NetApp

9.4 Release Notes

Cloud Volumes ONTAP

NetApp
July 30, 2021

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9.4 Release Notes

What's new in Cloud Volumes ONTAP 9.4

Cloud Volumes ONTAP 9.4 includes several new features and enhancements.

> **ℹ** Additional features and enhancements are also introduced in the latest versions of Cloud Manager. See the Cloud Manager Release Notes for details.

Support for pay-as-you-go in the AWS GovCloud (US) region

The pay-as-you-go version of Cloud Volumes ONTAP is now supported in the AWS GovCloud (US) region. This is in addition to supporting Cloud Volumes ONTAP BYOL in the GovCloud (US) region.

You can deploy Cloud Volumes ONTAP in the GovCloud (US) region just like any other region. Go to NetApp Cloud Central and launch Cloud Manager in GovCloud (US). Then launch Cloud Volumes ONTAP PAYGO or BYOL by creating a new working environment in Cloud Manager.

Tiering cold data with Cloud Volumes ONTAP Premium and BYOL

The 9.2 release introduced automated data tiering between a performance tier (SSD or HDD) and a capacity tier (an object store). The cold data sent to the capacity tier included Snapshot copies of read-write volumes (the *Snapshot only* tiering policy) or data from destination volumes (the *backup* tiering policy).

With Cloud Volumes ONTAP 9.4 Premium and BYOL, you now have a third option: you can use the *auto* tiering policy to tier cold data blocks in a read-write volume to a capacity tier. The cold data includes not just Snapshot copies but also cold user data from the active file system.

If read by random reads, the cold data blocks in the capacity tier become hot and move to the performance tier. If read by sequential reads, such as those associated with index and antivirus scans, the cold data blocks stay cold and do not move to the performance tier.

You can choose the tiering policy when you create or edit a volume in Cloud Manager. For details, refer to Cloud Manager documentation.

Data tiering in Microsoft Azure

You can now reduce your Azure storage costs by combining a performance tier for hot data (Premium or Standard managed disks) with a capacity tier for cold data (Azure Blob storage). The same tiering policies that are supported in AWS are also supported in Azure: auto, Snapshot only, and backup.

> **ℹ** Data tiering is not supported with the DS3_v2 virtual machine type.

You can choose the tiering policy when you create or edit a volume in Cloud Manager. For details, refer to Cloud Manager documentation.

Data tiering with Provisioned IOPS SSDs

Data tiering is now supported in AWS with Provisioned IOPS SSDs. You can use these SSDs as the performance tier for hot data with Amazon S3 as the capacity tier for cold data.

Improved performance when tiering data

The enhanced write performance that was introduced in the 9.2 and 9.3 releases is now supported with volumes that tier cold data to an object store capacity tier. This applies to volumes created on new SSD aggregates in Cloud Volumes ONTAP 9.4.

Improved performance for multiple workloads in AWS

Cloud Volumes ONTAP now has additional networking bandwidth in AWS, which provides improved performance for systems with multiple workloads. The additional bandwidth is available for the following EC2 instance types when you upgrade to 9.4 and when you launch new 9.4 systems:

- m4.xlarge
- m4.2xlarge
- m4.4xlarge
- c4.4xlarge
- c4.8xlarge

EC2 instance types no longer supported

All versions of Cloud Volumes ONTAP no longer support several EC2 instance types. Existing systems running these instance types will continue to operate normally; however, NetApp strongly recommends changing to a different instance type.

To review pricing differences between instance types and NetApp licenses, go to the AWS Marketplace for single-node systems and for HA pairs.

Instance type no longer supported	Recommended instance type
c3.2xlarge	m4.xlarge
c4.2xlarge	m4.2xlarge
m3.xlarge	m4.xlarge
m3.2xlarge	m4.2xlarge
r3.xlarge	m4.2xlarge
r3.2xlarge	r4.2xlarge

> M3 and R3 instance types are not supported with data tiering and enhanced performance, so moving to the M4 and R4 instance types allows you to take advantage of those Cloud Volumes ONTAP features.

Upgrade notes

- Upgrades of Cloud Volumes ONTAP must be completed from Cloud Manager. You should not upgrade Cloud Volumes ONTAP by using System Manager or the CLI. Doing so can impact system stability.
- You can upgrade to Cloud Volumes ONTAP 9.4 from the 9.3 release.

  To understand version requirements, refer to ONTAP 9 Documentation: Cluster update requirements.

- The upgrade of a single node system takes the system offline for up to 25 minutes, during which I/O is interrupted.
- Upgrading an HA pair is nondisruptive and I/O is uninterrupted. During this nondisruptive upgrade process, each node is upgraded in tandem to continue serving I/O to clients.

Supported configurations for Cloud Volumes ONTAP 9.4

Cloud Volumes ONTAP is available in AWS and Azure in two pricing options: pay-as-you-go and Bring Your Own License (BYOL). For pay-as-you-go, you can choose from three configurations: Explore, Standard, or Premium.

Cloud Volumes ONTAP for AWS

In AWS, you can deploy Cloud Volumes ONTAP as a single system or an HA pair.

	Explore	Standard	Premium	BYOL
EC2 instance types	m4.xlarge	• m4.2xlarge • r4.xlarge	• c4.4xlarge • c4.8xlarge • m4.4xlarge • r4.2xlarge	• c4.4xlarge • c4.8xlarge • m4.xlarge • m4.2xlarge • m4.4xlarge • r4.xlarge • r4.2xlarge
Underlying storage	General Purpose SSDs, Provisioned IOPS SSDs, Throughput Optimized HDDs, and Cold HDDs, up to 16 TB per disk			
Maximum system capacity (disks + object storage)	2 TB	10 TB	368 TB	368 TB per license

Notes:

1. If you enable data tiering, a system's capacity limit stays the same. The capacity limit includes both disks and object storage.
2. Data tiering is supported with Cloud Volumes ONTAP Standard, Premium, and BYOL.
3. When you choose an EC2 instance type, you can specify whether it is a shared instance or a dedicated instance.
4. Enhanced write performance is supported when using EBS SSDs with Cloud Volumes ONTAP Standard, Premium, and BYOL.
5. For AWS region support, see Cloud Volumes Global Regions.

Cloud Volumes ONTAP for Azure

In Azure, you can deploy Cloud Volumes ONTAP as a single node system.

	Explore	Standard	Premium	BYOL
Virtual machine types	DS3_v2	• DS4_v2 • DS13_v2	• DS5_v2 • DS14_v2	• DS3_v2 • DS4_v2 • DS5_v2 • DS13_v2 • DS14_v2
Underlying storage	Standard HDD Managed Disks, Standard SSD Managed Disks, and Premium SSD Managed Disks, up to 32 TB per disk			
Maximum system capacity (disks + object storage)	2 TB	10 TB	368 TB	368 TB per license

Notes:

1. If you enable data tiering, a system's capacity limit stays the same. The capacity limit includes both disks and object storage.

2. Data tiering is not supported with the DS3_v2 virtual machine type.

3. Enhanced write performance is enabled when using Azure Premium Storage disks, but not when using the DS3_v2 virtual machine type.

4. For Azure region support, see Cloud Volumes Global Regions.

Storage limits for Cloud Volumes ONTAP 9.4

Cloud Volumes ONTAP has storage configuration limits to provide reliable operations. For best performance, do not configure your system at the maximum values.

Maximum system capacity by license

The maximum system capacity for a Cloud Volumes ONTAP system is determined by its license. The maximum system capacity includes disk-based storage plus object storage used for data tiering. NetApp doesn't support exceeding this limit.

In Azure, disk limits prevent you from reaching the 368 TB capacity limit by using disks alone. In those cases, you can reach the 368 TB capacity limit by tiering inactive data to object storage. Refer to capacity and disk limits by Azure VM size for more details.

License	Maximum system capacity (disks + object storage)
Explore	2 TB (data tiering is not supported with Explore)
Standard	10 TB
Premium	368 TB
BYOL	368 TB per license

For HA, is the license capacity limit per node or for the entire HA pair?

The capacity limit is for the entire HA pair. It is not per node. For example, if you use the Premium license, you can have up to 368 TB of capacity between both nodes.

For an HA system in AWS, does mirrored data count against the capacity limit?

No, it doesn't. Data in an AWS HA pair is synchronously mirrored between the nodes so that the data is available in the event of failure. For example, if you purchase an 8 TB disk on node A, Cloud Manager also allocates an 8 TB disk on node B that is used for mirrored data. While 16 TB of capacity was provisioned, only 8 TB counts against the license limit.

Aggregate and disk limits for Cloud Volumes ONTAP in AWS

In Cloud Volumes ONTAP 9.4, all EC2 instance types can reach the 368 TB capacity limit using EBS storage alone, or by using EBS storage and tiering to S3 (both single node and HA).

Physical storage	Parameter	Limit
Aggregates and disks	Maximum number of aggregates	34 for single-node configurations 18 per node in an HA configuration [1]
	Maximum aggregate size	96 TB of raw capacity [2]
	Disks per aggregate	1-6 [3]
	Maximum disk size	16 TB
	Maximum number of data disks across all aggregates [4]	34 for single-node configurations 31 per node in an HA configuration
RAID groups	Maximum per aggregate	1

Notes:

1. It is not possible to create 18 aggregates on both nodes in an HA pair because doing so would exceed the data disk limit.

2. The aggregate capacity limit is based on the disks that comprise the aggregate. The limit does not include object storage used for data tiering.

3. All disks in an aggregate must be the same size.

4. The data disk limit is specific to disks that contain user data. The boot disk and root disk for each node are not included in this limit.

Aggregate and disk limits for Cloud Volumes ONTAP in Azure

Physical storage	Parameter	Limit
Aggregates and disks	Maximum number of aggregates	Same as the disk limit
	Maximum aggregate size	200 TB of raw capacity [1]
	Disks per aggregate	1-12 [2]
	Maximum disk size	32 TB
	Maximum number of data disks across all aggregates [3]	Depends on VM size. See below.
RAID groups	Maximum per aggregate	1

Notes:

1. The aggregate capacity limit is based on the disks that comprise the aggregate. The limit does not include object storage used for data tiering.

2. All disks in an aggregate must be the same size.

3. The data disk limit is specific to disks that contain user data. The boot disk and root disk for each node are not included in this limit.

Capacity and disk limits by Azure VM size

In Azure, single node systems can use Standard HDD Managed Disks, Standard SSD Managed Disks, and Premium SSD Managed Disks, with up to 32 TB per disk. The number of supported disks varies by VM size.

The tables below show the maximum system capacity by VM size with disks alone, and with disks and cold data tiering to object storage.

Disk limits are shown by VM size for Premium and BYOL licenses only because disk limits can't be reached with Explore or Standard licenses due to system capacity limits.

Single node with a Premium license

VM size	Max disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
DS3_v2	15	368 TB	Tiering not supported
DS4_v2	31	368 TB	368 TB
DS5_v2	63	368 TB	368 TB
DS13_v2	31	368 TB	368 TB
DS14_v2	63	368 TB	368 TB

Single node with one or more BYOL licenses

> For some VM types, you'll need several BYOL licenses to reach the max system capacity listed below. For example, you'd need 6 BYOL licenses to reach 2 PB with DS5_v2.

VM size	Max disks per node	Max system capacity with one license		Max system capacity with multiple licenses	
		Disks alone	Disks + data tiering	Disks alone	Disks + data tiering
DS3_v2	15	368 TB	Tiering not supported	480 TB	Tiering not supported
DS4_v2	31	368 TB	368 TB	992 TB	368 TB x each license
DS5_v2	63	368 TB	368 TB	2 PB	368 TB x each license
DS13_v2	31	368 TB	368 TB	992 TB	368 TB x each license
DS14_v2	63	368 TB	368 TB	2 PB	368 TB x each license

Logical storage limits

Logical storage	Parameter	Limit
Storage virtual machines (SVMs)	Maximum number for Cloud Volumes ONTAP (HA pair or single node)	One data-serving SVM and one destination SVM used for disaster recovery. You can activate the destination SVM for data access if there's an outage on the source SVM. [1] The one data-serving SVM spans the entire Cloud Volumes ONTAP system (HA pair or single node).
Files	Maximum size	16 TB
	Maximum per volume	Volume size dependent, up to 2 billion
FlexClone volumes	Hierarchical clone depth [2]	499
FlexVol volumes	Maximum per node	500
	Minimum size	20 MB
	Maximum size	AWS: Dependent on the size of the aggregate [3] Azure: 100 TB
Qtrees	Maximum per FlexVol volume	4,995
Snapshot copies	Maximum per FlexVol volume	1,023

Notes:

1. Cloud Manager does not provide any setup or orchestration support for SVM disaster recovery. It also does not support storage-related tasks on an additional SVM. You must use System Manager or the CLI for SVM disaster recovery.
    ◦ SVM Disaster Recovery Preparation Express Guide

2. Hierarchical clone depth is the maximum depth of a nested hierarchy of FlexClone volumes that can be created from a single FlexVol volume.

3. Less than 100 TB is supported because aggregates for this configuration are limited to 96 TB of *raw* capacity.

iSCSI storage limits

iSCSI storage	Parameter	Limit
LUNs	Maximum per node	1,024
	Maximum number of LUN maps	1,024
	Maximum size	16 TB
	Maximum per volume	512
igroups	Maximum per node	256
Initiators	Maximum per node	512
	Maximum per igroup	128
iSCSI sessions	Maximum per node	1,024
LIFs	Maximum per port	32
	Maximum per portset	32
Portsets	Maximum per node	256

Known issues for Cloud Volumes ONTAP 9.4

Known issues identify problems that might prevent you from using this release of the product successfully.

There are no known issues in this release specific to Cloud Volumes ONTAP.

You can find known issues for ONTAP software in the ONTAP Release Notes.

Known limitations for Cloud Volumes ONTAP 9.4

Known limitations identify platforms, devices, or functions that are not supported by this release of the product, or that do not interoperate correctly with it. Review these limitations carefully.

General limitations

The following limitations apply to Cloud Volumes ONTAP in AWS and in Azure.

Software updates must be completed by Cloud Manager

Upgrades of Cloud Volumes ONTAP must be completed from Cloud Manager. You should not upgrade Cloud Volumes ONTAP by using System Manager or the CLI. Doing so can impact system stability.

Encryption is not supported on boot and root disks

If you enabled an option from your cloud provider that automatically encrypts all new volumes or disks, then you must temporarily disable that option when deploying Cloud Volumes ONTAP. If you don't, then deployment of Cloud Volumes ONTAP will fail. Encryption is not supported on the boot and root disks for the Cloud Volumes ONTAP system.

Cloud Volumes ONTAP deployment must not be modified from your cloud provider's console

Changes to a Cloud Volumes ONTAP configuration from your cloud provider's console results in an unsupported configuration. Any changes to the Cloud Volumes ONTAP resources that Cloud Manager creates and manages can impact system stability and Cloud Manager's ability to manage the system.

Disks and aggregates must be managed from Cloud Manager

All disks and aggregates must be created and deleted directly from Cloud Manager. You should not perform these actions from another management tool. Doing so can impact system stability, hamper the ability to add disks in the future, and potentially generate redundant cloud provider fees.

SnapManager licensing limitation

SnapManager per-server licenses are supported with Cloud Volumes ONTAP. Per-storage system (SnapManager suite) licenses are not supported.

Unsupported ONTAP features

The following features are not supported with Cloud Volumes ONTAP:

- Aggregate-level inline deduplication
- Aggregate-level background deduplication
- Disk maintenance center
- Disk sanitization
- Fibre Channel (FC)
- Flash Pools
- FlexCache
- Infinite Volumes
- Interface groups
- Intranode LIF failover
- MetroCluster
- Multi-tenancy (only one data-serving SVM is supported)
- NetApp Volume Encryption
- RAID4, RAID-DP, RAID-TEC (RAID0 is supported)
- Service Processor
- SnapLock Compliance mode (Enterprise mode is supported)
- SnapMirror Synchronous
- VLANs

Known limitations in AWS

The following known limitations affect Cloud Volumes ONTAP in AWS.

False alarms reported by Amazon CloudWatch

Cloud Volumes ONTAP does not release CPUs when idle, so Amazon CloudWatch can report a high CPU warning for the EC2 instance because it sees 100% usage. You can ignore this alarm. The ONTAP statistics command displays the true usage of the CPUs.

Cloud Volumes ONTAP HA pairs do not support immediate storage giveback

After a node reboots, the partner must sync data before it can return the storage. The time that it takes to resync data depends on the amount of data written by clients while the node was down and the data write speed during the time of giveback.

Limitations with the AWS GovCloud (US) region

- Cloud Manager must be deployed in an AWS GovCloud (US) region if you want to launch Cloud Volumes ONTAP instances in any AWS GovCloud (US) region.
- When deployed in the AWS GovCloud (US) region, Cloud Manager cannot discover ONTAP clusters in a NetApp Private Storage for Microsoft Azure configuration or a NetApp Private Storage for SoftLayer configuration.

Detaching and reattaching EBS volumes is not supported

Detaching an EBS volume from a Cloud Volumes ONTAP instance and then reattaching it to another Cloud Volumes ONTAP instance is not supported. You should use Cloud Manager to replicate data between instances.

Encryption limitations

- LUN move is not supported on systems that have Cloud Volumes ONTAP encryption enabled.
- Cloud Volumes ONTAP sends encryption keys to key managers even for aggregates that it failed to create.

  You must manually delete the keys from key managers.

Known limitations in Microsoft Azure

The following known limitations affect Cloud Volumes ONTAP in Azure.

Pay-as-you-go not available for CSP partners

If you are a Microsoft Cloud Solution Provider (CSP) partner, you cannot deploy Cloud Volumes ONTAP Explore, Standard, or Premium because pay-as-you-go subscriptions are not available for CSP partners. You must purchase a license and deploy Cloud Volumes ONTAP BYOL.