



Storage limits for Cloud Volumes ONTAP 9.5

Cloud Volumes ONTAP

Ben Cammett
August 03, 2020

This PDF was generated from https://docs.netapp.com/us-en/cloud-volumes-ontap/reference_storage_limits_95.html on March 18, 2021. Always check docs.netapp.com for the latest.

Table of Contents

- Storage limits for Cloud Volumes ONTAP 9.5 1
 - Maximum system capacity by license 1
 - Capacity and disk limits by AWS EC2 instance 1
 - Disk and tiering limits by Azure VM size 4
 - Aggregate limits in AWS 6
 - Aggregate limits in Azure 6
 - Logical storage limits 7
 - iSCSI storage limits 8

Storage limits for Cloud Volumes ONTAP 9.5

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 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 below 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.

Capacity and disk limits by AWS EC2 instance

Cloud Volumes ONTAP uses EBS volumes as disks. The disk limits below are specific to disks that contain user data. The limits do not include the boot disk and root disk.

The maximum EBS disk size is 16 TB. The number of supported disks varies by instance type.

The tables below shows the maximum capacity by instance type with just EBS disks, and with disks and tiering to object storage.

Single node with a Premium license

Instance type	Max disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
c4.4xlarge	34	368 TB	368 TB
c4.8xlarge	34	368 TB	368 TB
c5d.4xlarge	23	368 TB	368 TB
c5d.9xlarge	23	368 TB	368 TB
m4.4xlarge	34	368 TB	368 TB
m5.4xlarge	23	368 TB	368 TB
r4.2xlarge	34	368 TB	368 TB
r5.2xlarge	23	368 TB	368 TB
r5d.2xlarge	23	368 TB	368 TB

Single node with one or more BYOL licenses

Instance type	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
c4.4xlarge	34	368 TB	368 TB	544 TB	368 TB x each license
c4.8xlarge	34	368 TB	368 TB	544 TB	368 TB x each license
c5d.4xlarge	23	368 TB	368 TB	368 TB	368 TB x each license
c5d.9xlarge	23	368 TB	368 TB	368 TB	368 TB x each license
m4.xlarge	34	368 TB	368 TB	544 TB	368 TB x each license
m4.2xlarge	34	368 TB	368 TB	544 TB	368 TB x each license
m4.4xlarge	34	368 TB	368 TB	544 TB	368 TB x each license
m5.xlarge	23	368 TB	368 TB	368 TB	368 TB x each license
m5.2xlarge	23	368 TB	368 TB	368 TB	368 TB x each license
m5.4xlarge	23	368 TB	368 TB	368 TB	368 TB x each license

Instance type	Max disks per node	Max system capacity with one license		Max system capacity with multiple licenses	
r4.xlarge	34	368 TB	368 TB	544 TB	368 TB x each license
r4.2xlarge	34	368 TB	368 TB	544 TB	368 TB x each license
r5.xlarge	23	368 TB	368 TB	368 TB	368 TB x each license
r5.2xlarge	23	368 TB	368 TB	368 TB	368 TB x each license
r5d.2xlarge	23	368 TB	368 TB	368 TB	368 TB x each license

HA pairs with a Premium license

Instance type	Max disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
c4.4xlarge	31	368 TB	368 TB
c4.8xlarge	31	368 TB	368 TB
c5d.4xlarge	20	320 TB	368 TB
c5d.9xlarge	20	320 TB	368 TB
m4.4xlarge	31	368 TB	368 TB
m5.4xlarge	20	320 TB	368 TB
r4.2xlarge	31	368 TB	368 TB
r5.2xlarge	20	320 TB	368 TB
r5d.2xlarge	20	320 TB	368 TB

HA pairs with one or more BYOL licenses

Instance type	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
c4.4xlarge	31	368 TB	368 TB	496 TB	368 TB x each license
c4.8xlarge	31	368 TB	368 TB	496 TB	368 TB x each license
c5d.4xlarge	20	320 TB	368 TB	320 TB	368 TB x each license

Instance type	Max disks per node	Max system capacity with one license		Max system capacity with multiple licenses	
c5d.9xlarge	20	320 TB	368 TB	320 TB	368 TB x each license
m4.xlarge	31	368 TB	368 TB	496 TB	368 TB x each license
m4.2xlarge	31	368 TB	368 TB	496 TB	368 TB x each license
m4.4xlarge	31	368 TB	368 TB	496 TB	368 TB x each license
m5.xlarge	20	320 TB	368 TB	320 TB	368 TB x each license
m5.2xlarge	20	320 TB	368 TB	320 TB	368 TB x each license
m5.4xlarge	20	320 TB	368 TB	320 TB	368 TB x each license
r4.xlarge	31	368 TB	368 TB	496 TB	368 TB x each license
r4.2xlarge	31	368 TB	368 TB	496 TB	368 TB x each license
r5.xlarge	20	320 TB	368 TB	320 TB	368 TB x each license
r5.2xlarge	20	320 TB	368 TB	320 TB	368 TB x each license
r5d.2xlarge	20	320 TB	368 TB	320 TB	368 TB x each license

Disk and tiering limits by Azure VM size

The disk limits below are specific to disks that contain user data. The limits do not include the boot disk and root disk. The tables below show the maximum system capacity by VM size with managed 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 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.
- HA systems use Premium page blobs as disks, with up to 8 TB per page blob. The number of supported disks varies by VM size.

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

HA pairs with a Premium license

VM size	Max disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
DS4_v2	31	368 TB	Tiering not supported
DS5_v2	63	368 TB	Tiering not supported
DS13_v2	31	368 TB	Tiering not supported
DS14_v2	63	368 TB	Tiering not supported
DS15_v2	63	368 TB	Tiering not supported

HA pairs 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 3 BYOL licenses to reach 1 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
DS4_v2	31	368 TB	Tiering not supported	496 TB	Tiering not supported
DS5_v2	63	368 TB	Tiering not supported	1 PB	Tiering not supported
DS13_v2	31	368 TB	Tiering not supported	496 TB	Tiering not supported
DS14_v2	63	368 TB	Tiering not supported	1 PB	Tiering not supported
DS15_v2	63	368 TB	Tiering not supported	1 PB	Tiering not supported

Aggregate limits in AWS

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 TB 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 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.

Aggregate limits in Azure

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	200 TB of raw capacity for single node ¹ 96 TB of raw capacity for HA pairs ¹
Disks per aggregate	1-12 ²
Maximum number of RAID groups per aggregate	Single node: 1 HA pairs: 6

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.

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 HA: Dependent on the size of the aggregate ³ Azure single node: 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.
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

Copyright Information

Copyright © 2021 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.