



# **Storage limits for Cloud Volumes ONTAP 9.6 in AWS**

## **Cloud Volumes ONTAP**

Ben Cammett  
August 03, 2020

# Table of Contents

- Storage limits for Cloud Volumes ONTAP 9.6 in AWS ..... 1
  - Maximum system capacity by license ..... 1
  - Disk and tiering limits by EC2 instance ..... 1
  - Aggregate limits ..... 5
  - Logical storage limits ..... 6
  - iSCSI storage limits ..... 6

# Storage limits for Cloud Volumes ONTAP 9.6 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 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.

## Disk and tiering limits by EC2 instance

Cloud Volumes ONTAP uses EBS volumes as disks, with a maximum disk size of 16 TB. 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.

Disk limits are shown by instance for Premium and BYOL licenses only because disk limits can't be reached with Explore or Standard licenses.

## 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
c5.9xlarge	22	352 TB	368 TB
c5.18xlarge	22	352 TB	368 TB
c5d.4xlarge	22	352 TB	368 TB
c5d.9xlarge	22	352 TB	368 TB
c5d.18xlarge	22	352 TB	368 TB
m4.4xlarge	34	368 TB	368 TB
m5.4xlarge	22	352 TB	368 TB
m5d.8xlarge	22	352 TB	368 TB
r4.2xlarge	34	368 TB	368 TB
r5.2xlarge	22	352 TB	368 TB
r5d.2xlarge	22	352 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
c5.9xlarge	22	352 TB	368 TB	352 TB	368 TB x each license
c5.18xlarge	22	352 TB	368 TB	352 TB	368 TB x each license
c5d.4xlarge	22	352 TB	368 TB	352 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	22	352 TB	368 TB	352 TB	368 TB x each license
c5d.18xlarge	22	352 TB	368 TB	352 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	22	352 TB	368 TB	352 TB	368 TB x each license
m5.2xlarge	22	352 TB	368 TB	352 TB	368 TB x each license
m5.4xlarge	22	352 TB	368 TB	352 TB	368 TB x each license
m5d.8xlarge	22	352 TB	368 TB	352 TB	368 TB x each license
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	22	352 TB	368 TB	352 TB	368 TB x each license
r5.2xlarge	22	352 TB	368 TB	352 TB	368 TB x each license
r5d.2xlarge	22	352 TB	368 TB	352 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
c5.9xlarge	19	304 TB	368 TB
c5.18xlarge	19	304 TB	368 TB

Instance type	Max disks per node	Max system capacity with disks alone	Max system capacity with disks and data tiering
c5d.4xlarge	19	304 TB	368 TB
c5d.9xlarge	19	304 TB	368 TB
c5d.18xlarge	19	304 TB	368 TB
m4.4xlarge	31	368 TB	368 TB
m5.4xlarge	19	304 TB	368 TB
m5d.8xlarge	19	304 TB	368 TB
r4.2xlarge	31	368 TB	368 TB
r5.2xlarge	19	304 TB	368 TB
r5d.2xlarge	19	304 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
c5.9xlarge	19	304 TB	368 TB	304 TB	368 TB x each license
c5.18xlarge	19	304 TB	368 TB	304 TB	368 TB x each license
c5d.4xlarge	19	304 TB	368 TB	304 TB	368 TB x each license
c5d.9xlarge	19	304 TB	368 TB	304 TB	368 TB x each license
c5d.18xlarge	19	304 TB	368 TB	304 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

Instance type	Max disks per node	Max system capacity with one license		Max system capacity with multiple licenses	
m4.4xlarge	31	368 TB	368 TB	496 TB	368 TB x each license
m5.xlarge	19	304 TB	368 TB	304 TB	368 TB x each license
m5.2xlarge	19	304 TB	368 TB	304 TB	368 TB x each license
m5.4xlarge	19	304 TB	368 TB	304 TB	368 TB x each license
m5d.8xlarge	19	304 TB	368 TB	304 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	19	304 TB	368 TB	304 TB	368 TB x each license
r5.2xlarge	19	304 TB	368 TB	304 TB	368 TB x each license
r5d.2xlarge	19	304 TB	368 TB	304 TB	368 TB x each license

## 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 <sup>1</sup>
Maximum aggregate size	96 TB of raw capacity <sup>2</sup>
Disks per aggregate	1-6 <sup>3</sup>
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.

## Logical storage limits

Logical storage	Parameter	Limit
<b>Storage virtual machines (SVMs)</b>	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. <sup>1</sup>  The one data-serving SVM spans the entire Cloud Volumes ONTAP system (HA pair or single node).
<b>Files</b>	Maximum size	16 TB
	Maximum per volume	Volume size dependent, up to 2 billion
<b>FlexClone volumes</b>	Hierarchical clone depth <sup>2</sup>	499
<b>FlexVol volumes</b>	Maximum per node	500
	Minimum size	20 MB
	Maximum size	Dependent on the size of the aggregate
<b>Qtrees</b>	Maximum per FlexVol volume	4,995
<b>Snapshot copies</b>	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
<b>LUNs</b>	Maximum per node	1,024
	Maximum number of LUN maps	1,024
	Maximum size	16 TB
	Maximum per volume	512
<b>igroups</b>	Maximum per node	256
<b>Initiators</b>	Maximum per node	512
	Maximum per igroup	128



<b>iSCSI storage</b>	<b>Parameter</b>	<b>Limit</b>
<b>iSCSI sessions</b>	Maximum per node	1,024
<b>LIFs</b>	Maximum per port	32
	Maximum per portset	32
<b>Portsets</b>	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.