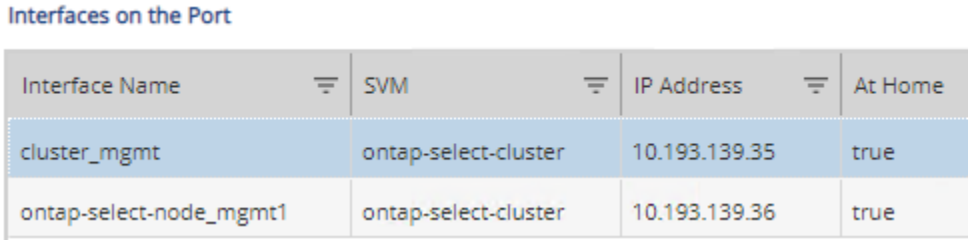


Figure 6) Ethernet ports.



The cluster and node management interfaces are defined on port e0a. Ports e0b and e0c are available for hosting data LIFs for customer traffic.

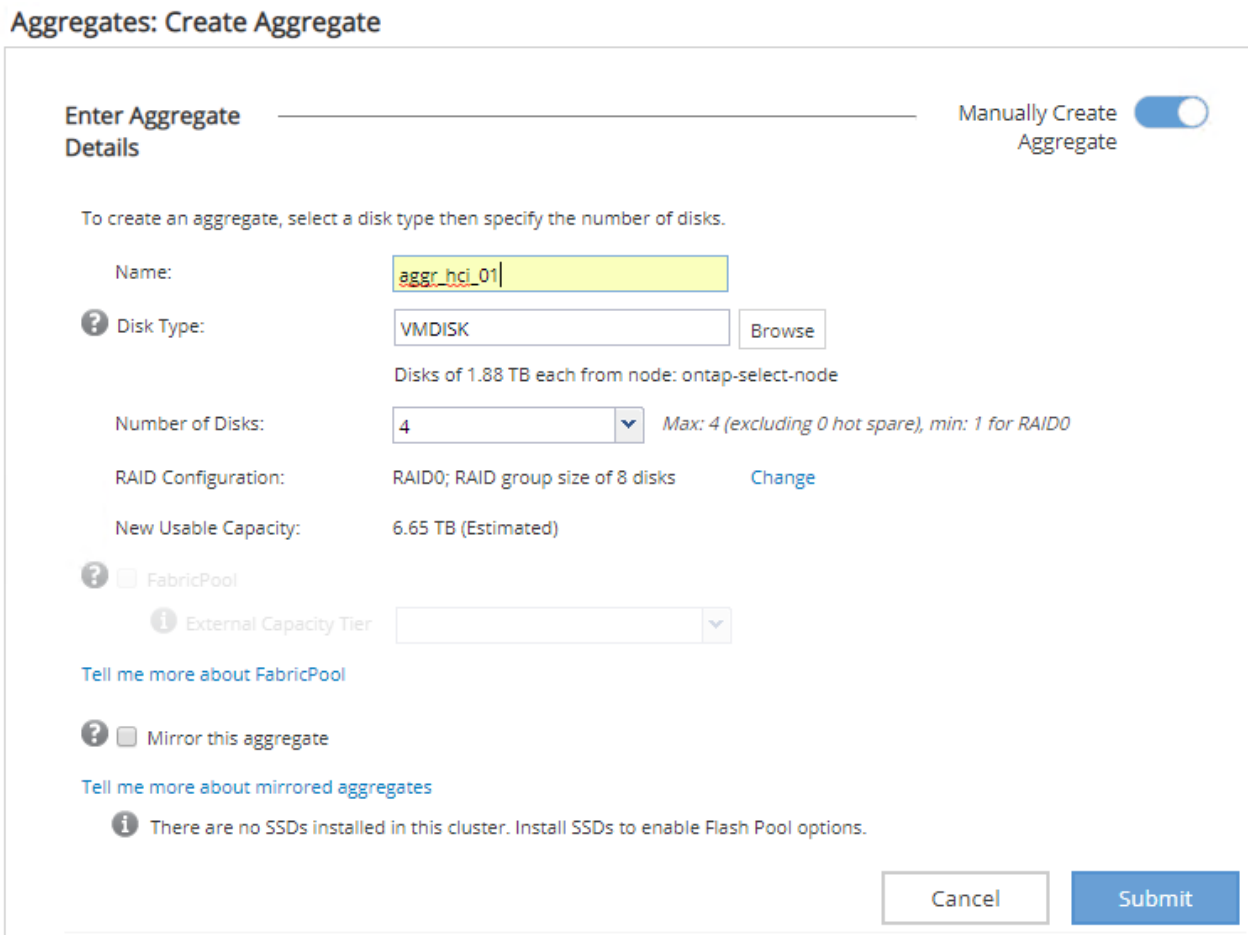
Figure 7) Select management interfaces.



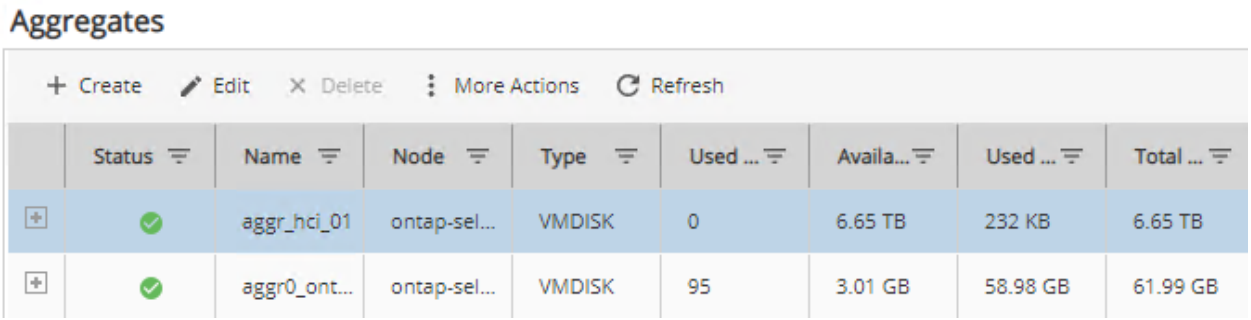
3.2 Create and Configure an Aggregate

You must create an aggregate from the available VMDISK objects before an SVM can be configured for file exports.

1. In OnCommand System Manager under Storage > Aggregates and Disks > Aggregates, add all the available VMDISKs to a new aggregate.



2. After creating the aggregate, you should verify that the size and available capacity were set up correctly.



4 Creating a Multiprotocol File Share

ONTAP Select supports creating multiprotocol file shares that can serve data over both NFS and SMB simultaneously. This section describes how to quickly create a share that is accessible over NFS and SMB with the following assumptions:

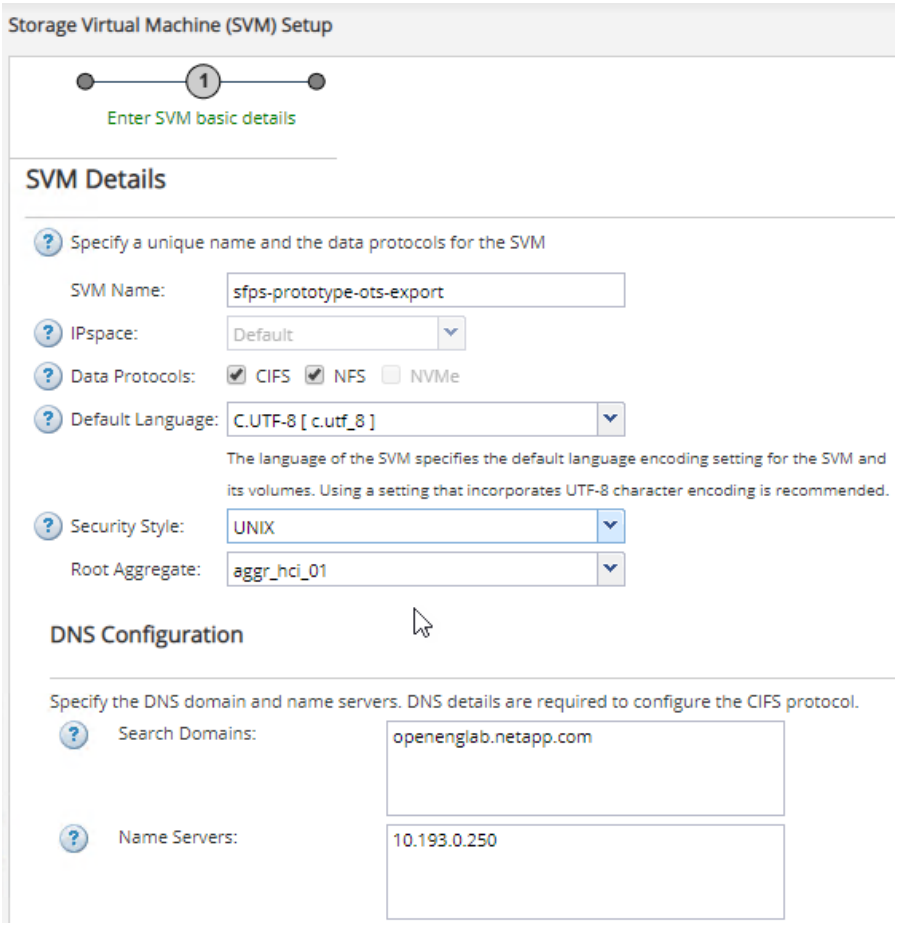
- NFS access will be through NFSv3, not NFSv4 or NFSv4.1.
- You want to implement best practices without reading all the relevant product documentation.

- You want to use OnCommand System Manager, not the ONTAP command-line interface or an automated scripting tool.
- You want to manage ONTAP Select through System Manager
- Your data network uses the default IPspace, the default broadcast domain, and the default failover group.
- If your data network is flat, using these default objects ensures that LIFs will fail over correctly in the event of a link failure. If you are not using the default objects, refer to the Network Management Guide for information about how to configure LIF path failover.
- LDAP, if used, is provided by Active Directory.

For complete details and restrictions, refer to the SMB/CIFS and NFS Multiprotocol Configuration Express Guide.

4.1 Create a Storage Virtual Machine

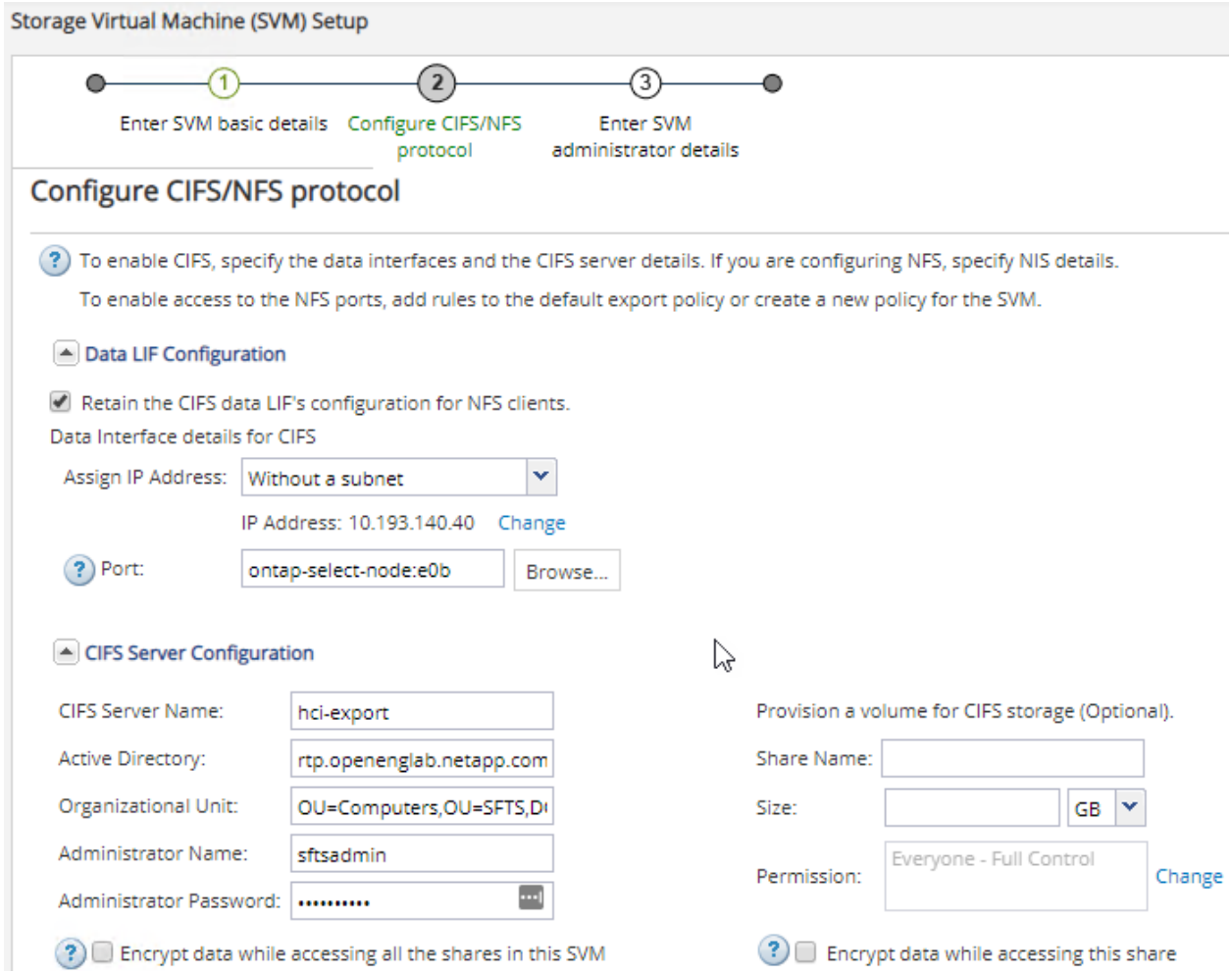
1. You must create a storage virtual machine (SVM) to facilitate file shares. To create an SVM, navigate to Storage > SVMs and select Create.
2. In SVM details, specify the name of the SVM, data protocols to use, security style, root aggregate, and DNS information. Retain the default settings of the other fields and click Next. Select UNIX for the security style.



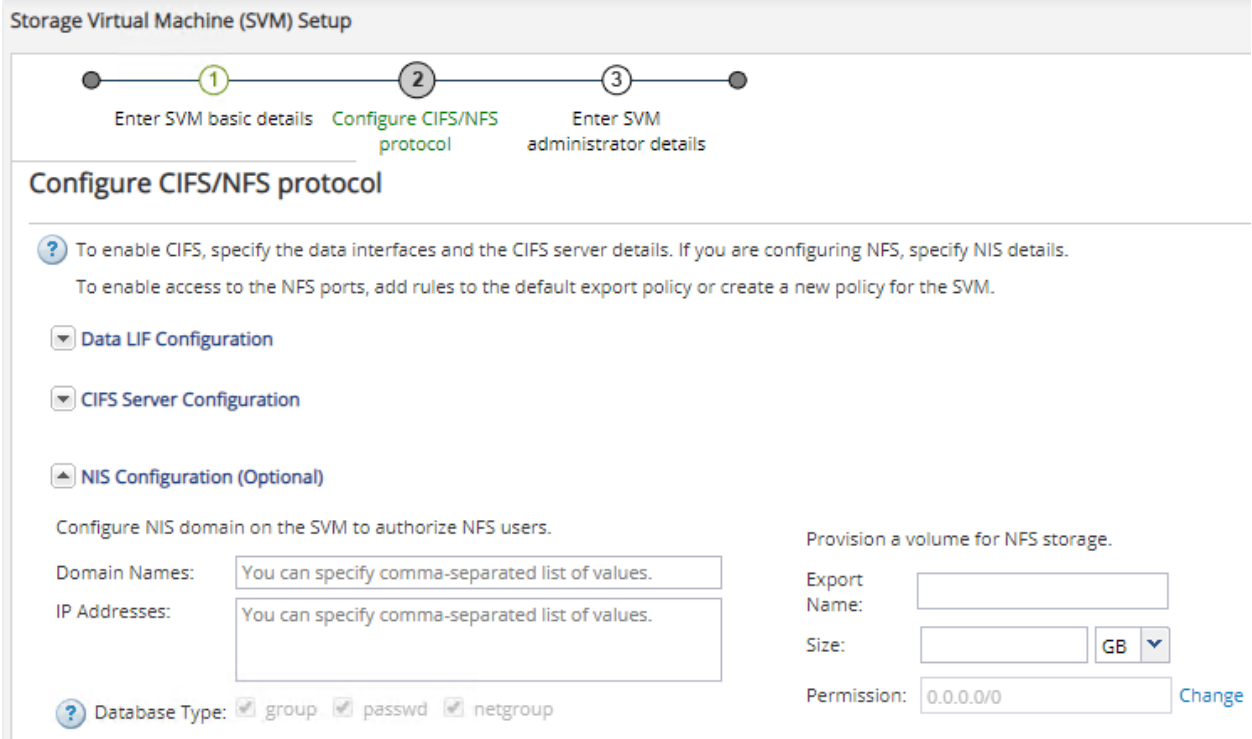
3. In the Configure CIFS/NFS protocol window, assign an IP address and either the e0b or e0c port for the export to be served from. Also provide the information required to join Active Directory.

Note: The CIFS Server Name should reflect the DNS name that you want clients to browse to on the network for CIFS shares. You must create a DNS host record for this entry if it does not already exist.

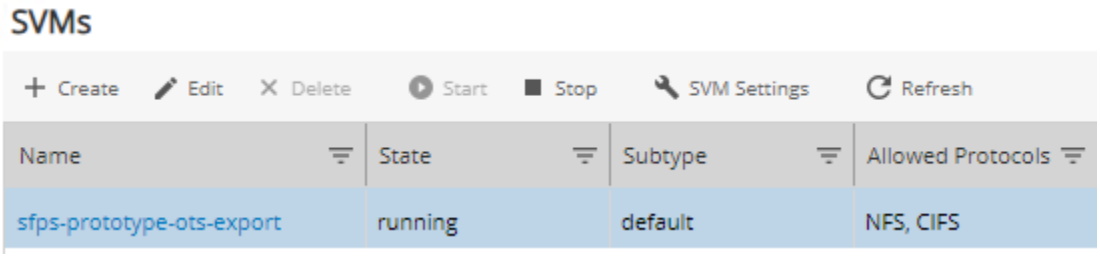
4. Do not enter any information in the Provision a Volume for CIFS Storage (Optional) area. This would provision a volume only for CIFS access, not for multiprotocol access.



5. If your environment uses NIS, expand the NIS Configuration (Optional) area and enter the details for NIS configuration. Do not enter any information in the Provision a Volume for NFS Storage area. This would provision a volume only for NFS access, not for multiprotocol access.
6. When all the data has been entered, click the Submit and Continue button to continue the wizard.



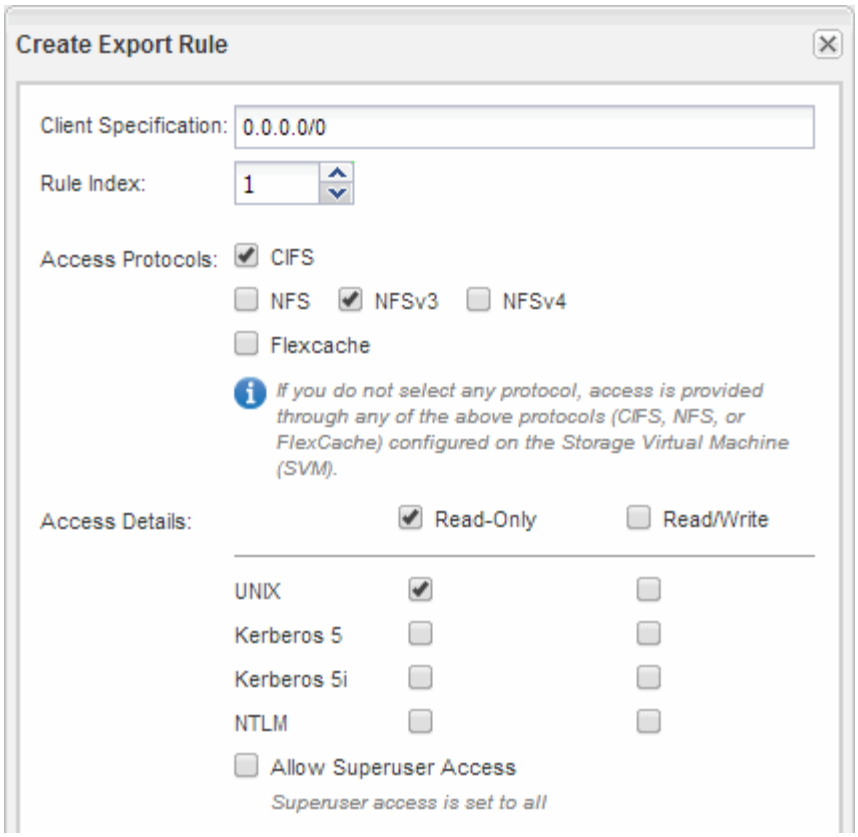
7. When the SVM Administration page is displayed, you can either configure or defer configuring a separate administrator for this SVM. On the summary page, click OK to finish the wizard. The SVM is now set up.



Add a Rule to the Export Policy

You must add a rule to the default export policy to allow all clients access through NFSv3. Without such a rule, all NFS clients are denied access to the storage virtual machine and its volumes. You should specify all NFS access as the default export policy, and later restrict access to individual volumes by creating custom export policies for individual volumes.

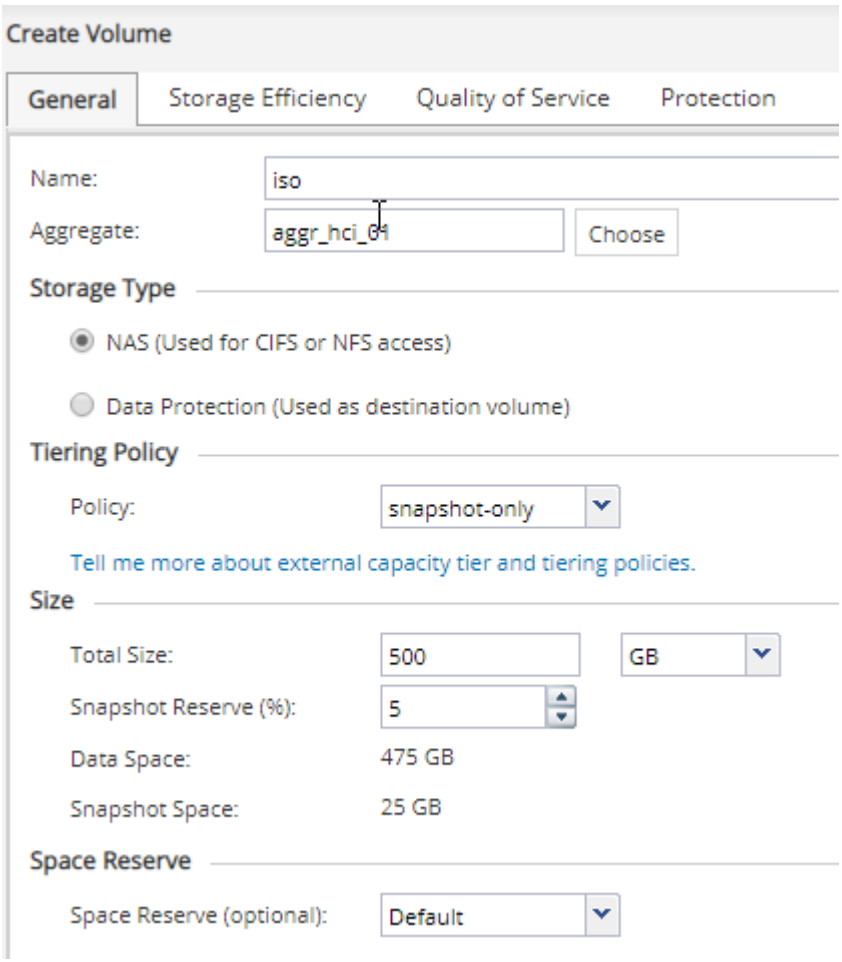
1. Open the SVM settings and navigate to Export Policies. Highlight the default export policy, select Add a Policy, then input the details shown in the following screenshot.



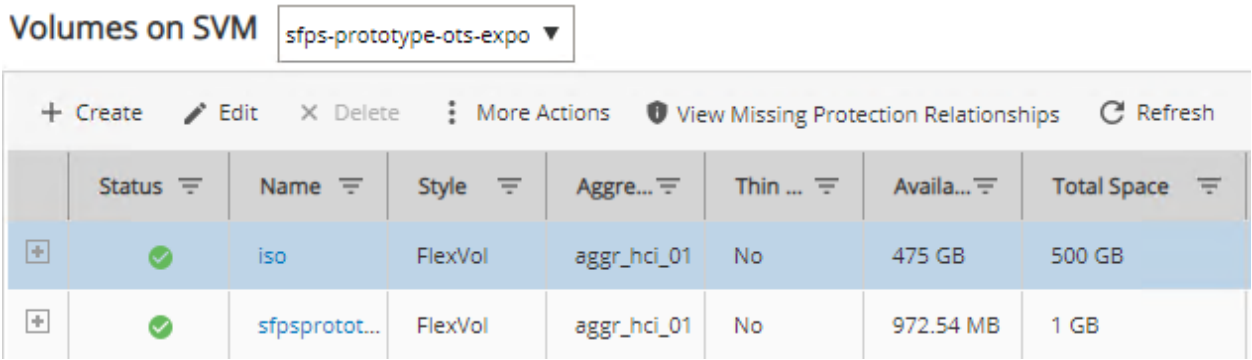
Create a FlexVol Volume

You must now create a FlexVol® volume to contain your data. Navigate to the Volumes window, click Create, and select Create FlexVol.

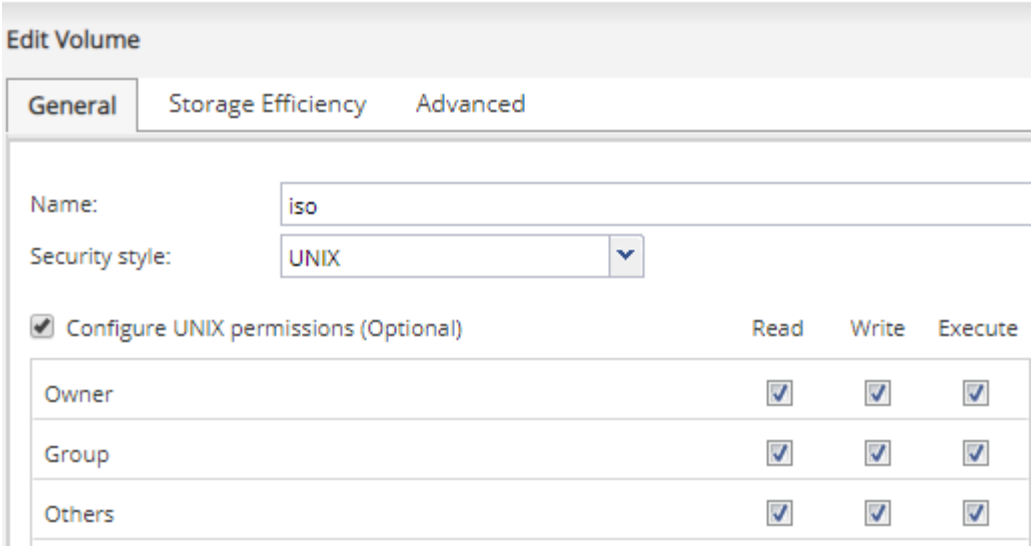
1. In the Create Volume window, give the volume a meaningful name, select the aggregate that you created earlier, and set the appropriate size and space reservations.



2. The volume should now be listed under the SVM.



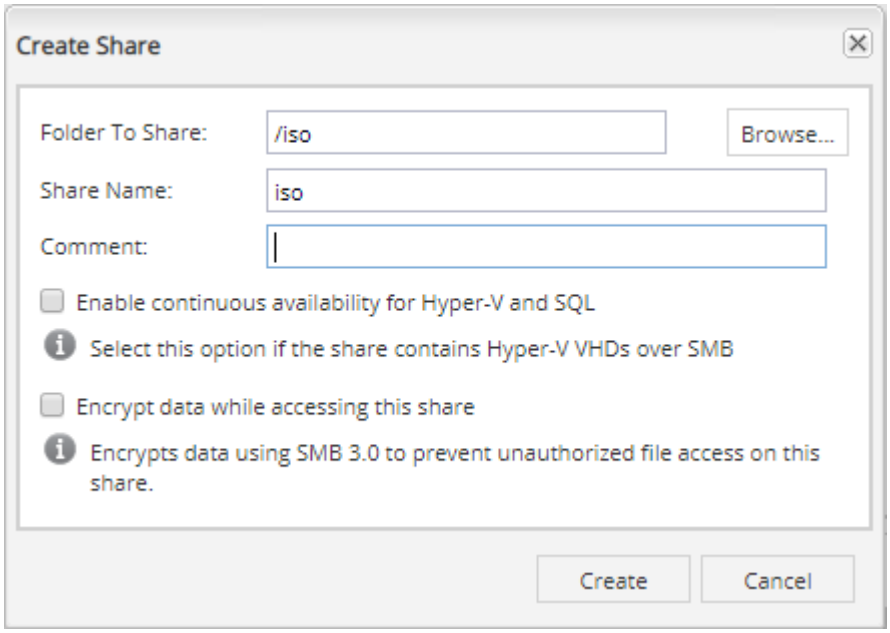
3. You can now edit the volume and change the security style to UNIX. For wide-open volume permissions for all UNIX user types, select all the boxes. Otherwise make selections that are appropriate for your environment. You can use export policies to limit access to the exports.



Create a Share

Before Windows users can access a volume, you must create a CIFS share on the volume.

1. In the Shares window, select Create Share. Specify the folder to share and the share name, then click Create.

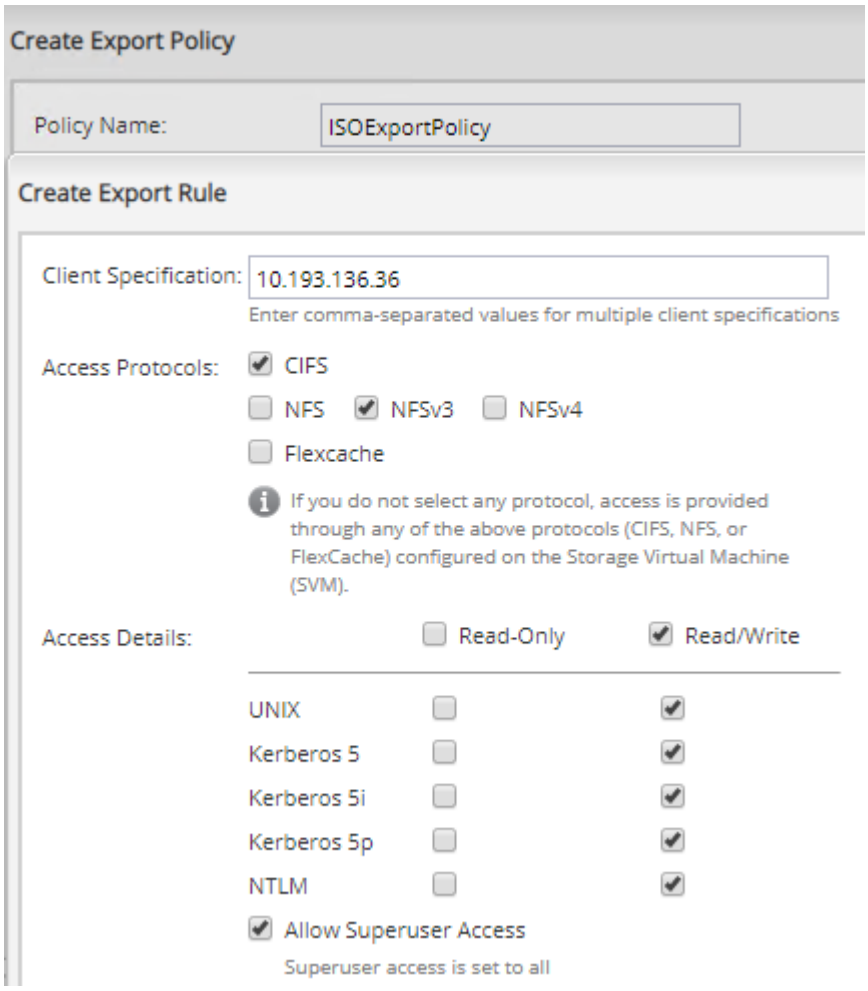


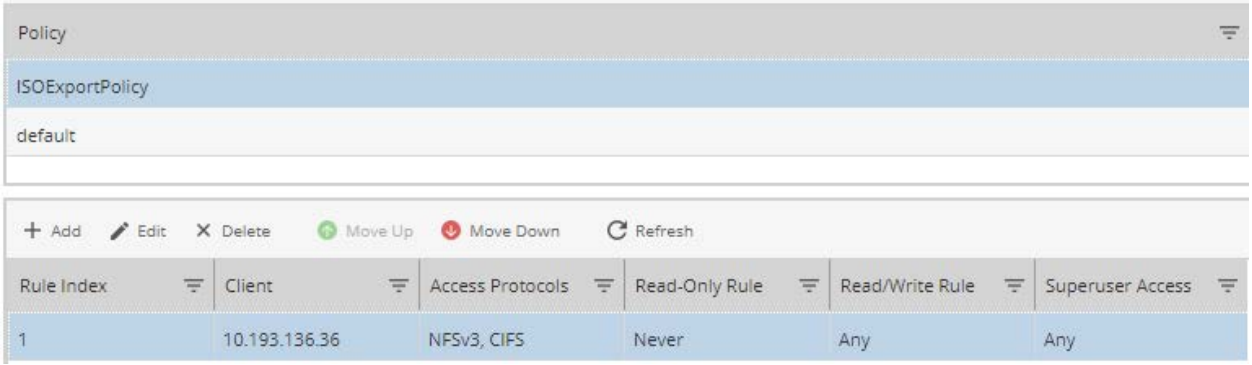
Create an Export Policy

Before NFS clients can access a volume, you must create an export policy for the volume. Add a rule that permits access by an administration host, and then apply the new export policy to the volume.

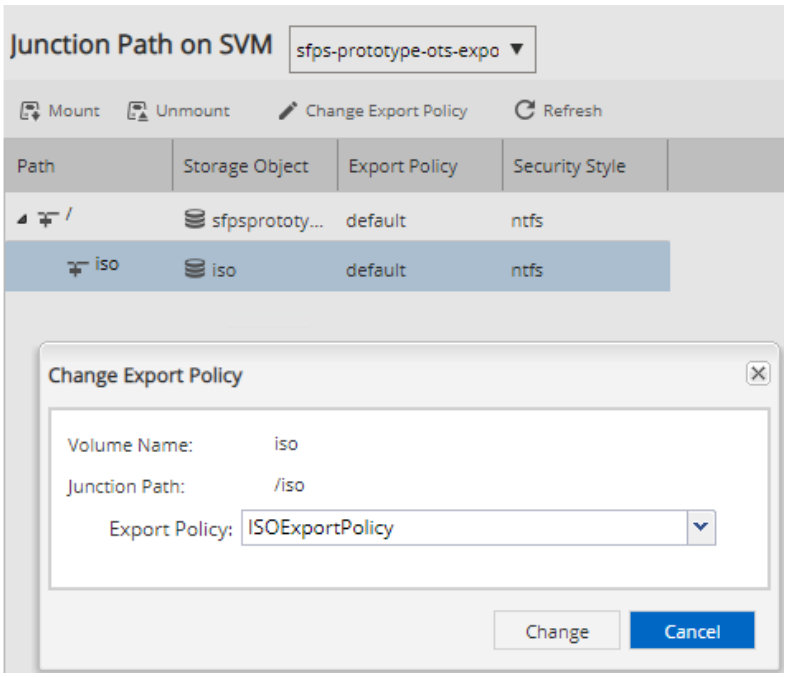
1. In the SVM window, open the SVM settings and select Export Policies. Create a new policy and then under Export Rules click Add to add a new rule to the policy.

2. In the Create Export Rule dialog box, create a rule that allows an administrator full access to the export through all protocols so that the export can be tested before allowing all clients to access it. Select CIFS and NFSv3, enable all Read/Write checkboxes, and select Allow Superuser Access.

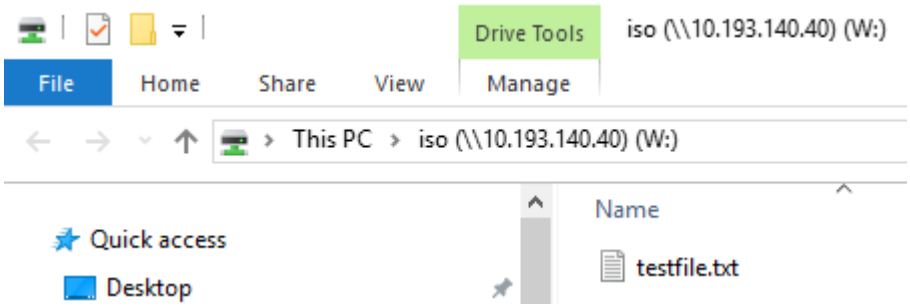




3. Now apply the export policy to the new volume. Navigate to the Junction Path on SVM window, highlight the volume, and click Change Export Policy.



4. The new share should now be available and browsable. To access it, go to \\<servername>\iso on a Windows host or mount <servername>:/<sharepath>.




```
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, go to the ONTAP 9 Documentation Center.

5 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 capex and opex costs going forward
- 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 Resources
  https://mysupport.netapp.com/netapphci/resources
- ONTAP Select Product Architecture and Best Practices
  https://fieldportal.netapp.com/content/454270
- SMB/CIFS and NFS Multiprotocol Configuration Express Guide
  https://library.netapp.com/ecm/ecm_download_file/ECMLP2495163
- ONTAP Select 9 Installation and Cluster Deployment Guide
  https://library.netapp.com/ecm/ecm_download_file/ECMLP2847383

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

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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