



# **High-availability pairs**

## **Cloud Volumes ONTAP**

NetApp  
July 13, 2022

# Table of Contents

- High-availability pairs ..... 1
  - High-availability pairs in Google Cloud ..... 1
  - Actions unavailable during takeover ..... 5

# High-availability pairs

## High-availability pairs in Google Cloud

A Cloud Volumes ONTAP high availability (HA) configuration provides nondisruptive operations and fault tolerance. In Google Cloud, data is synchronously mirrored between the two nodes.

### HA components

Cloud Volumes ONTAP HA configurations in Google Cloud include the following components:

- Two Cloud Volumes ONTAP nodes whose data is synchronously mirrored between each other.
- A mediator instance that provides a communication channel between the nodes to assist in storage takeover and giveback processes.

The mediator runs the Linux operating system on a f1-micro instance and uses two standard persistent disks that are 10 GB each.

- One zone or three zones (recommended).

If you choose three zones, the two nodes and mediator are in separate Google Cloud zones.

- Four Virtual Private Clouds (VPCs).

The configuration uses four VPCs because GCP requires that each network interface resides in a separate VPC network.

- Four Google Cloud internal load balancers (TCP/UDP) that manage incoming traffic to the Cloud Volumes ONTAP HA pair.

[Learn about networking requirements](#), including more details about load balancers, VPCs, internal IP addresses, subnets, and more.

The following conceptual image shows a Cloud Volumes ONTAP HA pair and its components:



## Mediator

Here are some key details about the mediator instance in Google Cloud:

### Instance type

f1-micro

### Disks

Two standard persistent disks that are 10 GiB each.

### Operating system

Debian 11



For Cloud Volumes ONTAP 9.10.0 and earlier, Debian 10 was installed on the mediator.

## Upgrades

When you upgrade Cloud Volumes ONTAP, Cloud Manager also updates the mediator instance as needed.

## Access to the instance

For Debian, the default cloud user is `admin`. Google Cloud creates and adds a certificate for the `admin` user when SSH access is requested through the Google Cloud console or `gcloud` command line. You can specify `sudo` to gain root privileges.

## Third-party agents

Third-party agents or VM extensions are not supported on the mediator instance.

## Storage takeover and giveback

If a node goes down, the other node can serve data for its partner to provide continued data service. Clients can access the same data from the partner node because the data was synchronously mirrored to the partner.

After the node reboots, the partner must resync data before it can return the storage. The time that it takes to resync data depends on how much data was changed while the node was down.

Storage takeover, resync, and giveback are all automatic by default. No user action is required.

## RPO and RTO

An HA configuration maintains high availability of your data as follows:

- The recovery point objective (RPO) is 0 seconds.

Your data is transactionally consistent with no data loss.

- The recovery time objective (RTO) is 60 seconds.

In the event of an outage, data should be available in 60 seconds or less.

## HA deployment models

You can ensure the high availability of your data by deploying an HA configuration in multiple zones or in a single zone.

### Multiple zones (recommended)

Deploying an HA configuration across three zones ensures continuous data availability if a failure occurs within a zone. Note that write performance is slightly lower compared to using a single zone, but it's minimal.

### Single zone

When deployed in a single zone, a Cloud Volumes ONTAP HA configuration uses a spread placement policy. This policy ensures that an HA configuration is protected from a single point of failure within the zone, without having to use separate zones to achieve fault isolation.

This deployment model does lower your costs because there are no data egress charges between zones.

## How storage works in an HA pair

Unlike an ONTAP cluster, storage in a Cloud Volumes ONTAP HA pair in GCP is not shared between nodes. Instead, data is synchronously mirrored between the nodes so that the data is available in the event of failure.

## Storage allocation

When you create a new volume and additional disks are required, Cloud Manager allocates the same number of disks to both nodes, creates a mirrored aggregate, and then creates the new volume. For example, if two disks are required for the volume, Cloud Manager allocates two disks per node for a total of four disks.

## Storage configurations

You can use an HA pair as an active-active configuration, in which both nodes serve data to clients, or as an active-passive configuration, in which the passive node responds to data requests only if it has taken over storage for the active node.

## Performance expectations for an HA configuration

A Cloud Volumes ONTAP HA configuration synchronously replicates data between nodes, which consumes network bandwidth. As a result, you can expect the following performance in comparison to a single-node Cloud Volumes ONTAP configuration:

- For HA configurations that serve data from only one node, read performance is comparable to the read performance of a single-node configuration, whereas write performance is lower.
- For HA configurations that serve data from both nodes, read performance is higher than the read performance of a single-node configuration, and write performance is the same or higher.

For more details about Cloud Volumes ONTAP performance, see [Performance](#).

## Client access to storage

Clients should access NFS and CIFS volumes by using the data IP address of the node on which the volume resides. If NAS clients access a volume by using the IP address of the partner node, traffic goes between both nodes, which reduces performance.



If you move a volume between nodes in an HA pair, you should remount the volume by using the IP address of the other node. Otherwise, you can experience reduced performance. If clients support NFSv4 referrals or folder redirection for CIFS, you can enable those features on the Cloud Volumes ONTAP systems to avoid remounting the volume. For details, see ONTAP documentation.

You can easily identify the correct IP address from Cloud Manager:

## Volumes

2 Volumes | 0.22 TB Allocated | < 0.01 TB Used (0 TB in S3)



### Related links

- [Learn about networking requirements](#)
- [Learn how to get started in GCP](#)

## Actions unavailable during takeover

When a node in an HA pair isn't available, the other node serves data for its partner to provide continued data service. This is called *storage takeover*. Several actions are unavailable until in storage giveback is complete.



When a node in an HA pair is unavailable, the state of the working environment in Cloud Manager is *Degraded*.

The following actions are unavailable from Cloud Manager during storage takeover:

- Support registration
- License changes
- Instance or VM type changes
- Write speed changes
- CIFS setup
- Changing the location of configuration backups
- Setting the cluster password
- Managing disks and aggregates (advanced allocation)

These actions are available again after storage giveback completes and the state of the working environment changes back to normal.

## 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.