



Storage limits

Cloud Volumes ONTAP 9.11.0 release notes

NetApp
April 04, 2022

Table of Contents

- Storage limits 1
 - Storage limits in AWS 1
 - Storage limits in Azure 8
 - Storage limits in Google Cloud 15

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 the system capacity limit. If you reach the licensed capacity limit, Cloud Manager displays an action required message and no longer allows you to add additional disks.

For some 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 | 368 TiB per license |
| 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 family because many EC2 instance types have different disk

limits. Disk limits are also different between single node systems and HA pairs.

Note the following:

- c4, m4, and r4 instance types are not supported with new Cloud Volumes ONTAP 9.10.0 systems. However, we're still showing disk limits for these instance types because you can upgrade a system to the 9.10.0 release when running on one of these instance types.
- 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 now purchase multiple node-based licenses for a Cloud Volumes ONTAP BYOL system to allocate more than 368 TiB of capacity. The number of licenses that you can purchase for a single node system or HA pair is unlimited. 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](#).

Single node with a Premium license

| Instance | Max disks per node | Max system capacity with disks alone | Max system capacity with disks and data tiering |
|--------------------------|--------------------|--------------------------------------|-------------------------------------------------|
| c5, m5, and r5 instances | 21 ¹ | 336 TiB | 368 TiB |
| m5dn.24xlarge | 19 ² | 304 TiB | 368 TiB |
| c4, m4, and r4 instances | 34 | 368 TiB | 368 TiB |

1. 21 data disks is the limit for *new* deployments of Cloud Volumes ONTAP. If you upgrade a system that was created with version 9.7 or earlier, then the system continues to support 22 disks. One less data disk is supported on new systems that use these instance types because of the addition of a core disk starting with the 9.8 release.
2. This instance type has more local NVMe disks than other instance types, which means a smaller number of data disks are supported.

Single node with node-based licensing

| Instance | 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 | 21 ¹ | 336 TiB | 368 TiB | 336 TiB | 368 TiB x each license |
| m5dn.24xlarge | 19 ² | 304 TiB | 368 TiB | 304 TiB | 368 TiB x each license |
| c4, m4, and r4 instances | 34 | 368 TiB | 368 TiB | 544 TiB | 368 TiB x each license |

1. 21 data disks is the limit for *new* deployments of Cloud Volumes ONTAP. If you upgrade a system that was created with version 9.7 or earlier, then the system continues to support 22 disks. One less data disk is supported on new systems that use these instance types because of the addition of a core disk starting

with the 9.8 release.

2. This instance type has more local NVMe disks than other instance types, which means a smaller number of data disks are supported.

Single node with capacity-based licensing

| Instance | Max disks per node | Max system capacity with disks alone | Max system capacity with disks and data tiering |
|--------------------------|--------------------|--------------------------------------|-------------------------------------------------|
| c5, m5, and r5 instances | 21 | 336 TiB | 2 PiB |
| m5dn.24xlarge | 19 ¹ | 304 TiB | 2 PiB |

1. This instance type has more local NVMe disks than other instance types, which means a smaller number of data disks are supported.

HA pairs with a Premium license

| Instance | Max disks per node | Max system capacity with disks alone | Max system capacity with disks and data tiering |
|--------------------------|--------------------|--------------------------------------|-------------------------------------------------|
| c5, m5, and r5 instances | 18 ¹ | 288 TiB | 368 TiB |
| m5dn.24xlarge | 16 ² | 256 TiB | 368 TiB |
| c4, m4, and r4 instances | 31 | 368 TiB | 368 TiB |

1. 18 data disks is the limit for *new* deployments of Cloud Volumes ONTAP. If you upgrade a system that was created with version 9.7 or earlier, then the system continues to support 19 disks. One less data disk is supported on new systems that use these instance types because of the addition of a core disk starting with the 9.8 release.
2. This instance type has more local NVMe disks than other instance types, which means a smaller number of data disks are supported.

HA pairs with node-based licensing

| Instance | 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 | 18 ¹ | 288 TiB | 368 TiB | 288 TiB | 368 TiB x each license |
| m5dn.24xlarge | 16 ² | 256 TiB | 368 TiB | 256 TiB | 368 TiB x each license |
| c4, m4, and r4 instances | 31 | 368 TiB | 368 TiB | 496 TiB | 368 TiB x each license |

1. 18 data disks is the limit for *new* deployments of Cloud Volumes ONTAP. If you upgrade a system that was created with version 9.7 or earlier, then the system continues to support 19 disks. One less data disk is

supported on new systems that use these instance types because of the addition of a core disk starting with the 9.8 release.

2. This instance type has more local NVMe disks than other instance types, which means a smaller number of data disks are supported.

HA pairs with capacity-based licensing

| Instance | Max disks per node | Max system capacity with disks alone | Max system capacity with disks and data tiering |
|--------------------------|--------------------|--------------------------------------|-------------------------------------------------|
| c5, m5, and r5 instances | 18 | 288 TiB | 2 PiB |
| m5dn.24xlarge | 16 ¹ | 256 TiB | 2 PiB |

1. This instance type has more local NVMe disks than other instance types, which means a smaller number of data disks are supported.

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's 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.

Storage VM limits

Some configurations enable you to create additional storage VMs (SVMs) for Cloud Volumes ONTAP.

[Learn how to create additional storage VMs.](#)

| License type | Instance family | Storage VM limit |
|--------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------|
| PAYGO | c4, m4, and r4 | <ul style="list-style-type: none"> • 1 storage VM for serving data • 1 storage VM for disaster recovery |
| | c5, m5, and r5 | <ul style="list-style-type: none"> • 1 storage VM for serving data • 1 storage VM for disaster recovery |
| Freemium | c5, m5, and r5 | <ul style="list-style-type: none"> • 24 storage VMs total ^{1,2} |
| Capacity-based license ³ | c5, m5, and r5 | <ul style="list-style-type: none"> • 24 storage VMs total ^{1,2} |
| Node-based BYOL ⁴ | c4, m4, and r4 | <ul style="list-style-type: none"> • 1 storage VM for serving data • 1 storage VM for disaster recovery |
| | c5, m5, and r5 | <ul style="list-style-type: none"> • 24 storage VMs total ^{1,2} |

1. The limit can be lower, depending on the EC2 instance type that you use. The limits per instance are listed in the section below.
2. These 24 storage VMs can serve data or be configured for disaster recovery (DR).
3. For capacity-based licensing, there are no extra licensing costs for additional storage VMs, but there is a 4 TiB minimum capacity charge per storage VM. For example, if you create two storage VMs and each has 2 TiB of provisioned capacity, you'll be charged a total of 8 TiB.
4. For node-based BYOL, an add-on license is required for each additional *data-serving* storage VM beyond the first storage VM that comes with Cloud Volumes ONTAP by default. Contact your account team to obtain a storage VM 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. For example, if you have 12 data-serving storage VMs and 12 storage VMs configured for disaster recovery, then you've reached the limit and can't create any additional storage VMs.

Storage VM limit by EC2 instance type

When you create an additional storage VM, you need to allocate private IP addresses to port e0a. The table below identifies the maximum number of private IPs per interface, as well as the number of IP addresses that are available on port e0a after Cloud Volumes ONTAP has been deployed. The number of available IP addresses directly affects the maximum number of storage VMs for that configuration.

The instances listed below are for the c5, m5, and r5 instance families.

| Configuration | Instance type | Max private IPs per interface | IPs remaining after deployment ¹ | Max storage VMs without a mgmt LIF ^{2,3} | Max storage VMs with a mgmt LIF ^{2,3} |
|----------------------|---------------|-------------------------------|---------------------------------------------|---------------------------------------------------|------------------------------------------------|
| Single node | *.xlarge | 15 | 9 | 10 | 5 |
| | *.2xlarge | 15 | 9 | 10 | 5 |
| | *.4xlarge | 30 | 24 | 24 | 12 |
| | *.8xlarge | 30 | 24 | 24 | 12 |
| | *.9xlarge | 30 | 24 | 24 | 12 |
| | *.12xlarge | 30 | 24 | 24 | 12 |
| | *.16xlarge | 50 | 44 | 24 | 12 |
| | *.18xlarge | 50 | 44 | 24 | 12 |
| | *.24xlarge | 50 | 44 | 24 | 12 |
| HA pair in single AZ | *.xlarge | 15 | 10 | 11 | 5 |
| | *.2xlarge | 15 | 10 | 11 | 5 |
| | *.4xlarge | 30 | 25 | 24 | 12 |
| | *.8xlarge | 30 | 25 | 24 | 12 |
| | *.9xlarge | 30 | 25 | 24 | 12 |
| | *.12xlarge | 30 | 25 | 24 | 12 |
| | *.16xlarge | 50 | 45 | 24 | 12 |
| | *.18xlarge | 50 | 45 | 24 | 12 |
| | *.24xlarge | 50 | 44 | 24 | 12 |
| HA pair in multi AZs | *.xlarge | 15 | 12 | 13 | 13 |
| | *.2xlarge | 15 | 12 | 13 | 13 |
| | *.4xlarge | 30 | 27 | 24 | 24 |
| | *.8xlarge | 30 | 27 | 24 | 24 |
| | *.9xlarge | 30 | 27 | 24 | 24 |
| | *.12xlarge | 30 | 27 | 24 | 24 |
| | *.16xlarge | 50 | 47 | 24 | 24 |
| | *.18xlarge | 50 | 47 | 24 | 24 |
| | *.24xlarge | 50 | 44 | 24 | 12 |

1. This number indicates how many *remaining* private IP addresses are available on port e0a after Cloud Volumes ONTAP is deployed and set up. For example, a *.2xlarge system supports a maximum of 15 IP addresses per network interface. When an HA pair is deployed in a single AZ, 5 private IP addresses are allocated to port e0a. As a result, an HA pair that uses a *.2xlarge instance type has 10 private IP addresses remaining for additional storage VMs.
2. The number listed in these columns includes the initial storage VM that Cloud Manager creates by default. For example, if 24 is listed in this column, it means that you can create 23 additional storage VMs for a total

of 24.

3. A management LIF for the storage VM is optional. A management LIF provides a connection to management tools like SnapCenter.

Because it requires a private IP address, it will limit the number of additional storage VMs that you can create. The only exception is an HA pair in multiple AZs. In that case, the IP address for the management LIF is a *floating* IP address so it doesn't count against the *private* IP limit.

File and volume limits

| Logical storage | Parameter | Limit |
|-------------------|---------------------------------------|----------------------------------------|
| Files | Maximum size | 16 TiB |
| | Maximum per volume | Volume size dependent, up to 2 billion |
| FlexClone volumes | Hierarchical clone depth ¹ | 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 |

1. 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 the system capacity limit. If you reach the licensed capacity limit, Cloud Manager displays an action required message and no longer allows you to add additional disks.

| 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 | 368 TiB per license |
| 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 VNV RAM.

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 system to allocate more than 368 TiB of capacity. The number of licenses that you can purchase for a single node system or HA pair is unlimited. 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](#).

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 |
| DS15_v2 | 61 | 368 TiB | 368 TiB |
| E32s_v3 | 29 | 368 TiB | 368 TiB |
| E48s_v3 | 29 | 368 TiB | 368 TiB |
| E64is_v3 | 29 | 368 TiB | 368 TiB |
| E32ds_v4 | 29 | 368 TiB | 368 TiB |
| E48ds_v4 | 29 | 368 TiB | 368 TiB |
| E80ids_v4 | 61 | 368 TiB | 368 TiB |

Single node with node-based licensing



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 1.95 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 |
| DS4_v2 | 29 | 368 TiB | 368 TiB | 928 TiB | 368 TiB x each license |
| DS5_v2 | 61 | 368 TiB | 368 TiB | 1.95 PiB | 368 TiB x each license |
| DS13_v2 | 29 | 368 TiB | 368 TiB | 928 TiB | 368 TiB x each license |
| DS14_v2 | 61 | 368 TiB | 368 TiB | 1.95 PiB | 368 TiB x each license |

| VM size | Max data disks per node | Max system capacity with one license | | Max system capacity with multiple licenses | |
|-----------|-------------------------|--------------------------------------|---------|--------------------------------------------|------------------------|
| DS15_v2 | 61 | 368 TiB | 368 TiB | 1.95 PiB | 368 TiB x each license |
| L8s_v2 | 13 | 368 TiB | 368 TiB | 416 TiB | 368 TiB x each license |
| E4s_v3 | 5 | 160 TiB | 368 TiB | 160 TiB | 368 TiB x each license |
| E8s_v3 | 13 | 368 TiB | 368 TiB | 416 TiB | 368 TiB x each license |
| E32s_v3 | 29 | 368 TiB | 368 TiB | 928 TiB | 368 TiB x each license |
| E48s_v3 | 29 | 368 TiB | 368 TiB | 928 TiB | 368 TiB x each license |
| E64is_v3 | 29 | 368 TiB | 368 TiB | 928 TiB | 368 TiB x each license |
| E4ds_v4 | 5 | 160 TiB | 368 TiB | 160 TiB | 368 TiB x each license |
| E8ds_v4 | 13 | 368 TiB | 368 TiB | 416 TiB | 368 TiB x each license |
| E32ds_v4 | 29 | 368 TiB | 368 TiB | 928 TiB | 368 TiB x each license |
| E48ds_v4 | 29 | 368 TiB | 368 TiB | 928 TiB | 368 TiB x each license |
| E80ids_v4 | 61 | 368 TiB | 368 TiB | 1.95 PiB | 368 TiB x each license |

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 |
|---------|-------------------------|--------------------------------------|-------------------------------------------------|
| DS4_v2 | 29 | 928 TiB | 2 PiB |
| DS5_v2 | 61 | 1.95 PiB | 2 PiB |
| DS13_v2 | 29 | 928 TiB | 2 PiB |
| DS14_v2 | 61 | 1.95 PiB | 2 PiB |
| DS15_v2 | 61 | 1.95 PiB | 2 PiB |
| L8s_v2 | 13 | 416 TiB | 2 PiB |
| E4s_v3 | 5 | 160 TiB | 2 PiB |
| E8s_v3 | 13 | 416 TiB | 2 PiB |
| E32s_v3 | 29 | 928 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 | 928 TiB | 2 PiB |
| E64is_v3 | 29 | 928 TiB | 2 PiB |
| E4ds_v4 | 5 | 160 TiB | 2 PiB |
| E8ds_v4 | 13 | 416 TiB | 2 PiB |
| E32ds_v4 | 29 | 928 TiB | 2 PiB |
| E48ds_v4 | 29 | 928 TiB | 2 PiB |
| E80ids_v4 | 61 | 1.95 PiB | 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 |
| E8s_v3 | 13 | 104 TiB | 368 TiB |
| E48s_v3 | 29 | 232 TiB | 368 TiB |
| E32ds_v4 | 29 | 232 TiB | 368 TiB |
| E48ds_v4 | 29 | 232 TiB | 368 TiB |
| E80ids_v4 | 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 | 368 TiB x each license |
| DS5_v2 | 61 | 368 TiB | 368 TiB | 488 TiB | 368 TiB x each license |

| VM size | Max data disks for an HA pair | Max system capacity with one license | | Max system capacity with multiple licenses | |
|-----------|-------------------------------|--------------------------------------|---------|--------------------------------------------|------------------------|
| DS13_v2 | 29 | 232 TiB | 368 TiB | 232 TiB | 368 TiB x each license |
| DS14_v2 | 61 | 368 TiB | 368 TiB | 488 TiB | 368 TiB x each license |
| DS15_v2 | 61 | 368 TiB | 368 TiB | 488 TiB | 368 TiB x each license |
| E8s_v3 | 13 | 104 TiB | 368 TiB | 104 TiB | 368 TiB x each license |
| E48s_v3 | 29 | 232 TiB | 368 TiB | 232 TiB | 368 TiB x each license |
| E8ds_v4 | 13 | 104 TiB | 368 TiB | 104 TiB | 368 TiB x each license |
| E32ds_v4 | 29 | 232 TiB | 368 TiB | 232 TiB | 368 TiB x each license |
| E48ds_v4 | 29 | 232 TiB | 368 TiB | 232 TiB | 368 TiB x each license |
| E80ids_v4 | 61 | 368 TiB | 368 TiB | 488 TiB | 368 TiB x each license |

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 |
|-----------|-------------------------------|--------------------------------------|-------------------------------------------------|
| DS4_v2 | 29 | 232 TiB | 2 PiB |
| DS5_v2 | 61 | 488 TiB | 2 PiB |
| DS13_v2 | 29 | 232 TiB | 2 PiB |
| DS14_v2 | 61 | 488 TiB | 2 PiB |
| DS15_v2 | 61 | 488 TiB | 2 PiB |
| E8s_v3 | 13 | 104 TiB | 2 PiB |
| E48s_v3 | 29 | 232 TiB | 2 PiB |
| E8ds_v4 | 13 | 104 TiB | 2 PiB |
| E32ds_v4 | 29 | 232 TiB | 2 PiB |
| E48ds_v4 | 29 | 232 TiB | 2 PiB |
| E80ids_v4 | 61 | 488 TiB | 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.

Storage VM limits

Some configurations enable you to create additional storage VMs (SVMs) for Cloud Volumes ONTAP.

These are the tested limits. While it is theoretically possible to configure additional storage VMs, it's not supported.

[Learn how to create additional storage VMs.](#)

| License type | Storage VM limit |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| PAYGO | <ul style="list-style-type: none">• 1 storage VM for serving data• 1 storage VM for disaster recovery |
| Freemium | 24 storage VMs total ^{1,2} |
| Capacity-based license ³ | 24 storage VMs total ^{1,2} |
| Node-based BYOL ⁴ | 24 storage VMs total ^{1,2} |

1. These 24 storage VMs can serve data or be configured for disaster recovery (DR).
2. Each storage VM can have up to three LIFs where two are data LIFs and one is an SVM management LIF.
3. For capacity-based licensing, there are no extra licensing costs for additional storage VMs, but there is a 4 TiB minimum capacity charge per storage VM. For example, if you create two storage VMs and each has 2 TiB of provisioned capacity, you'll be charged a total of 8 TiB.

4. For node-based BYOL, an add-on license is required for each additional *data-serving* storage VM beyond the first storage VM that comes with Cloud Volumes ONTAP by default. Contact your account team to obtain a storage VM 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. For example, if you have 12 data-serving storage VMs and 12 storage VMs configured for disaster recovery, then you've reached the limit and can't create any additional storage VMs.

File and volume limits

| Logical storage | Parameter | Limit |
|-------------------|---------------------------------------|----------------------------------------|
| 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 |

| iSCSI storage | Parameter | Limit |
|----------------|---------------------|-------|
| 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 the system capacity limit. If you reach the licensed capacity limit, Cloud Manager displays an action required message and no longer allows you to add additional disks.

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 |
| Node-based license | 368 TB per license |
| Capacity-based license | 2 PiB |

For an HA pair, is the licensed 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 pair, does mirrored data count against the licensed capacity limit?

No, it doesn't. Data in an HA pair is synchronously mirrored between the nodes so that the data is available in

the event of failure in Google Cloud. 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.

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 data disks | <ul style="list-style-type: none">• 124 for single node systems• 123 per node for HA pairs |
| Maximum disk size | 64 TB |
| Maximum system capacity with disks alone | 256 TB ¹ |
| Maximum system capacity with disks and cold data tiering to a Google Cloud Storage bucket | Depends on the license. See the table above. |

¹ This limit is defined by virtual machine limits in Google Cloud Platform.

Aggregate limits

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

| Parameter | Limit |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Maximum number of data aggregates ¹ | <ul style="list-style-type: none">• 99 for single node• 64 for an entire HA pair |
| Maximum aggregate size | 256 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 (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 | 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](#)
 - [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 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 |

Copyright Information

Copyright © 2022 NetApp, Inc. All rights reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means-graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system-without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

Trademark Information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.