



Module 3

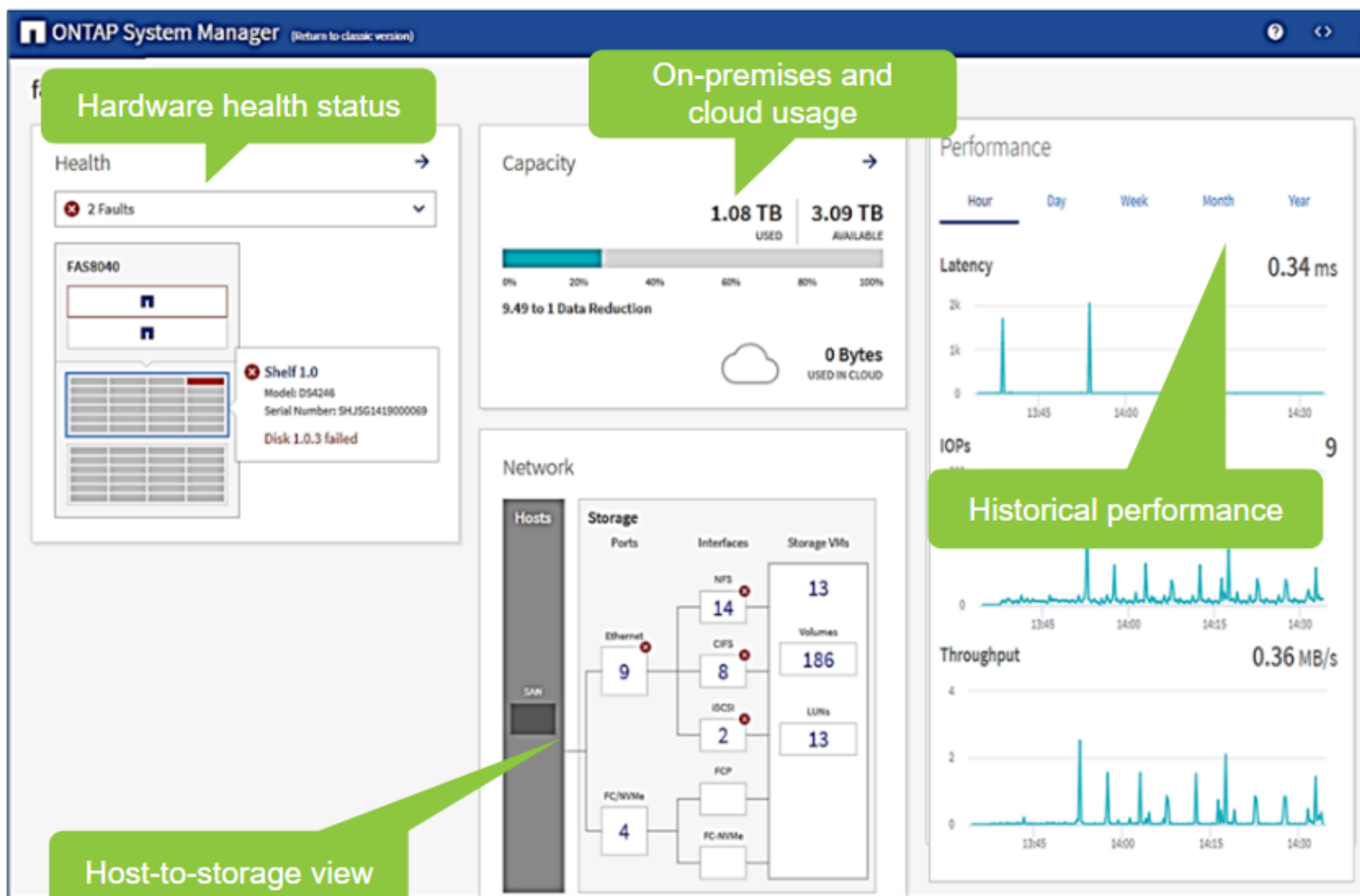
ONTAP 9.7 Software and Manageability

Software Enhancements



ONTAP System Manager and Active IQ Unified Manager Enhancements

NetApp ONTAP System Manager 9.7 Dashboard: New UI

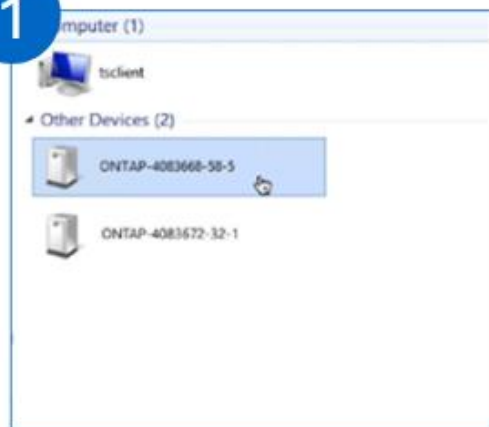


- Hardware health visualization
- Host to storage visualization
- Comprehensive on-premises and in-cloud capacity reporting
- Granular view of performance graphs for different time periods

ONTAP System Manager 9.7: Cluster Setup

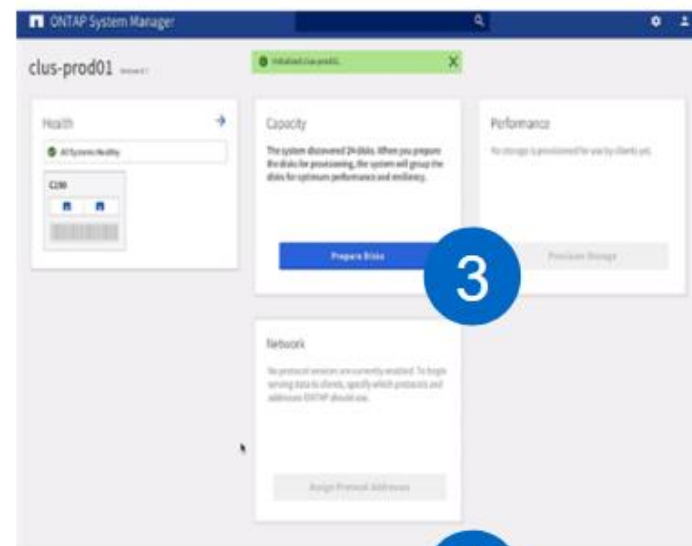
Even faster and simpler than previous versions

1



2

License keys
autoloaded



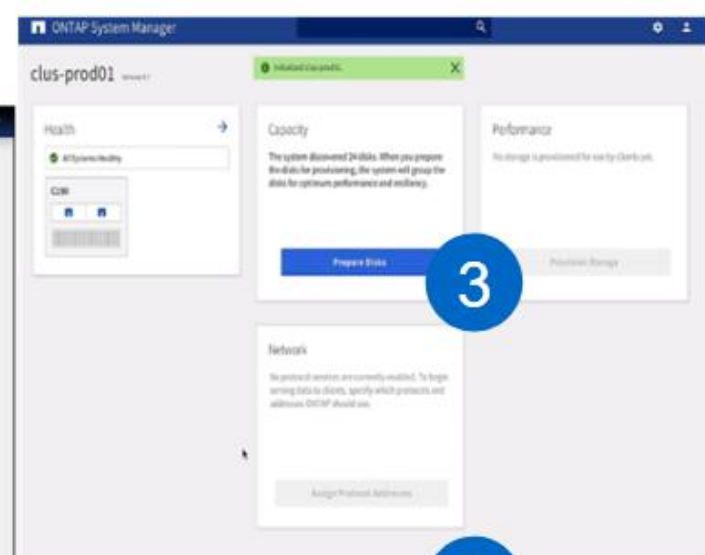
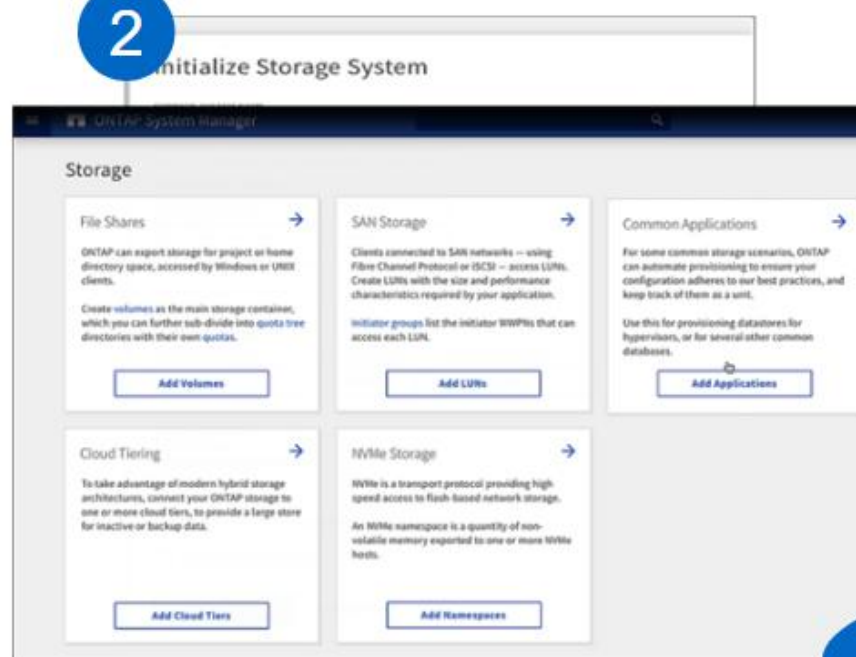
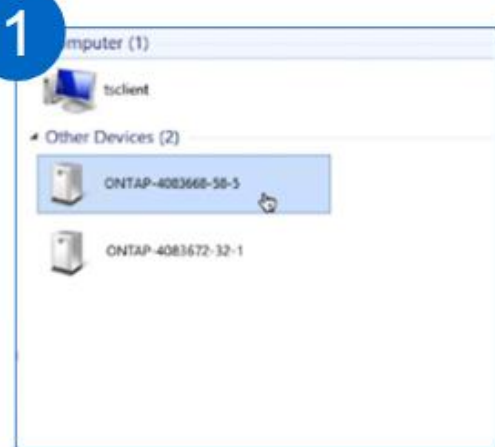
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ONTAP System Manager 9.7: Cluster Setup

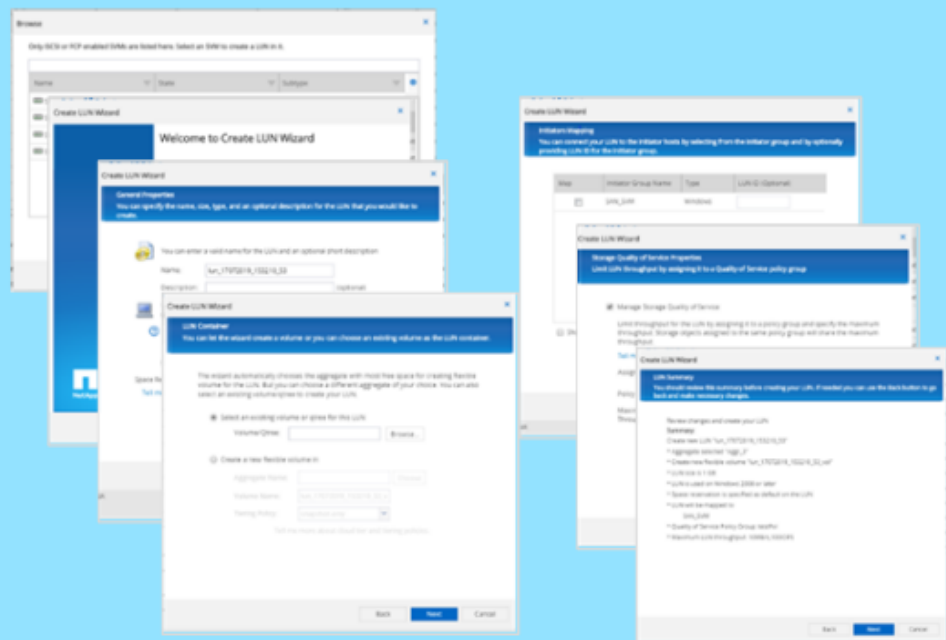
Even faster and simpler than previous versions



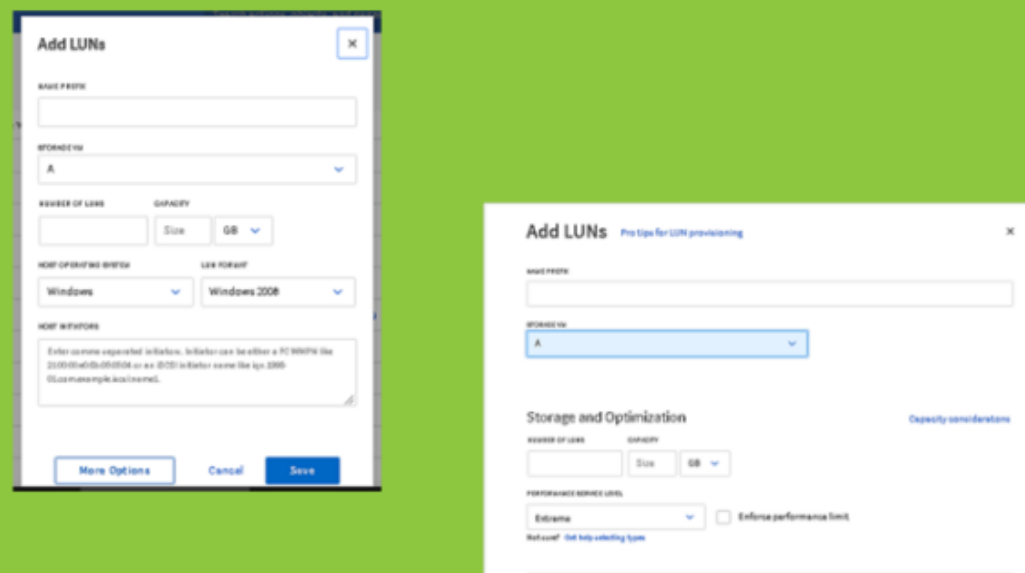
Simple guided cluster setup, storage provisioning, and host mapping

ONTAP System Manager 9.7: SAN Storage Provisioning

Classic UI: seven windows and many options

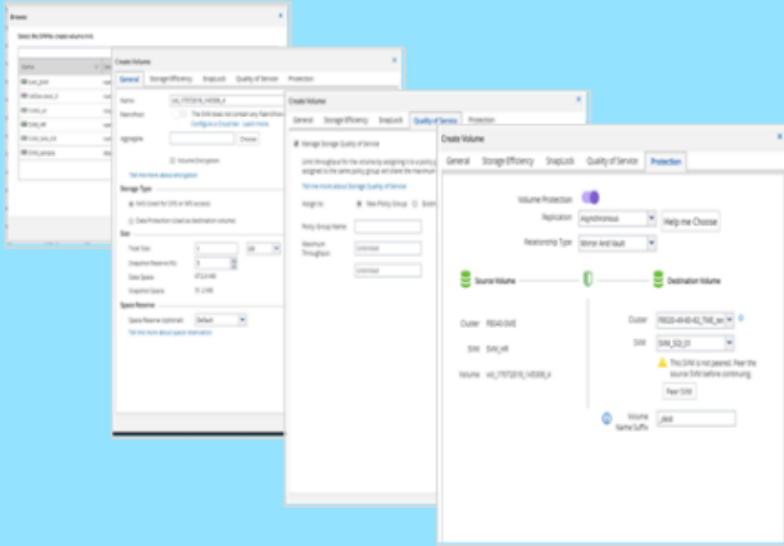


New UI: one window

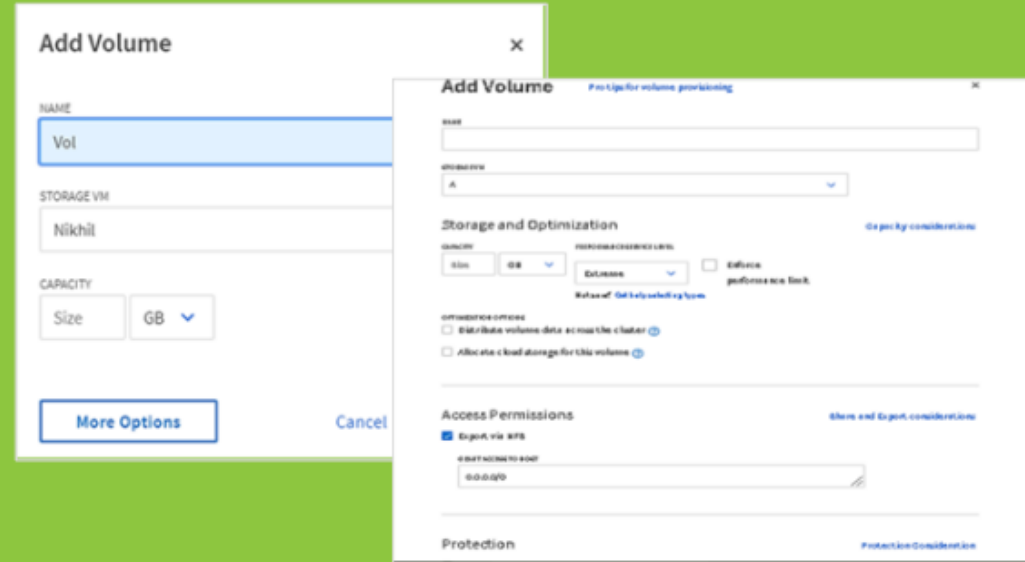


ONTAP System Manager 9.7: NAS Storage Provisioning

Classic UI: four windows and many options



New UI: one window



ONTAP System Manager 9.7: Volumes Page

Fast storage inventory search

The screenshot displays the ONTAP System Manager 9.7 Volumes page. The left sidebar contains navigation menus for Dashboard, Storage, Applications, LUNs, Shares, Qtree, Quotas, Exports, Storage VMS, Tiers, Network, Overview, Ethernet Ports, FC Ports, Hosts, and Cluster. The main content area shows a table of volumes. A red box highlights the 'Peak View' toggle and the volume 'voln1k2'. A green oval highlights the 'Filtering capabilities' section, which includes a search bar and a 'Filter' button. The table lists various attributes for each volume, including Name, SVM, Status, Capacity, IOPs, Latency, and more.

Name	SVM	Status	Capacity (available total)	IOPs	Latency (ms)
voln1k2	N1K1	Online	10 GB 200 GB	741	0.41
voln1k3	N1K1	Online	10 GB 179 GB	522	0.42

Filtering capabilities

- ✓ Peek views make it easy to compare volumes.
- ✓ Filtering and sorting based on volume attributes is fast.

ONTAP System Manager 9.7: Volumes Page

Fast storage inventory search

The screenshot displays the ONTAP System Manager 9.7 Volumes page. The left sidebar contains navigation menus for Dashboard, Storage, Applications, LUNs, Shares, Qtree, Quotas, Exports, Storage VMs, Tiers, Network, and Hosts. The main content area shows two views of the Volumes page.

Peak View (Left): This view shows a detailed comparison of two volumes, volink2 and volink3. A red box highlights the 'Peak View' toggle. The table below shows the details for these volumes.

Name	SW	Status	Capacity (available total)	IOPS	Latency (ms)
volink2	NONE	Online	91 GB 200 GB	741	0.42
volink3	NONE	Online	91 GB 170 GB	122	0.42

Filtered View (Right): This view shows a list of volumes with a search bar and filter options. A green oval highlights the 'Filter' button. The table below shows the results of a search for 'dp'.

Name	Storage VM	Mount Path	Status	Capacity (available total)	IOPS	Latency (ms)
vol_dp	vs0		Online	99.5 MB 100 MB	0	0
lun1_volvol_dpvol...	vs0	/test	Online	194 MB 1.2 GB	0	0

Sorted View (Bottom Right): This view shows a list of volumes sorted by capacity. A green oval highlights the 'Sort based on capacity' button. The table below shows the results of a sort by capacity.

Name	Storage VM	Mount Path	Status	Capacity (available total)	IOPS	Latency (ms)
offline	vs0		Offline	- 100 MB	0	0
restrict	vs0		Restricted	- 100 MB	0	0
fg1	vs0		Offline	- 400 GB	0	0
fg2	vs0		Restricted	- 400 MB	0	0
svm1_root	svm1	/	Online	17.9 MB 18.3 MB	0	0
c2_p1_dest	vs0	/c2_p1_dest	Online	18.9 MB 19.2 MB	0	0
c1_p1	vs0		Online	44.7 MB 95 MB	0	0

- ✓ Peek views make it easy to compare volumes.
- ✓ Filtering and sorting based on volume attributes is fast.

ONTAP System Manager 9.7: Intuitive Integrated Global Search

Get system status instantly and hop to details or documentation

The screenshot shows the ONTAP System Manager 9.7 web interface. The browser address bar displays `https://10.141.35.178/sysmgr/v4/storage/volumes`. The interface has a dark blue sidebar on the left with navigation links: DASHBOARD, STORAGE, Overview, Applications, Volumes (selected), LUNs, NFS Namespaces, Shares, Qtrees, Quotas, Storage VMs, Tiers, NETWORK, EVENTS & JOBS, PROTECTION, HOSTS, and CLUSTER. The main content area is titled 'Volumes' and features a '+ Add' button. Below it is a table with columns: Name, Storage VM, Mount Path, and Status. The table lists 15 volumes, all with status 'Online'. A search bar is located at the top right of the main content area. A dropdown menu is open, showing search results for 'Cluster - Settings', 'Dashboard', 'Add a volume', 'Cluster - Overview', 'Storage - Storage VMs', and 'Cluster - Disks'. The bottom of the screen shows the Windows taskbar with the Start button and several application icons, along with the system clock showing 10:44 AM on 6/19/2019.

Name	Storage VM	Mount Path	Status
SMQAVolnewTest40	NAS01	/SMQAVolnewTest40	Online
SMQAVolnewTest41	NAS01	/SMQAVolnewTest41	Online
SMQAVolnewTest42	NAS01	/SMQAVolnewTest42	Online
SMQAVolnewTest43	NAS01	/SMQAVolnewTest43	Online
SMQAVolnewTest44	NAS01	/SMQAVolnewTest44	Online
SMQAVolnewTest45	NAS01	/SMQAVolnewTest45	Online
SMQAVolnewTest46	NAS01	/SMQAVolnewTest46	Online
SMQAVolnewTest47	NAS01	/SMQAVolnewTest47	Online
SMQAVolnewTest48	NAS01	/SMQAVolnewTest48	Online
SMQAVolnewTest49	NAS01	/SMQAVolnewTest49	Online
SMQAVolnewTest5	NAS01	/SMQAVolnewTest5	Online
SMQAVolnewTest50	NAS01	/SMQAVolnewTest50	Online

Global Search enables the cluster to be searched for the following:

- Storage Objects
- Ports
- Network Overview
- Pages
- Application
- Actions

ONTAP System Manager 9.7: Intuitive Integrated Global Search

Get system status instantly and hop to details or documentation

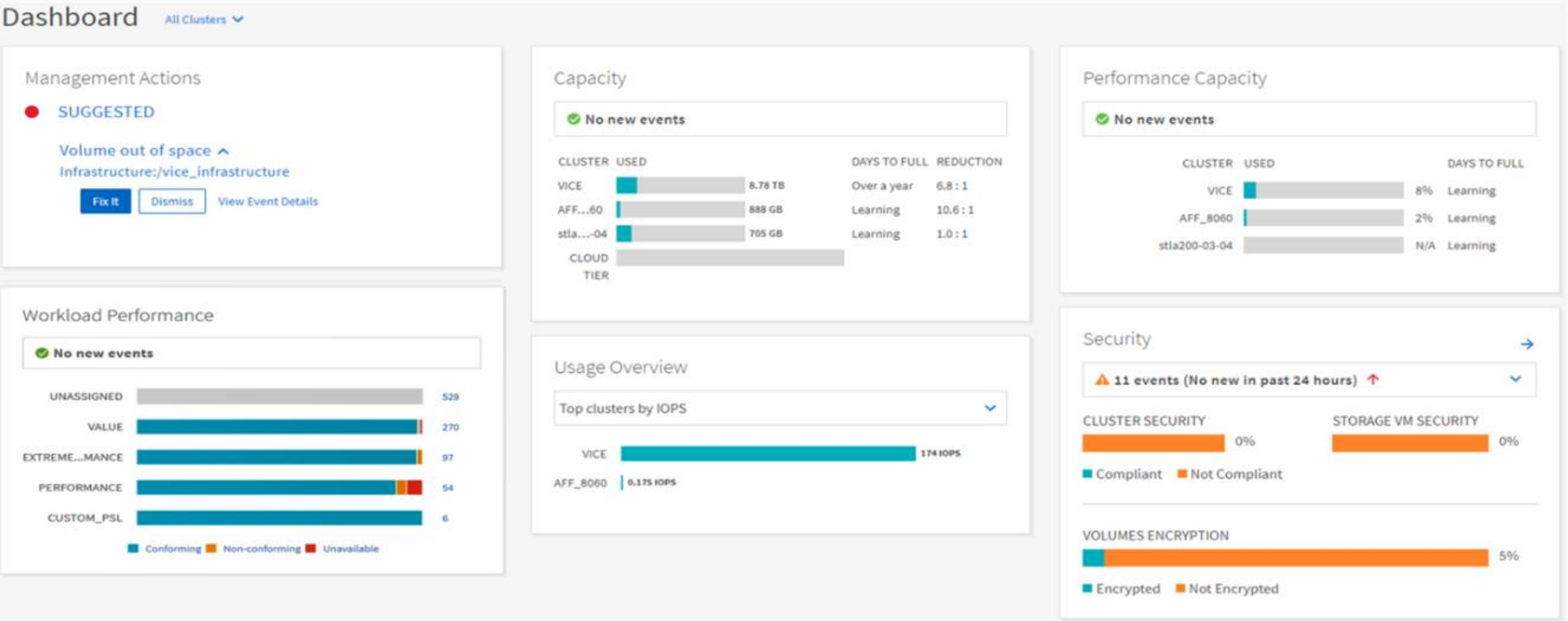
The screenshot displays the ONTAP System Manager 9.7 web interface. The top navigation bar includes the ONTAP logo, the system name 'F8080-32-22-25_1', and a search bar. The left sidebar shows the navigation menu with categories like DASHBOARD, STORAGE, NETWORK, EVENTS & JOBS, and PROTECTION. The main content area is titled 'Volumes' and shows a table of storage volumes. A search bar is present in the top right of the main content area. A dropdown menu is open, showing search results for the query 'volum'. The results include actions like 'Add a volume', pages like 'Storage - Volumes', and specific volume details such as 'exp1_NFS_volume' and 'exp_NFS_volume'. A tooltip 'What is a volume' is also visible.

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NetApp Active IQ Unified Manager 9.7 Dashboard

Clear summary status with information that you can easily act on



NetApp Active IQ Unified Manager 9.7 Dashboard

Clear summary status with information that you can easily act on

Dashboard

All Clusters ▼

Management Actions

● SUGGESTED

Volume out of space ^

Infrastructure:/vice_infrastructure

Fix It

Dismiss

View Event Details

Capacity

✓ No new events

CLUSTER	USED	DAYS TO FULL	REDUCTION
VICE	<div><div></div></div> 8.78 TB	Over a year	6.8 : 1
AFF...60	<div><div></div></div> 888 GB	Learning	10.6 : 1
stla...-04	<div><div></div></div> 705 GB	Learning	1.0 : 1
CLOUD TIER	<div><div></div></div>		

Performance Capacity

✓ No new events

CLUSTER	USED	DAYS TO FULL
VICE	<div><div></div></div> 8%	Learning
AFF_8060	<div><div></div></div> 2%	Learning
stla200-03-04	<div><div></div></div> N/A	Learning

Workload Performance

✓ No new events

UNASSIGNED	<div><div></div></div>	529
VALUE	<div><div></div></div>	270
EXTREME...MANCE	<div><div></div></div>	97
PERFORMANCE	<div><div></div></div>	54
CUSTOM_PSL	<div><div></div></div>	6

■ Conforming ■ Non-conforming ■ Unavailable

Usage Overview

Top clusters by IOPS ▼

VICE	<div><div></div></div> 174 IOPS
AFF_8060	<div><div></div></div> 0.175 IOPS

Security

⚠ 11 events (No new in past 24 hours) ↑ ▼

CLUSTER SECURITY

0%

■ Compliant ■ Not Compliant

STORAGE VM SECURITY

0%

VOLUMES ENCRYPTION

5%

■ Encrypted ■ Not Encrypted

NetApp Active IQ Unified Manager 9.7 Dashboard

Clear summary status with information that you can easily act on

Dashboard

All Clusters

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Dashboard

All Clusters ▼

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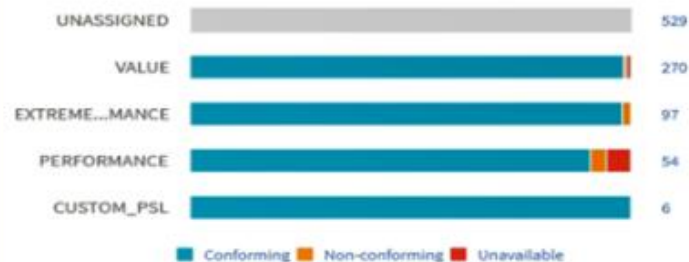
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Workload Performance

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Usage Overview

Top clusters by IOPS ▼



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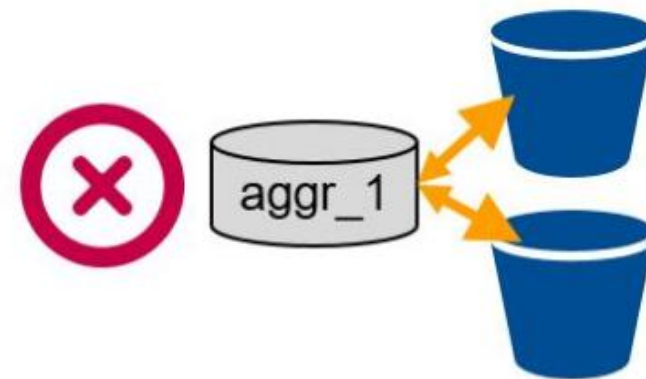
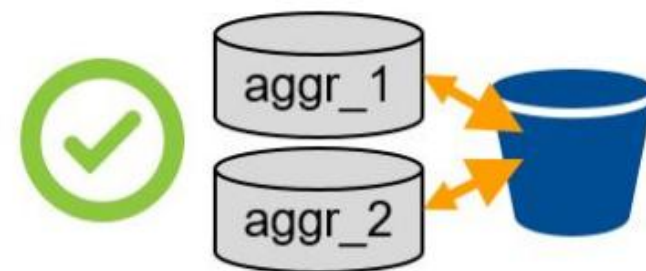
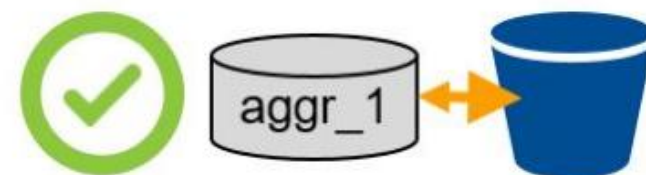


FabricPool, FlexCache, and FlexGroup Enhancements

FabricPool Mirrors

ONTAP 9.7 software

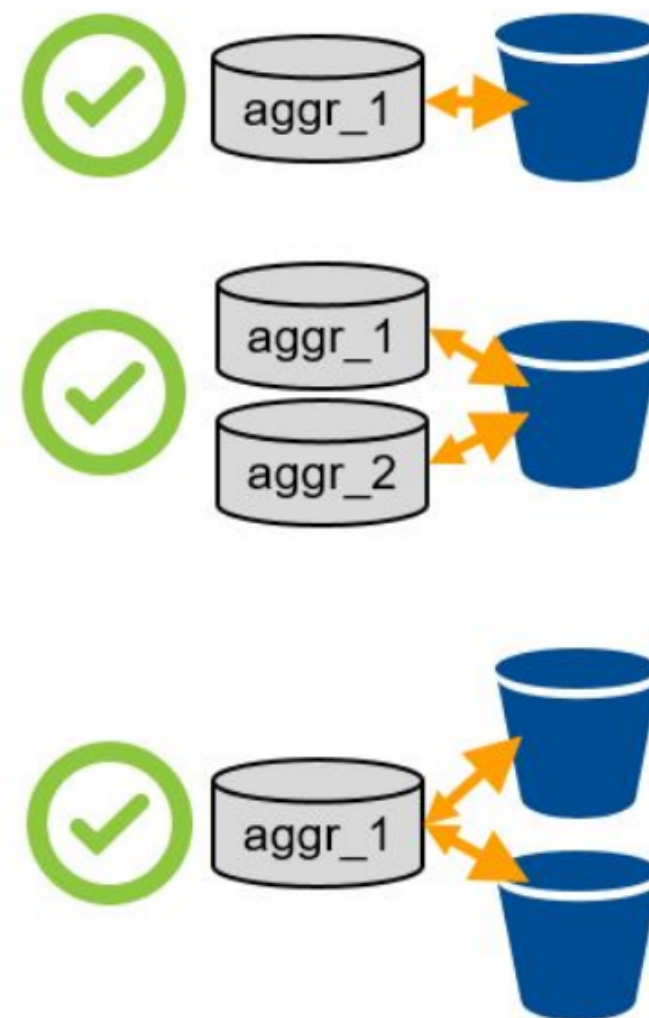
- Aggregate-to-bucket relationships support
 - ONTAP 9.2–9.6 software
 - One aggregate can use one object bucket.
 - Many aggregates can share one bucket.
 - One aggregate tiering to multiple buckets was **not supported**.



FabricPool Mirrors

ONTAP 9.7 software

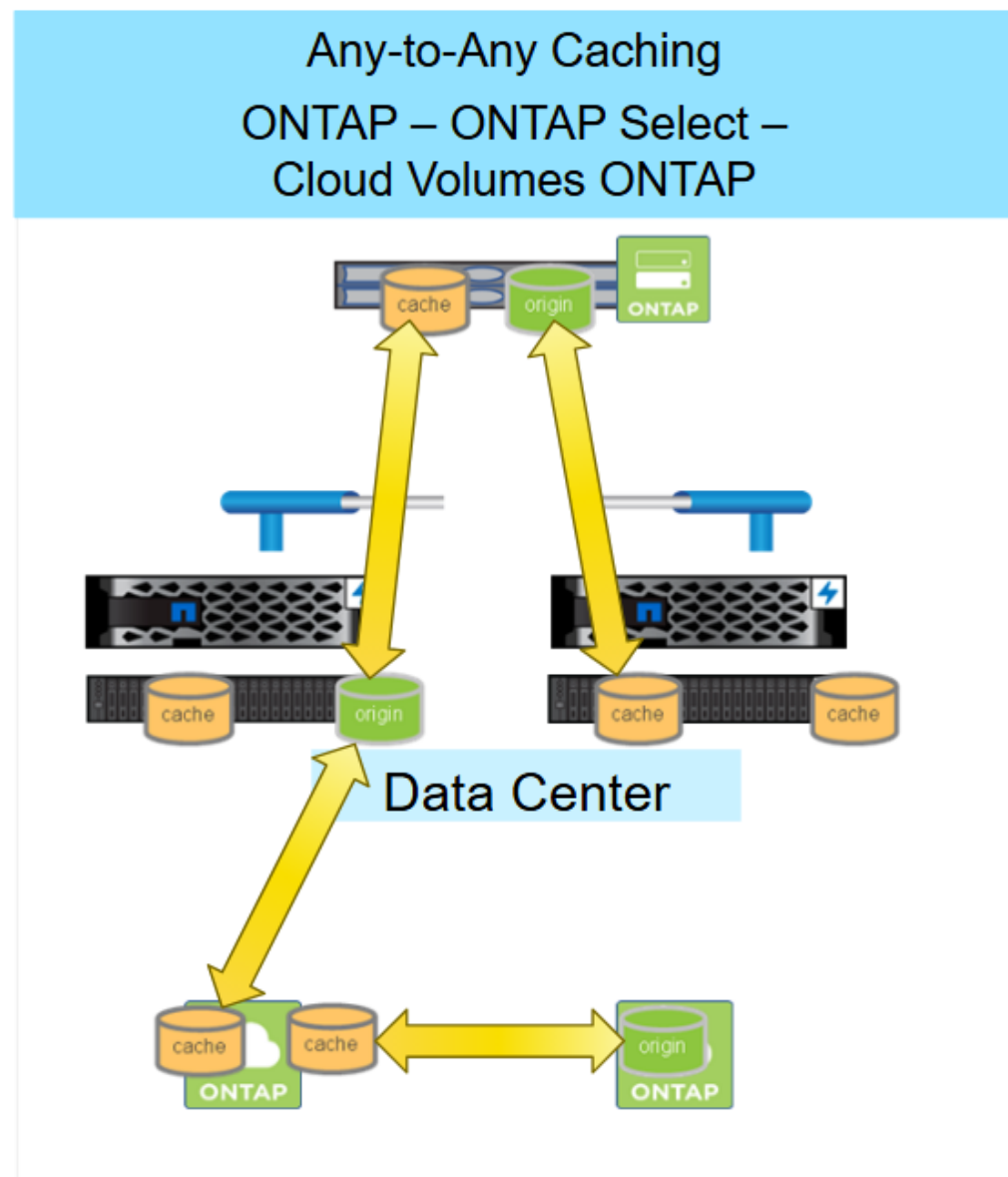
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 - One aggregate tiering to multiple buckets was **not supported**.
 - ONTAP 9.7
 - One aggregate can tier to multiple buckets.
- Use cases for FabricPool Mirrors
 - Changing cloud providers or migrating between on-premises and cloud
 - Migration is nondisruptive and tiered cold data is not recalled.
 - Cloud tier in multiple zones or different providers for added resiliency



FlexCache Enhancements

ONTAP 9.7 software

- **More cache volume storage efficiency**
Thin provisioning and data compaction added
- **Cache volume migration by using `volmove`**
Nondisruptive relocation of caches when workload needs change
- **Native ONTAP auditing of cache volume reads**
 - The feature enables regulatory and security compliance with cached reads.
 - Auditing is already supported on origin volumes.
- **Antivirus scanning of origin volumes**
Scans can be scheduled on the origin volume.



FlexGroup Enhancements

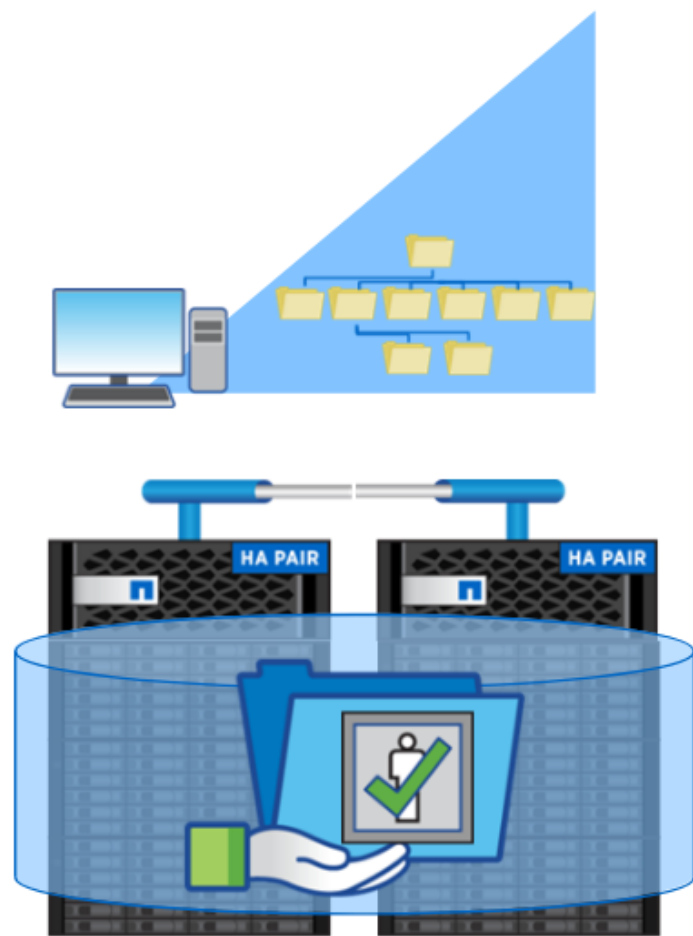
ONTAP 9.7 software

■ NDMP backup

- Baseline and incremental backup and restore for FlexGroup volumes, directories, and qtrees
- Dump and restore across and between FlexGroup and FlexVol volumes

■ NFSv4 and NFSv4.1

- Enhances NFS security and locking
- Includes parallel NFS (pNFS) support
pNFS fits nicely with FlexGroup volumes for data I/O path locality in a cluster.
- Applies to these use cases: secure file shares, GIT repositories, and EDA and AI workloads

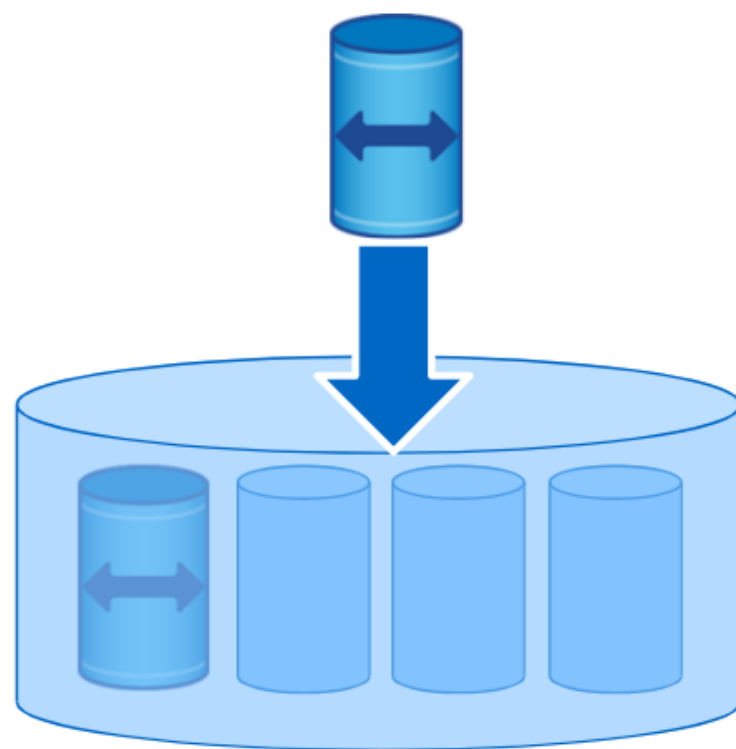


FlexGroup volume

FlexVol Volume to FlexGroup Volume Conversion

ONTAP 9.7 software

- FlexVol volume to FlexGroup volume data in-place conversion
 - Converts a FlexVol volume into a FlexGroup volume with a single member
 - Conversion takes less than 40 seconds! Large dataset migration can take days.
 - Works with FabricPool without touching tiered data
 - After conversion, add member volumes to expand capacity and performance.



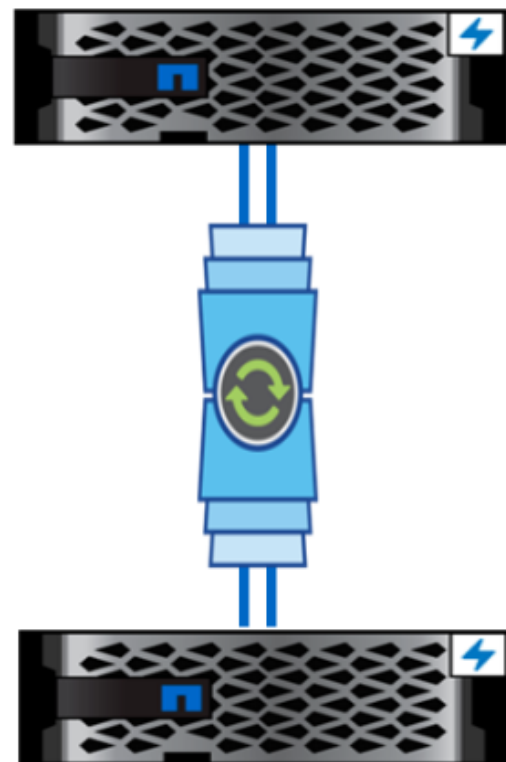


MetroCluster and SnapMirror Synchronous Enhancements

MetroCluster Enhancements

MetroCluster IP

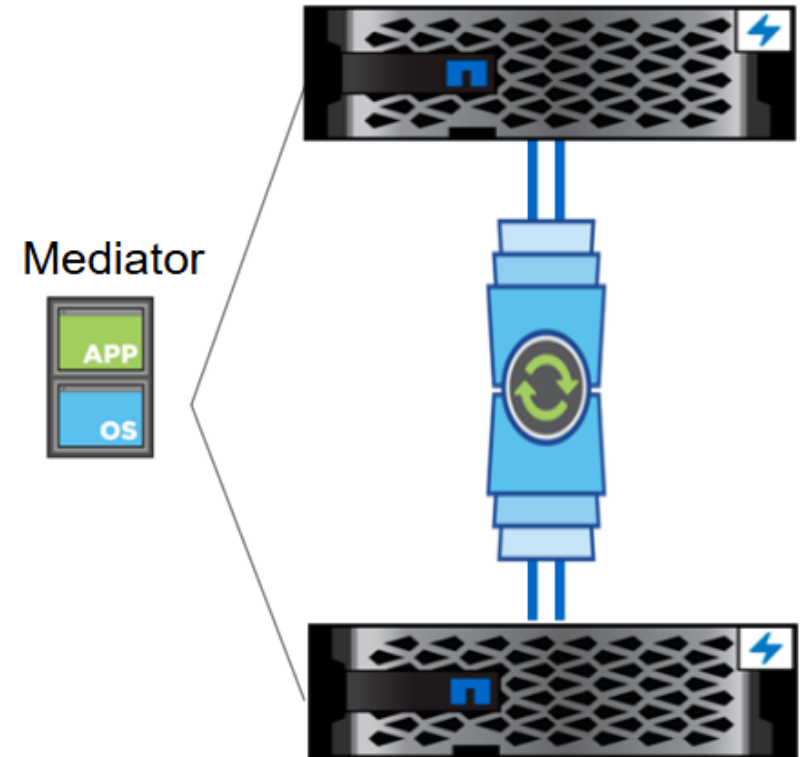
- MetroCluster IP using customer's existing network infrastructure
 - This feature can significantly reduce deployment cost and time.
 - Switches must comply with NetApp specifications for bandwidth, latency, and option settings.
 - The customer is responsible for switch support and issue resolution.



MetroCluster Enhancements

MetroCluster IP and MetroCluster IP Mediator

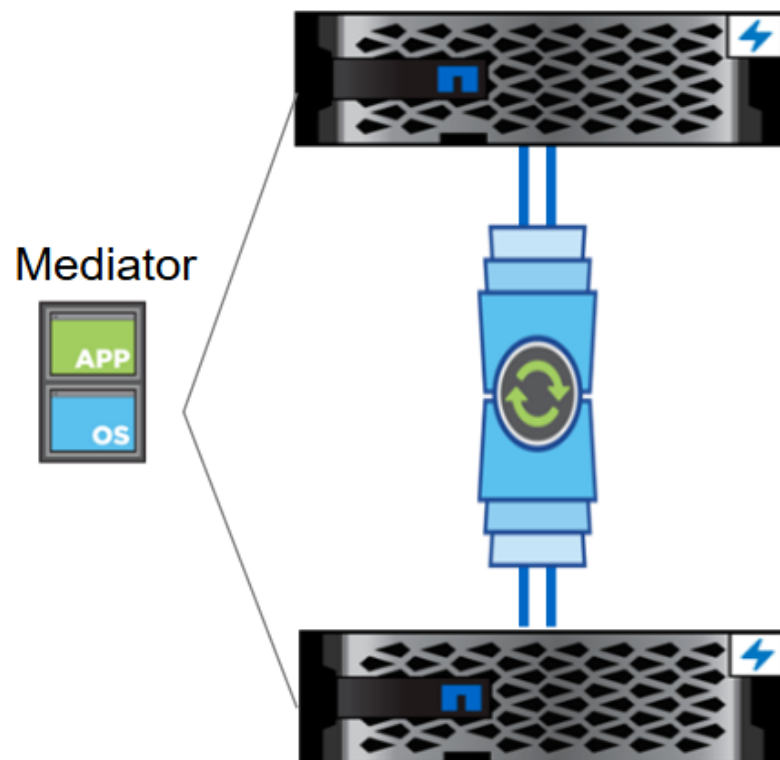
- MetroCluster IP using customer's existing network infrastructure
 - This feature can significantly reduce deployment cost and time.
 - Switches must comply with NetApp specifications for bandwidth, latency, and option settings.
 - The customer is responsible for switch support and issue resolution.
- New MetroCluster IP mediator
 - Enables automate switchover in a consistent state to prevent data loss
 - Is deployed at a site different from the sites hosting MetroCluster nodes



MetroCluster Enhancements

FabricPool Aggregate Support

- FabricPool aggregate support for MetroCluster IP
 - MetroCluster aggregates can be FabricPool aggregates.
 - Workloads that require continuous data availability can tier data automatically.

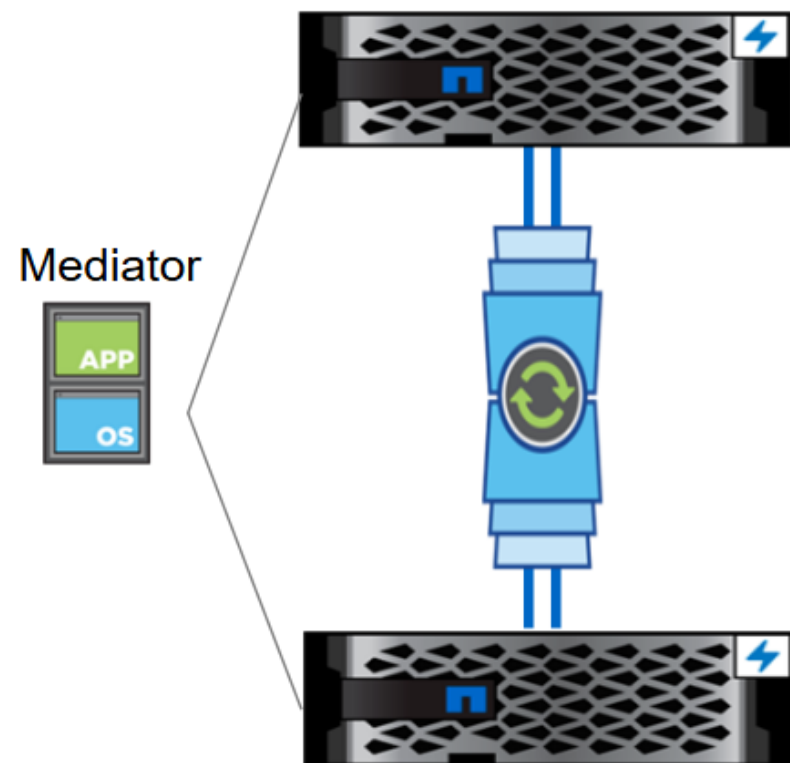


MetroCluster Enhancements

FabricPool Aggregate Support and FlexCache Support

- FabricPool aggregate support for MetroCluster IP
 - MetroCluster aggregates can be FabricPool aggregates.
 - Workloads that require continuous data availability can tier data automatically.
- FlexCache support for MetroCluster FC and IP

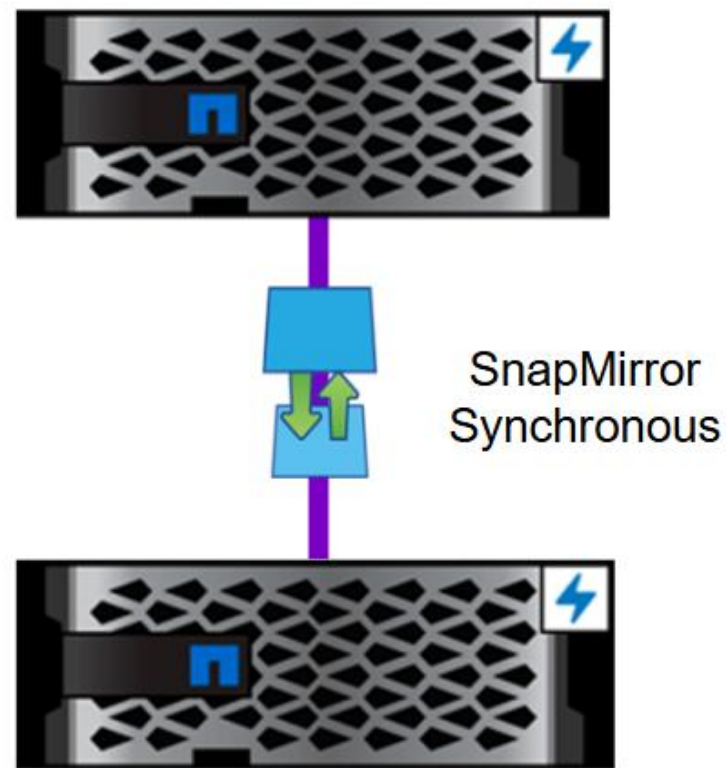
Origin and cache volumes can be provisioned on mirrored aggregates.



SnapMirror Synchronous Enhancements

NVMe over Fibre Channel (NVMe/FC)

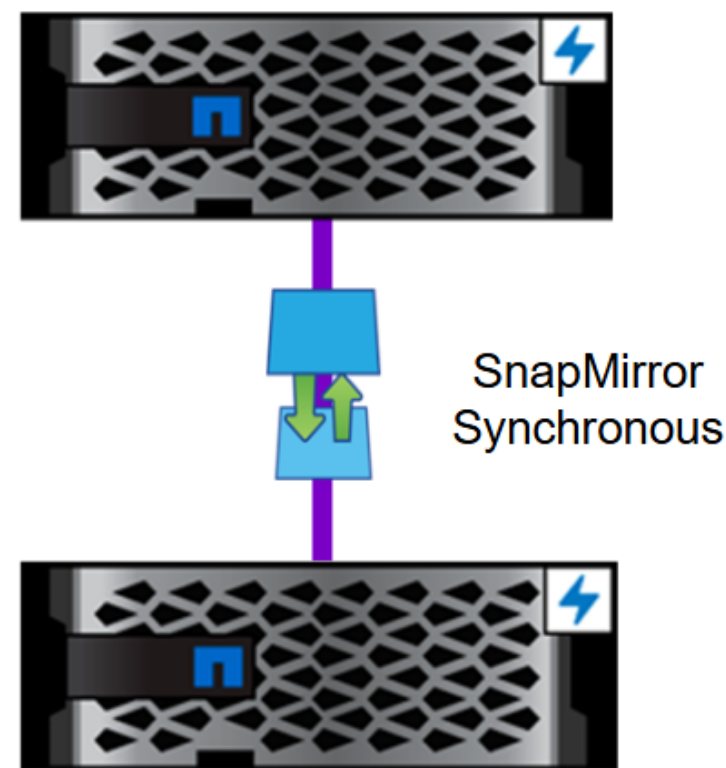
- NVMe over Fibre Channel (NVMe/FC) protocol and namespace support added
All protocols are now supported: FC, NVMe/FC, iSCSI, NFS v3/v4, and SMB/CIFS.



SnapMirror Synchronous Enhancements

Support for Application-Created Snapshot Copies and LUN Clones

- NVMe/FC protocol and namespace support added
All protocols are now supported: FC, NVMe/FC, iSCSI, NFS v3/v4, and SMB/CIFS.
- Support for application-created snapshot copies and LUN clones
 - Clones and application-created snapshots are replicated to secondary volumes.
(Note: Scheduled snapshots are not replicated.)
 - This enhancement enables third-party backup applications to use LUN clones for indexing and host-based single-file restore workflows.



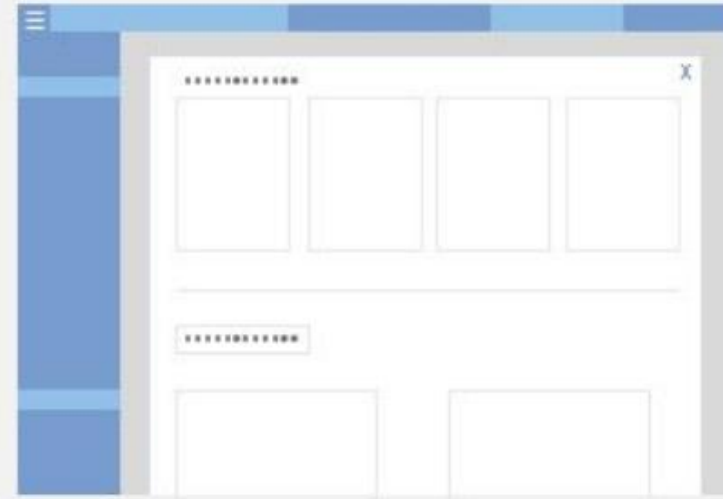


Security Enhancements in ONTAP 9.7 Software

Main Enhancements



Data-at-rest encryption
enabled by default



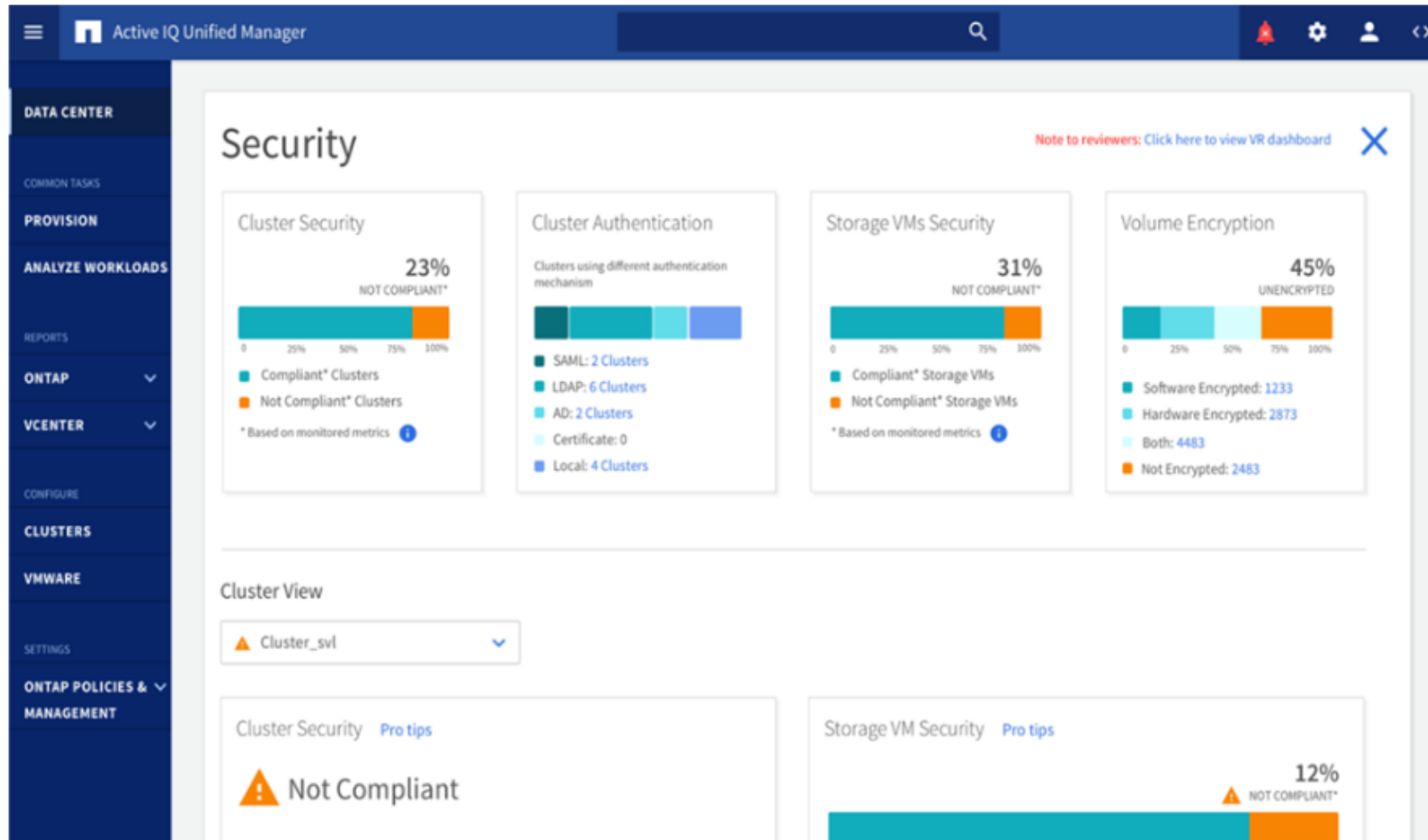
Security dashboard in Active
IQ Unified Manager

Data-at-Rest Encryption Enabled by Default

- Data-at-rest encryption is enabled on new volumes when an encryption key manager is configured on the cluster.
ONTAP System Manager includes Onboard Key Manager setup.
- If the system is configured with encrypting solid-state drives (SSDs) or HDDs, ONTAP software automatically applies hardware encryption.
- Otherwise, NetApp Aggregate Encryption (NAE) or NetApp Volume Encryption (NVE) is used.



Active IQ Unified Manager Security Dashboard



- Based on the security hardening guide
- Will grow in capabilities over releases

Security Hardening Guide for NetApp ONTAP 9 (TR-4569)

[https://
www.netapp.com/us/
media/tr-4569.pdf](https://www.netapp.com/us/media/tr-4569.pdf)



Summary and References

Course Summary



- Navigate the new mid-range and high-end AFF and FAS systems
- Describe the new AFF All SAN Array system offerings
- List the enhancements to NetApp ONTAP System Manager (formerly OnCommand System Manager) and NetApp Active IQ Unified Manager (formerly OnCommand Unified Manager)
- Describe FabricPool enhancements
- Describe FlexCache technology enhancements
- Describe NetApp ONTAP FlexGroup enhancements
- List MetroCluster enhancements
- Describe SnapMirror Synchronous enhancements
- Describe security enhancements

References



- NetApp University courses

- ONTAP Fundamentals
- ONTAP Cluster Administration
- ONTAP NFS Administration
- ONTAP SMB Administration
- ONTAP SAN Administration
- ONTAP Data Protection Administration
- ONTAP Security and Compliance Solutions Administration
- ONTAP Cluster Installation
- ONTAP MetroCluster Installation

- Community

- http://communities.netapp.com/community/products_and_solutions
- <http://techontappodcast.com>

Thank You

