



System administration

Cloud Volumes ONTAP

NetApp
May 11, 2022

This PDF was generated from <https://docs.netapp.com/us-en/cloud-manager-cloud-volumes-ontap/aws/task-updating-ontap-cloud.html> on May 11, 2022. Always check docs.netapp.com for the latest.

Table of Contents

- System administration 1
 - Upgrade Cloud Volumes ONTAP software. 1
 - Registering pay-as-you-go systems 7
 - Managing the state of Cloud Volumes ONTAP 8
 - Synchronize the system time using NTP 10
 - Modify system write speed 10
 - Change the password for Cloud Volumes ONTAP 10
 - Add, remove, or delete systems 11
 - Administration in AWS 13
 - Use System Manager or the CLI 15

System administration

Upgrade Cloud Volumes ONTAP software

Upgrade Cloud Volumes ONTAP from Cloud Manager to gain access to the latest new features and enhancements. You should prepare Cloud Volumes ONTAP systems before you upgrade the software.

Upgrade overview

You should be aware of the following before you start the Cloud Volumes ONTAP upgrade process.

Upgrade from Cloud Manager only

Upgrades of Cloud Volumes ONTAP must be completed from Cloud Manager. You should not upgrade Cloud Volumes ONTAP by using System Manager or the CLI. Doing so can impact system stability.

How to upgrade

Cloud Manager provides two ways to upgrade Cloud Volumes ONTAP:

- By following upgrade notifications that appear in the working environment
- By placing the upgrade image at an HTTPS location and then providing Cloud Manager with the URL

Supported upgrade paths

The version of Cloud Volumes ONTAP that you can upgrade to depends on the version of Cloud Volumes ONTAP that you're currently running.

Current version	Versions that you can directly upgrade to
9.10.1	9.11.0
9.10.0	9.10.1
9.9.1	9.10.1
	9.10.0
9.9.0	9.9.1
9.8	9.9.1
9.7	9.8
9.6	9.7
9.5	9.6
9.4	9.5
9.3	9.4
9.2	9.3

Current version	Versions that you can directly upgrade to
9.1	9.2
9.0	9.1
8.3	9.0

Note the following:

- The supported upgrade paths for Cloud Volumes ONTAP are different than they are for an on-premises ONTAP cluster.
- If you upgrade by following the upgrade notifications that appear in a working environment, Cloud Manager will prompt you to upgrade to a release that follows these supported upgrade paths.
- If you upgrade by placing an upgrade image at an HTTPS location, be sure to follow these supported upgrade paths.
- In some cases, you might need to upgrade a few times to reach your target release.

For example, if you're running version 9.8 and you want to upgrade to 9.10.1, you first need to upgrade to version 9.9.1 and then to 9.10.1.

Reverting or downgrading

Reverting or downgrading Cloud Volumes ONTAP to a previous release is not supported.

Support registration

Cloud Volumes ONTAP must be registered with NetApp support in order to upgrade the software using any of the methods described on this page. This applies to both PAYGO and BYOL. You'll need to [manually register PAYGO systems](#), while BYOL systems are registered by default.



A system that isn't registered for support will still receive the software update notifications that appear in Cloud Manager when a new version is available. But you will need to register the system before you can upgrade the software.

Upgrades of the HA mediator

Cloud Manager also updates the mediator instance as needed during the Cloud Volumes ONTAP upgrade process.

Prepare to upgrade

Before performing an upgrade, you must verify that your systems are ready and make any required configuration changes.

- [Plan for downtime](#)
- [Verify that automatic giveback is still enabled](#)
- [Suspend SnapMirror transfers](#)
- [Verify that aggregates are online](#)

Plan for downtime

When you upgrade a single-node system, the upgrade process takes the system offline for up to 25 minutes, during which I/O is interrupted.

Upgrading an HA pair is nondisruptive and I/O is uninterrupted. During this nondisruptive upgrade process, each node is upgraded in tandem to continue serving I/O to clients.

Verify that automatic giveback is still enabled

Automatic giveback must be enabled on a Cloud Volumes ONTAP HA pair (this is the default setting). If it isn't, then the operation will fail.

[ONTAP 9 Documentation: Commands for configuring automatic giveback](#)

Suspend SnapMirror transfers

If a Cloud Volumes ONTAP system has active SnapMirror relationships, it is best to suspend transfers before you update the Cloud Volumes ONTAP software. Suspending the transfers prevents SnapMirror failures. You must suspend the transfers from the destination system.



Even though Cloud Backup uses an implementation of SnapMirror to create backup files (called SnapMirror Cloud), backups do not need to be suspended when a system is upgraded.

About this task

These steps describe how to use System Manager for version 9.3 and later.

Steps

1. Log in to System Manager from the destination system.

You can log in to System Manager by pointing your web browser to the IP address of the cluster management LIF. You can find the IP address in the Cloud Volumes ONTAP working environment.



The computer from which you are accessing Cloud Manager must have a network connection to Cloud Volumes ONTAP. For example, you might need to log in to Cloud Manager from a jump host that's in your cloud provider network.

2. Click **Protection > Relationships**.
3. Select the relationship and click **Operations > Quiesce**.

Verify that aggregates are online

Aggregates for Cloud Volumes ONTAP must be online before you update the software. Aggregates should be online in most configurations, but if they are not, then you should bring them online.

About this task

These steps describe how to use System Manager for version 9.3 and later.

Steps

1. In the working environment, click the menu icon, and then click **Advanced > Advanced allocation**.
2. Select an aggregate, click **Info**, and then verify that the state is online.

aggr1		
Aggregate Capacity:	88.57 GB	

Used Aggregate Capacity:	1.07 GB	

Volumes:	2	▼

AWS Disks:	1	▼

State:	online	

3. If the aggregate is offline, use System Manager to bring the aggregate online:
 - a. Click **Storage > Aggregates & Disks > Aggregates**.
 - b. Select the aggregate, and then click **More Actions > Status > Online**.

Upgrade Cloud Volumes ONTAP

Cloud Manager notifies you when a new version is available for upgrade. You can start the upgrade process from this notification. For details, see [Upgrade from Cloud Manager notifications](#).

Another way to perform software upgrades by using an image on an external URL. This option is helpful if Cloud Manager can't access the S3 bucket to upgrade the software or if you were provided with a patch. For details, see [Upgrade from an image available at a URL](#).

Upgrade from Cloud Manager notifications

Cloud Manager displays a notification in Cloud Volumes ONTAP working environments when a new version of Cloud Volumes ONTAP is available:



You can start the upgrade process from this notification, which automates the process by obtaining the software image from an S3 bucket, installing the image, and then restarting the system.

Before you begin

Cloud Manager operations such as volume or aggregate creation must not be in progress on the Cloud Volumes ONTAP system.

Steps

1. Click **Canvas**.
2. Select a working environment.

A notification appears in the right pane if a new version is available:



3. If a new version is available, click **Upgrade**.
4. In the Release Information page, click the link to read the Release Notes for the specified version, and then select the **I have read...** check box.
5. In the End User License Agreement (EULA) page, read the EULA, and then select **I read and approve the EULA**.
6. In the Review and Approve page, read the important notes, select **I understand...**, and then click **Go**.

Result

Cloud Manager starts the software upgrade. You can perform actions on the working environment once the software update is complete.

After you finish

If you suspended SnapMirror transfers, use System Manager to resume the transfers.

Upgrade from an image available at a URL

You can place the Cloud Volumes ONTAP software image on the Connector or on an HTTP server and then initiate the software upgrade from Cloud Manager. You might use this option if Cloud Manager can't access the S3 bucket to upgrade the software.

Before you begin

Cloud Manager operations such as volume or aggregate creation must not be in progress on the Cloud Volumes ONTAP system.

Steps

1. Optional: Set up an HTTP server that can host the Cloud Volumes ONTAP software image.

If you have a VPN connection to the virtual network, you can place the Cloud Volumes ONTAP software

image on an HTTP server in your own network. Otherwise, you must place the file on an HTTP server in the cloud.

2. If you use your own security group for Cloud Volumes ONTAP, ensure that the outbound rules allow HTTP connections so Cloud Volumes ONTAP can access the software image.



The predefined Cloud Volumes ONTAP security group allows outbound HTTP connections by default.

3. Obtain the software image from [the NetApp Support Site](#).
4. Copy the software image to a directory on the Connector or on an HTTP server from which the file will be served.

For example, you can copy the software image to the following path on the Connector:

```
/opt/application/netapp/cloudmanager/docker_occm/data/ontap/images/
```

5. From the working environment in Cloud Manager, click the menu icon, and then click **Advanced > Update Cloud Volumes ONTAP**.
6. On the update software page, enter the URL, and then click **Change Image**.

If you copied the software image to the Connector in the path shown above, you would enter the following URL:

```
http://<Connector-private-IP-address>/ontap/images/<image-file-name>
```

7. Click **Proceed** to confirm.

Result

Cloud Manager starts the software update. You can perform actions on the working environment once the software update is complete.

After you finish

If you suspended SnapMirror transfers, use System Manager to resume the transfers.

Registering pay-as-you-go systems

Support from NetApp is included with Cloud Volumes ONTAP PAYGO systems, but you must first activate support by registering the systems with NetApp.

Registering a PAYGO system with NetApp is required to upgrade ONTAP software using any of the methods [described on this page](#).



A system that isn't registered for support will still receive the software update notifications that appear in Cloud Manager when a new version is available. But you will need to register the system before you can upgrade the software.

Steps

1. If you have not yet added your NetApp Support Site account to Cloud Manager, go to **Account Settings** and add it now.

[Learn how to add NetApp Support Site accounts.](#)

2. On the Canvas page, double-click the name of the system that you want to register.
3. Click the menu icon and then click **Support registration**:



4. Select a NetApp Support Site account and click **Register**.

Result

Cloud Manager registers the system with NetApp.

Managing the state of Cloud Volumes ONTAP

You can stop and start Cloud Volumes ONTAP from Cloud Manager to manage your cloud compute costs.

Scheduling automatic shutdowns of Cloud Volumes ONTAP

You might want to shut down Cloud Volumes ONTAP during specific time intervals to lower your compute costs. Rather than do this manually, you can configure Cloud Manager to automatically shut down and then restart systems at specific times.

About this task

- When you schedule an automatic shutdown of your Cloud Volumes ONTAP system, Cloud Manager postpones the shutdown if an active data transfer is in progress.

Cloud Manager shuts down the system after the transfer is complete.

- This task schedules automatic shutdowns of both nodes in an HA pair.
- Snapshots of boot and root disks are not created when turning off Cloud Volumes ONTAP through scheduled shutdowns.

Snapshots are automatically created only when performing a manual shutdown, as described in the next section.

Steps

1. From the working environment, click the clock icon:



2. Specify the shutdown schedule:

- Choose whether you want to shut down the system every day, every weekday, every weekend, or any combination of the three options.
- Specify when you want to turn off the system and for how long you want it turned off.

Example

The following image shows a schedule that instructs Cloud Manager to shut down the system every Saturday at 12:00 a.m. for 48 hours. Cloud Manager restarts the system every Monday at 12:00 a.m.

<input type="checkbox"/>	Turn off every weekday Mon, Tue, Wed, Thu, Fri	turn off at	08 : 00 PM	for	12	Hours (1-24)
<input checked="" type="checkbox"/>	Turn off every weekend Sat	turn off at	12 : 00 AM	for	48	Hours (1-48)

3. Click **Save**.

Result

Cloud Manager saves the schedule. The clock icon changes to indicate that a schedule is set:



Stopping Cloud Volumes ONTAP

Stopping Cloud Volumes ONTAP saves you from accruing compute costs and creates snapshots of the root and boot disks, which can be helpful for troubleshooting.



To reduce costs, Cloud Manager periodically deletes older snapshots of root and boot disks. Only the two most recent snapshots are retained for both the root and boot disks.

About this task

When you stop an HA pair, Cloud Manager shuts down both nodes.

Steps

- From the working environment, click the **Turn off** icon.



- Keep the option to create snapshots enabled because the snapshots can enable system recovery.
- Click **Turn Off**.

It can take up to a few minutes to stop the system. You can restart systems at a later time from the working environment page.

Synchronize the system time using NTP

Specifying an NTP server synchronizes the time between the systems in your network, which can help prevent issues due to time differences.

Specify an NTP server using the [Cloud Manager API](#) or from the user interface when you [create a CIFS server](#).

Modify system write speed

Cloud Manager enables you to choose a normal or high write speed for Cloud Volumes ONTAP. The default write speed is normal. You can change to high write speed if fast write performance is required for your workload.

High write speed is supported with all types of single node systems and some HA pair configurations. View supported configurations in the [Cloud Volumes ONTAP Release Notes](#)

Before you change the write speed, you should [understand the differences between the normal and high settings](#).

About this task

- Ensure that operations such as volume or aggregate creation are not in progress.
- Be aware that this change restarts the Cloud Volumes ONTAP system. This is disruptive process that requires downtime for the entire system.

Steps

1. From the working environment, click the menu icon, and then click **Advanced > Writing Speed**.
2. Select **Normal** or **High**.

If you choose High, then you'll need to read the "I understand..." statement and confirm by checking the box.

3. Click **Save**, review the confirmation message, and then click **Proceed**.

Change the password for Cloud Volumes ONTAP

Cloud Volumes ONTAP includes a cluster admin account. You can change the password for this account from Cloud Manager, if needed.



You should not change the password for the admin account through System Manager or the CLI. The password will not be reflected in Cloud Manager. As a result, Cloud Manager cannot monitor the instance properly.

Steps

1. From the working environment, click the menu icon, and then click **Advanced > Set password**.
2. Enter the new password twice and then click **Save**.

The new password must be different than one of the last six passwords that you used.

Add, remove, or delete systems

Adding existing Cloud Volumes ONTAP systems to Cloud Manager

You can discover and add existing Cloud Volumes ONTAP systems to Cloud Manager. You might do this if you deployed a new Cloud Manager system.

Before you begin

You must know the password for the Cloud Volumes ONTAP admin user account.

Steps

1. On the Canvas page, click **Add Working Environment**.
2. Select the cloud provider in which the system resides.
3. Choose the type of Cloud Volumes ONTAP system.
4. Click the link to discover an existing system.



5. On the Region page, choose the region where the instances are running, and then select the instances.
6. On the Credentials page, enter the password for the Cloud Volumes ONTAP admin user, and then click **Go**.

Result

Cloud Manager adds the Cloud Volumes ONTAP instances to the workspace.

Removing Cloud Volumes ONTAP working environments

The Account Admin can remove a Cloud Volumes ONTAP working environment to move it to another system or to troubleshoot discovery issues.

About this task

Removing a Cloud Volumes ONTAP working environment removes it from Cloud Manager. It does not delete the Cloud Volumes ONTAP system. You can later rediscover the working environment.

Removing a working environment from Cloud Manager enables you to do the following:

- Rediscover it in another workspace
- Rediscover it from another Cloud Manager system
- Rediscover it if you had problems during the initial discovery

Steps

1. In the upper right of the Cloud Manager console, click the Settings icon, and select **Tools**.



2. From the Tools page, click **Launch**.
3. Select the Cloud Volumes ONTAP working environment that you want to remove.
4. On the Review and Approve page, click **Go**.

Result

Cloud Manager removes the working environment. Users can rediscover this working environment from the Canvas page at any time.

Deleting a Cloud Volumes ONTAP system

You should always delete Cloud Volumes ONTAP systems from Cloud Manager, rather than from your cloud provider's console. For example, if you terminate a licensed Cloud Volumes ONTAP instance from your cloud provider, then you can't use the license key for another instance. You must delete the working environment from Cloud Manager to release the license.

When you delete a working environment, Cloud Manager terminates Cloud Volumes ONTAP instances and deletes disks and snapshots.

Resources managed by other services like backups for Cloud Backup and instances for Cloud Data Sense and Monitoring are not deleted when you delete a working environment. You'll need to manually delete them yourself. If you don't, then you'll continue to receive charges for these resources.



When Cloud Manager deploys Cloud Volumes ONTAP in your cloud provider, it enables termination protection on the instances. This option helps prevent accidental termination.

Steps

1. If you enabled Cloud Backup on the working environment, determine whether the backed up data is still required and then [delete the backups, if necessary](#).

Cloud Backup is independent from Cloud Volumes ONTAP by design. Cloud Backup doesn't automatically delete backups when you delete a Cloud Volumes ONTAP system, and there is no current support in the UI

to delete the backups after the system has been deleted.

2. If you enabled Cloud Data Sense or Monitoring on this working environment and no other working environments use those services, then you'll need to delete the instances for those services.
 - [Learn more about the Cloud Data Sense instance.](#)
 - [Learn more about the Monitoring Acquisition Unit.](#)
3. Delete the Cloud Volumes ONTAP working environment.
 - a. On the Canvas page, double-click the name of the Cloud Volumes ONTAP working environment that you want to delete.
 - b. Click menu icon and then click **Delete**.



- c. Type the name of the working environment and then click **Delete**.

It can take up to 5 minutes to delete the working environment.

Administration in AWS

Change the EC2 instance type for Cloud Volumes ONTAP

You can choose from several instance or types when you launch Cloud Volumes ONTAP in AWS. You can change the instance type at any time if you determine that it is undersized or oversized for your needs.

About this task

- Automatic giveback must be enabled on a Cloud Volumes ONTAP HA pair (this is the default setting). If it isn't, then the operation will fail.

- Changing the instance type can affect AWS service charges.
- The operation restarts Cloud Volumes ONTAP.

For single node systems, I/O is interrupted.

For HA pairs, the change is nondisruptive. HA pairs continue to serve data.



Cloud Manager gracefully changes one node at a time by initiating takeover and waiting for give back. NetApp's QA team tested both writing and reading files during this process and didn't see any issues on the client side. As connections changed, we did see retries on the I/O level, but the application layer overcame these short "re-wire" of NFS/CIFS connections.

Steps

1. From the working environment, click the menu icon, and then select **Change instance**.
2. If you are using a node-based PAYGO license, you can optionally choose a different license.
3. Choose an instance type, select the check box to confirm that you understand the implications of the change, and then click **OK**.

Result

Cloud Volumes ONTAP reboots with the new configuration.

Change route tables for HA pairs in multiple AZs

You can modify the AWS route tables that include routes to the floating IP addresses for an HA pair that's deployed in multiple AWS Availability Zones (AZs). You might do this if new NFS or CIFS clients need to access an HA pair in AWS.

Steps

1. From the working environment, click the menu icon and then click **Information**.
2. Click **Route Tables**.
3. Modify the list of selected route tables and then click **Save**.

Result

Cloud Manager sends an AWS request to modify the route tables.

Monitoring AWS resource costs

Cloud Manager enables you to view the resource costs associated with running Cloud Volumes ONTAP in AWS. You can also see how much money you saved by using NetApp features that can reduce storage costs.

About this task

Cloud Manager updates the costs when you refresh the page. You should refer to AWS for final cost details.

Step

1. Verify that Cloud Manager can obtain cost information from AWS:

- a. Ensure that the IAM policy that provides Cloud Manager with permissions includes the following actions:

```
"ce:GetReservationUtilization",  
"ce:GetDimensionValues",  
"ce:GetCostAndUsage",  
"ce:GetTags"
```

These actions are included in the latest [Cloud Manager policy](#). New systems deployed from NetApp Cloud Central automatically include these permissions.

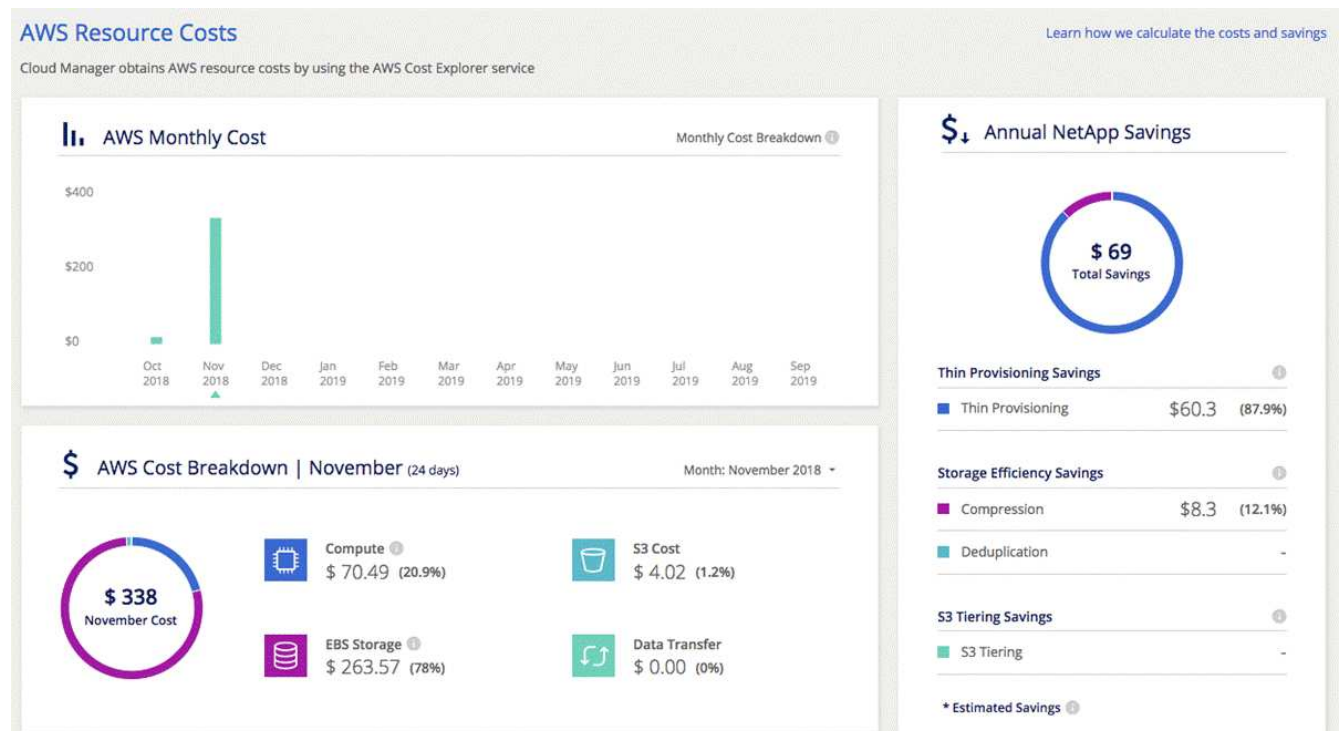
- b. [Activate the WorkingEnvironmentId tag](#).

To track your AWS costs, Cloud Manager assigns a cost allocation tag to Cloud Volumes ONTAP instances. After you create your first working environment, activate the **WorkingEnvironmentId** tag. User-defined tags don't appear on AWS billing reports until you activate them in the Billing and Cost Management console.

2. On the Canvas page, select a Cloud Volumes ONTAP working environment and then click **Cost**.

The Cost page displays costs for the current and previous months and shows your annual NetApp savings, if you enabled NetApp's cost-saving features on volumes.

The following image shows a sample Cost page:



Use System Manager or the CLI

If you need to perform advanced management of Cloud Volumes ONTAP, you can do so using ONTAP System Manager or the command line interface.

Connecting to System Manager

You might need to perform some Cloud Volumes ONTAP tasks from System Manager, which is a browser-based management tool that runs on the Cloud Volumes ONTAP system. For example, you need to use System Manager if you want to create LUNs.

Before you begin

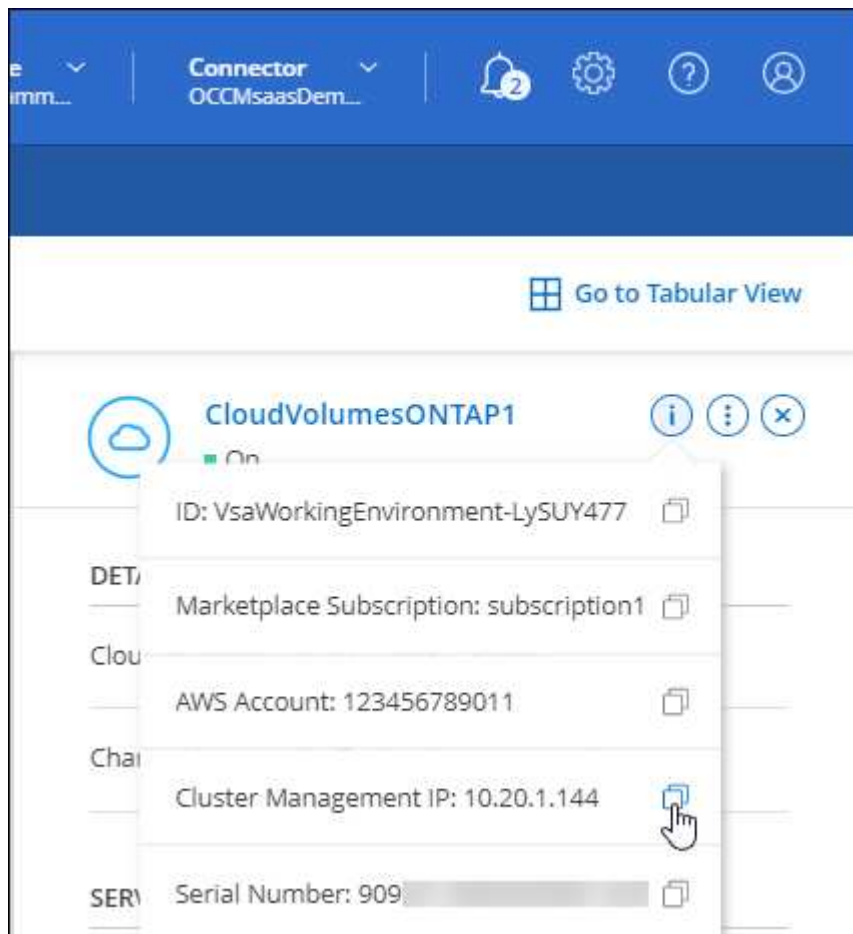
The computer from which you are accessing Cloud Manager must have a network connection to Cloud Volumes ONTAP. For example, you might need to log in to Cloud Manager from a jump host that's in your cloud provider network.



When deployed in multiple AWS Availability Zones, Cloud Volumes ONTAP HA configurations use a floating IP address for the cluster management interface, which means external routing is not available. You must connect from a host that is part of the same routing domain.

Steps

1. From the Canvas, select the Cloud Volumes ONTAP working environment.
2. On the right pane, click the information icon and copy the cluster management IP.



3. Open a web browser on the machine that has a network connection to Cloud Volumes ONTAP and enter the IP address.
4. At the login screen, enter **admin** in the User Name field, enter the password that you specified when you created the working environment, and then click **Sign In**.

Result

The System Manager console loads. You can now use it to manage Cloud Volumes ONTAP.

Connecting to the Cloud Volumes ONTAP CLI

The Cloud Volumes ONTAP CLI enables you to run all administrative commands and is a good choice for advanced tasks or if you are more comfortable using the CLI. You can connect to the CLI using Secure Shell (SSH).

Before you begin

The host from which you use SSH to connect to Cloud Volumes ONTAP must have a network connection to Cloud Volumes ONTAP. For example, you might need to SSH from a jump host that's in your cloud provider network.



When deployed in multiple AZs, Cloud Volumes ONTAP HA configurations use a floating IP address for the cluster management interface, which means external routing is not available. You must connect from a host that is part of the same routing domain.

Steps

1. In Cloud Manager, identify the IP address of the cluster management interface:
 - a. On the Canvas page, select the Cloud Volumes ONTAP system.
 - b. Copy the cluster management IP address that appears in the right pane.
2. Use SSH to connect to the cluster management interface IP address using the admin account.

Example

The following image shows an example using PuTTY:

A screenshot of the PuTTY connection configuration window. The title bar says "Specify the destination you want to connect to". There are two input fields: "Host Name (or IP address)" containing "admin@192.168.111.5" and "Port" containing "22". Below these is a section "Connection type:" with five radio buttons: "Raw", "Telnet", "Rlogin", "SSH" (which is selected with a black dot), and "Serial".

Host Name (or IP address)	Port
admin@192.168.111.5	22

Connection type:

☐ Raw ☐ Telnet ☐ Rlogin ☒ SSH ☐ Serial

3. At the login prompt, enter the password for the admin account.

Example

```
Password: *****
COT2: :>
```

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.