NetApp

Storage limits

Cloud Volumes ONTAP

NetApp
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Storage limits

Storage limits in AWS

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.

For some HA configurations, disk limits prevent you from reaching the capacity limit by using disks alone. In those cases, you can reach the capacity limit by tiering inactive data to object storage. Refer to capacity and disk limits below for more details.

License	Maximum system capacity (disks + object storage)
Freemium	500 GiB
PAYGO Explore	2 TiB (data tiering is not supported with Explore)
PAYGO Standard	10 TiB
PAYGO Premium	368 TiB
Node-based license	2 PiB (requires multiple licenses)
Capacity-based license	2 PiB

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 TiB 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 TiB disk on node A, Cloud Manager also allocates an 8 TiB disk on node B that is used for mirrored data. While 16 TiB of capacity was provisioned, only 8 TiB counts against the license limit.

Disk and tiering limits by EC2 instance

Cloud Volumes ONTAP uses EBS volumes as disks, with a maximum disk size of 16 TiB. The sections below show disk and tiering limits by EC2 instance type because many EC2 instance types have different disk limits. Disk limits are also different between single node systems and HA pairs.

The disk limits below are specific to disks that contain user data. The limits do not include the boot disk and root disk.

- You can purchase multiple node-based licenses for a Cloud Volumes ONTAP BYOL single node or HA pair system to allocate more than 368 TiB of capacity, up to the maximum tested and supported system capacity limit of 2 PiB. Be aware that disk limits can prevent you from reaching the capacity limit by using disks alone. You can go beyond the disk limit by tiering inactive data to object storage. Learn how to add additional system licenses to Cloud Volumes ONTAP. Though Cloud Volumes ONTAP supports up to the maximum tested and supported system capacity of 2 PiB, crossing the 2 PiB limit results in an unsupported system configuration.
  - AWS Secret Cloud and Top Secret Cloud regions support purchases of multiple node-based licenses starting with Cloud Volumes ONTAP 9.12.1.

Single node with a Premium license

Instance family	Max disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
c5, m5, and r5 instances	22	352 TiB	368 TiB
c4, m4, and r4 instances	34	368 TiB	368 TiB

Single node with node-based licensing

Instance family	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
c5, m5, and r5 instances	22	352 TiB	368 TiB	352 TiB	2 PiB
c4, m4, and r4 instances	34	368 TiB	368 TiB	544 TiB	368 TiB x each license

Single node with capacity-based licensing

Instance family	Max disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
c5, m5, and r5 instances	22	352 TiB	2 PiB
c4, m4, and r4 instances	34	544 TiB	2 PiB

HA pairs with a Premium license

Instance family	Max disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
c5, m5, and r5 instances	19	304 TiB	368 TiB

Instance family	Max disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
c4, m4, and r4 instances	31	368 TiB	368 TiB

HA pairs with node-based licensing

Instance family	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
c5, m5, and r5 instances	19	304 TiB	368 TiB	304 TiB	2 PiB
c4, m4, and r4 instances	31	368 TiB	368 TiB	496 TiB	368 TiB x each license

HA pairs with capacity-based licensing

Instance family	Max disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
c5, m5, and r5 instances	19	304 TiB	2 PiB
c4, m4, and r4 instances	31	496 TiB	2 PiB

Aggregate limits

Cloud Volumes ONTAP uses AWS volumes as disks and groups them into *aggregates*. Aggregates provide storage to volumes.

Parameter	Limit
Maximum number of aggregates	Single node: Same as the disk limit HA pairs: 18 in a node [1]
Maximum aggregate size	96 TiB of raw capacity [2]
Disks per aggregate	1-6 [3]
Maximum number of RAID groups per aggregate	1

Notes:

1. It is not possible to create 19 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.

Logical storage limits

Logical storage	Parameter	Limit
Storage VMs (SVMs)	Maximum number for Cloud Volumes ONTAP (HA pair or single node)	**C5, M5, and R5 instances with BYOL** The following number of storage VMs are supported with C5, M5, and R5 instance types when you bring your own license (BYOL): • 12 storage VMs with single node systems • 8 storage VMs with HA pairs ⓘ A storage VM spans the entire Cloud Volumes ONTAP system (HA pair or single node) An add-on license is required for each additional *data-serving* SVM beyond the first storage VM that comes with Cloud Volumes ONTAP by default. Contact your account team to obtain an SVM add-on license. Storage VMs that you configure for disaster recovery (DR) don't require an add-on license (they are free of charge), but they do count against the storage VM limit. [1,2] **All other configurations** One data-serving storage VM and one destination storage VM used for disaster recovery are supported. [2] A storage VM spans the entire Cloud Volumes ONTAP system (HA pair or single node).
Files	Maximum size	16 TiB
	Maximum per volume	Volume size dependent, up to 2 billion
FlexClone volumes	Hierarchical clone depth [3]	499
FlexVol volumes	Maximum per node	500
	Minimum size	20 MB
	Maximum size	100 TiB
Qtrees	Maximum per FlexVol volume	4,995
Snapshot copies	Maximum per FlexVol volume	1,023

Notes:

1. For example, if you have 8 data-serving storage VMs on an HA pair, then you've reached the limit and can't create any additional storage VMs. The same is true for another HA pair that has 8 storage VMs configured for disaster recovery—you've reached the limit and can't create any additional storage VMs.

2. You can activate a destination storage VM for data access if there's an outage on the source storage VM. Cloud Manager doesn't provide any setup or orchestration support for storage VM disaster recovery. You must use System Manager or the CLI.

    ◦ SVM Disaster Recovery Preparation Express Guide

    ◦ SVM Disaster Recovery Express Guide

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

iSCSI storage limits

iSCSI storage	Parameter	Limit
LUNs	Maximum per node	1,024
	Maximum number of LUN maps	1,024
	Maximum size	16 TiB
	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

Storage limits in Azure

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.

License	Maximum system capacity (disks + object storage)
Freemium	500 GiB
PAYGO Explore	2 TiB (data tiering is not supported with Explore)
PAYGO Standard	10 TiB

License	Maximum system capacity (disks + object storage)
PAYGO Premium	368 TiB
Node-based license	2 PiB (requires multiple licenses)
Capacity-based license	2 PiB

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 TiB of capacity between both nodes.

Disk and tiering limits by VM size

The disk limits below are specific to disks that contain user data. The limits do not include the root disk, core disk, and VNVRAM.

> ⓘ The number of data disks listed in the tables below are as 9.7 P5. In previous 9.7 releases, two additional data disks were supported. Starting in 9.7 P5, Cloud Volumes ONTAP uses an additional disk for core data and another for VNVRAM. This change reduced the number of disks available for data.

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

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

* HA systems use Premium page blobs as disks, with up to 8 TiB per page blob. The number of supported disks varies by VM size.

> ⓘ You can purchase multiple node-based licenses for a Cloud Volumes ONTAP BYOL single node or HA pair system to allocate more than 368 TiB of capacity, up to the maximum tested and supported system capacity limit of 2 PiB. Be aware that disk limits can prevent you from reaching the capacity limit by using disks alone. You can go beyond the disk limit by tiering inactive data to object storage. Learn how to add additional system licenses to Cloud Volumes ONTAP. Though Cloud Volumes ONTAP supports up to the maximum tested and supported system capacity of 2 PiB, crossing the 2 PiB limit results in an unsupported system configuration.

Single node with a Premium license

VM size	Max data disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
DS5_v2	61	368 TiB	368 TiB
DS14_v2	61	368 TiB	368 TiB

VM size	Max data disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
DS15_v2	61	368 TiB	368 TiB
E32s_v3	29	368 TiB	368 TiB
E48s_v3	29	368 TiB	368 TiB
L8s_v2	13	368 TiB	368 TiB

Single node with node-based licensing

> (i) 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 PiB with DS5_v2.

VM size	Max data 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	13	368 TiB	368 TiB	416 TiB	2 PiB
DS4_v2	29	368 TiB	368 TiB	896 TiB	2 PiB
DS5_v2	61	368 TiB	368 TiB	896 TiB	2 PiB
DS13_v2	29	368 TiB	368 TiB	896 TiB	2 PiB
DS14_v2	61	368 TiB	368 TiB	896 TiB	2 PiB
DS15_v2	61	368 TiB	368 TiB	896 TiB	2 PiB
E32s_v3	29	368 TiB	368 TiB	896 TiB	2 PiB
E48s_v3	29	368 TiB	368 TiB	896 TiB	2 PiB
L8s_v2	13	368 TiB	368 TiB	416 TiB	2 PiB

Single node with capacity-based licensing

VM size	Max data disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
DS3_v2	13	416 TiB	2 PiB
DS4_v2	29	896 TiB	2 PiB
DS5_v2	61	896 TiB	2 PiB
DS13_v2	29	896 TiB	2 PiB
DS14_v2	61	896 TiB	2 PiB
DS15_v2	61	896 TiB	2 PiB
E32s_v3	29	896 TiB	2 PiB

VM size	Max data disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
E48s_v3	29	896 TiB	2 PiB
L8s_v2	13	416 TiB	2 PiB

HA pairs with a Premium license

VM size	Max data disks for an HA pair	Max system capacity with disks alone	Max system capacity with disks and data tiering
DS5_v2	61	368 TiB	368 TiB
DS14_v2	61	368 TiB	368 TiB
DS15_v2	61	368 TiB	368 TiB

HA pairs with node-based licensing

VM size	Max data disks for an HA pair	Max system capacity with one license		Max system capacity with multiple licenses	
		Disks alone	Disks + data tiering	Disks alone	Disks + data tiering
DS4_v2	29	232 TiB	368 TiB	232 TiB	2 PiB
DS5_v2	61	368 TiB	368 TiB	488 TiB	2 PiB
DS13_v2	29	232 TiB	368 TiB	232 TiB	2 PiB
DS14_v2	61	368 TiB	368 TiB	488 TiB	2 PiB
DS15_v2	61	368 TiB	368 TiB	488 TiB	2 PiB

HA pairs with capacity-based licensing

VM size	Max data disks for an HA pair	Max system capacity with disks alone	Max system capacity with disks and data tiering
DS5_v2	61	488 TB	2 PiB
DS14_v2	61	488 TB	2 PiB
DS15_v2	61	488 TB	2 PiB

Aggregate limits

Cloud Volumes ONTAP uses Azure storage as disks and groups them into *aggregates*. Aggregates provide storage to volumes.

Parameter	Limit
Maximum number of aggregates	Same as the disk limit
Maximum aggregate size [1]	384 TiB of raw capacity for single node [2] 352 TiB of raw capacity for single node with PAYGO 96 TiB of raw capacity for HA pairs
Disks per aggregate	1-12 [3]
Maximum number of RAID groups 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. If using node-based licensing, two BYOL licenses are required to reach 384 TiB.

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

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 TiB
	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	100 TiB
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

- SVM Disaster Recovery 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.

iSCSI storage limits

iSCSI storage	Parameter	Limit
LUNs	Maximum per node	1,024
	Maximum number of LUN maps	1,024
	Maximum size	16 TiB
	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

Storage limits in Google Cloud

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.

For some configurations, disk limits prevent you from reaching the capacity limit by using disks alone. You can reach the capacity limit by tiering inactive data to object storage. Refer to the disk limits below for more details.

License	Maximum system capacity (disks + object storage)
Freemium	500 GB
PAYGO Explore	2 TB (data tiering is not supported with Explore)
PAYGO Standard	10 TB
PAYGO Premium	368 TB

License	Maximum system capacity (disks + object storage)
Node-based license	2 PiB (requires multiple licenses)
Capacity-based license	2 PiB

Disk and tiering limits

The table below shows the maximum system capacity with disks alone, and with disks and cold data tiering to object storage. The disk limits are specific to disks that contain user data. The limits do not include the boot disk and root disk.

Parameter	Limit
Maximum disks per system	124
Maximum disk size	16 TB
Maximum system capacity with disks alone	256 TB
Maximum system capacity with disks and cold data tiering to a Google Cloud Storage bucket	Depends on the license. See the table above.

Aggregate limits

Cloud Volumes ONTAP groups Google Cloud disks into *aggregates*. Aggregates provide storage to volumes.

Parameter	Limit
Maximum number of data aggregates	99 [1]
Maximum aggregate size	96 TB of raw capacity [2]
Disks per aggregate	1-6 [3]
Maximum number of RAID groups per aggregate	1

Notes:

1. The maximum number of data aggregates doesn't include the root aggregate.

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.

Logical storage limits

Logical storage	Parameter	Limit
Storage virtual machines (SVMs)	Maximum number for Cloud Volumes ONTAP	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.
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	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
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2. Hierarchical clone depth is the maximum depth of a nested hierarchy of FlexClone volumes that can be created from a single FlexVol volume.

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

iSCSI storage	Parameter	Limit
LIFs	Maximum per port	1
	Maximum per portset	32
Portsets	Maximum per node	256

iSCSI storage	Parameter	Limit
LIFs	Maximum per port	1