Use templates to standardize resource creation

Cloud Manager

NetApp
September 09, 2021

Table of Contents

Use templates to standardize resource creation

Learn about Application Templates

The Application Templates service enables you to standardize resource creation in your working environments. For example, you can hard-code required parameters in a "volume template" that are later applied when a storage admin creates a volume. This can include required disk type, size, protocol, snapshot policy, cloud provider, and more. You can also turn on certain services, like Cloud Backup, for every created volume.

Templates make it easy for your storage admins to create volumes that are optimized for the workload requirements for each deployed application; such as databases, email, or streaming services. And it makes life easier for your storage architects knowing that each volume is created optimally for each application.

Features

Application Templates offer the following features and benefits:

- Automates and improves the design and development of your infrastructure
- Provides a single location to activate different NetApp Cloud services; like Cloud Backup and Cloud Data Sense
- Identifies resources that have been changed and are no longer compliant with the template (using the "drift" feature)

What is "drift"?

"Drift" allows Cloud Manager to monitor the parameter values used when a resource is created with the template. At this time, "drift" can identify when a resource has been changed so you can manually make adjustments to bring it back into compliance with the template. In the future we'll be able to send you notifications when a resource is out of compliance, or even reverse a user's change so that all resources created from a template are brought back into compliance automatically.

Learn more about drift.

Pricing and licenses

The Application Templates feature requires no licensing and is free to use by all Cloud Manager users.

Templates enable you to apply a cloud service onto a created resources, for example, enable Cloud Backup on every volume. In this case there is a cost for using the Backup service and for the object storage space used by the backup files.

Available template actions

A template is a chain of "actions" that have some pre-defined values. You can build templates that include the following actions:

Resource actions:

- Create a Cloud Volumes ONTAP volume

- Create an Azure NetApp Files volume
- Create an on-premises ONTAP volume
- Create a Cloud Volumes ONTAP working environment (single node on AWS)

Services actions:

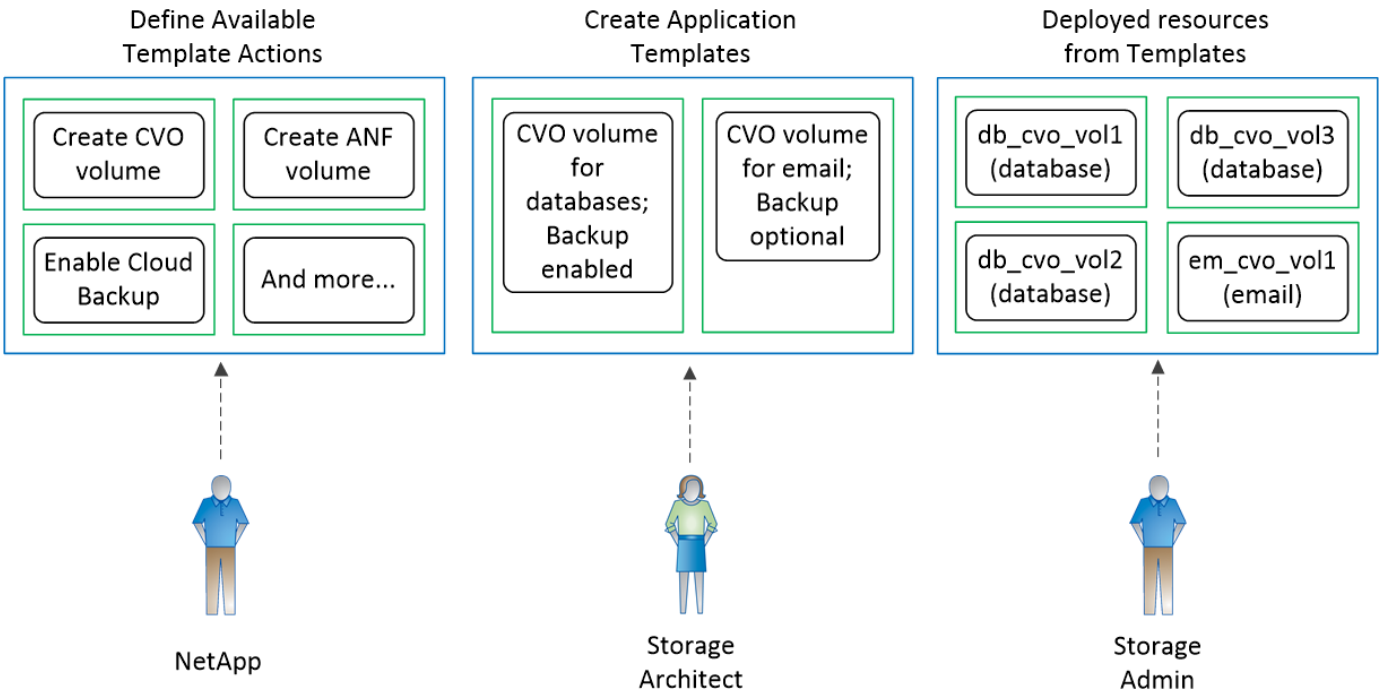
- Activate Cloud Backup on volumes (not applicable for Azure NetApp Files)
- Activate Cloud Data Sense on volumes
- Activate Replication on volumes (not applicable for Azure NetApp Files)

For example, you can create a template that creates a Cloud Volumes ONTAP volume. Or that that creates a Cloud Volumes ONTAP volume and then enables Cloud Backup on that volume. Or that that creates a Cloud Volumes ONTAP volume, and then enables Cloud Backup *and* Cloud Data Sense on that volume.

More actions will be added over time by NetApp.

How Application Templates work

The Application Templates service is made up of 3 parts. The available template "actions", the customized application template, and the deployed resource as a result of running the template. The following image shows the relationship between each component:



At a high level, Templates work like this:

1. NetApp defines the available template "actions".

   For example, an "action" to create a Cloud Volumes ONTAP volume or an Azure NetApp Files volume.

2. Your storage architect selects the "actions" they want to use to create an Application Template, and then they hard-code certain values for the listed parameters.

For example, they select high speed disks and a large amount of RAM for Cloud Volumes ONTAP volumes that will be used to carry the workloads for Oracle databases. And they require that backups are made for each volume.

3. Your storage admins use the templates to create resources that are optimized for the application they will be used for.

   For example, they create a volume that will be used for an Oracle database by using the volume template created for databases.

4. The service tracks certain resource settings defined in the template using the "drift" feature as determined by your storage architect.

Limitations

- The Application Templates service is not supported in any of the Gov Cloud regions or in "dark" sites.
- You can't use a template to create a Cloud Volumes ONTAP volume on an existing aggregate. New volumes are created in a new aggregate.

Template building blocks

There are certain features you can use when building a template that enable you pass values between actions (like a volume name), conditionally branch to connect actions together (enable backups on a new volume), and that help your users customize resources when using the template.

Special template controls

Before you start creating your template, you should understand some special options that you can set when pre-populating a value for a parameter in a template.

Editable checkbox

Check this box to let the storage admin override the pre-populated value you have entered in the template. This gives the storage admin a suggestion for what the value should be, but it allows them to customize the value when creating the resource.

When unchecked, the user can't change the value and the hard-coded value in the template is always used when the admin deploys a resource.

Drift checkbox

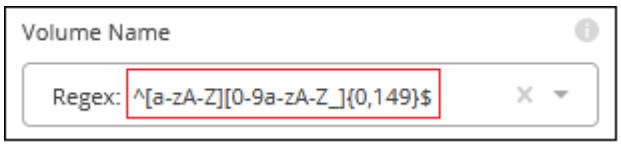
Check this box so that Cloud Manager monitors the hard-coded value you entered for a parameter when a resource is created with the template. Later, you can run a Drift Report to see which fields configured with Drift are no longer compliant with the template settings.

When unchecked, the user can change the value to any value after the resource has been created.

For the drift feature to work, after you have defined drift for some parameters in the template, you must enable the drift feature for the template. This is the last step when creating a template. Drift doesn't work if it is enabled for a parameter but hasn't been enabled on the template.

Using a regular expression (regex) in fields

There are a few fields within templates that allow you to enter a regex to define the value that your admin can enter in the field; for example "Volume Name" and "Share Name".



As an example, if you enter "^[a-zA-Z][0-9a-zA-Z_]{0,149}$" as the regex for the volume name, it means that "*the name should start with an alphabetic character, it can contain only numbers, letters, or the underscore, and it should be 150 or fewer characters in length*".

Pass values between template actions

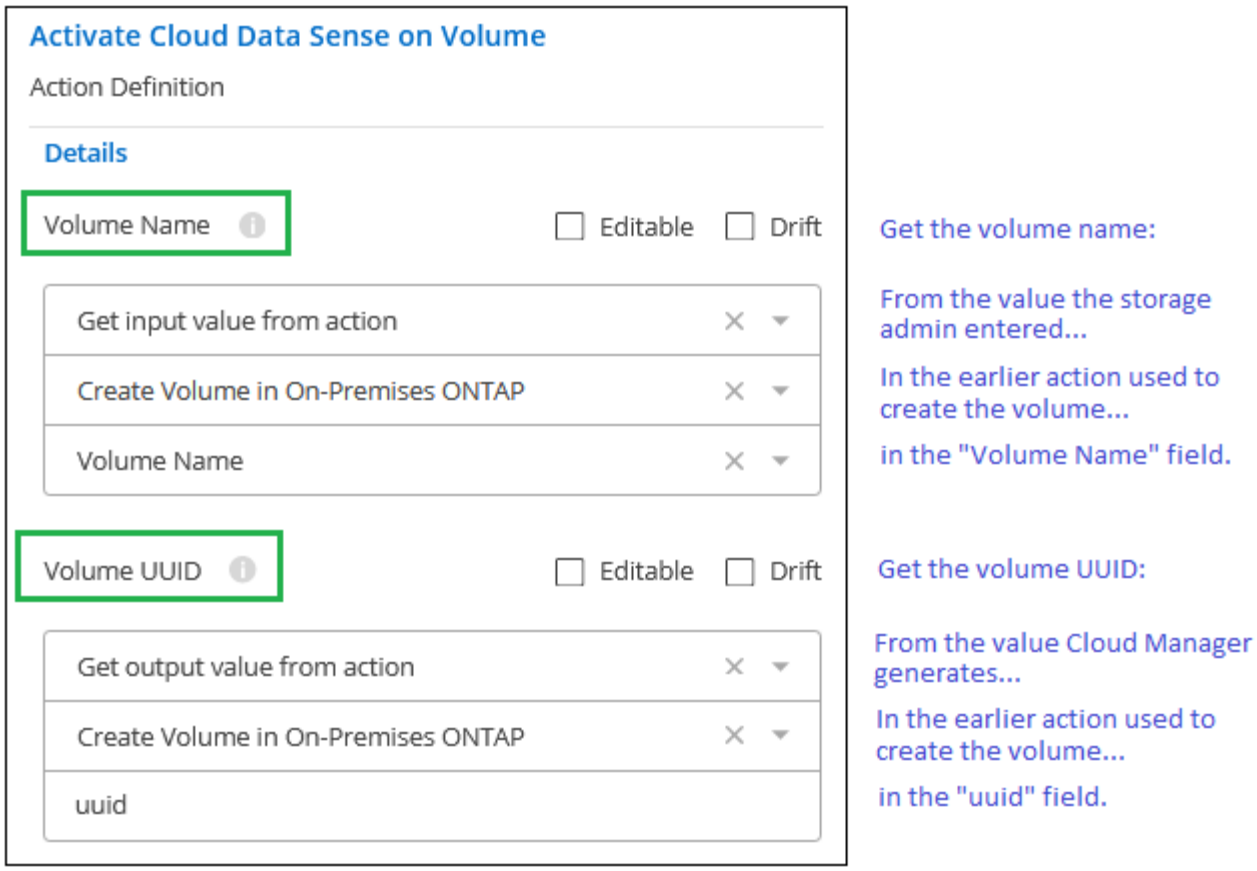
Templates have the ability to use information from a previous action to populate a field in a future action. For example, when defining the name of the volume that will have Cloud Backup functionality enabled, you can instruct the Backup action to use the value the storage admin entered as the name of the volume from the Create Cloud Volumes ONTAP action.

There are three types of information that the AppTemplate service can use:

- Input value - This is the actual value the storage admin entered into a field in a previous template action.
- Output value - This is the value Cloud Manager generates after creating a resource from a previous template action.
- Enter your own value - This is a value that you enter; it is not accessed from a previous action in the template.

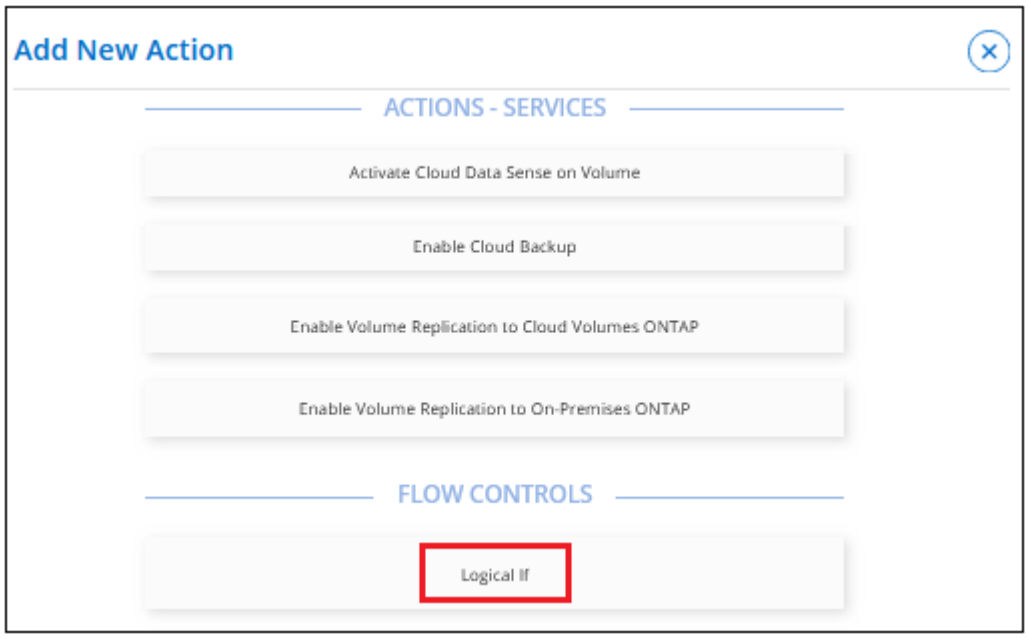
For example, to enable compliance scanning on a volume, the Cloud Data Sense service needs both the "volume name" that the storage admin enters (the Input value), and the "volume uuid" that Cloud Manager generates when it creates the volume (the Output value).

The following illustration shows how to enter this information in the Cloud Data Sense action section of the template.

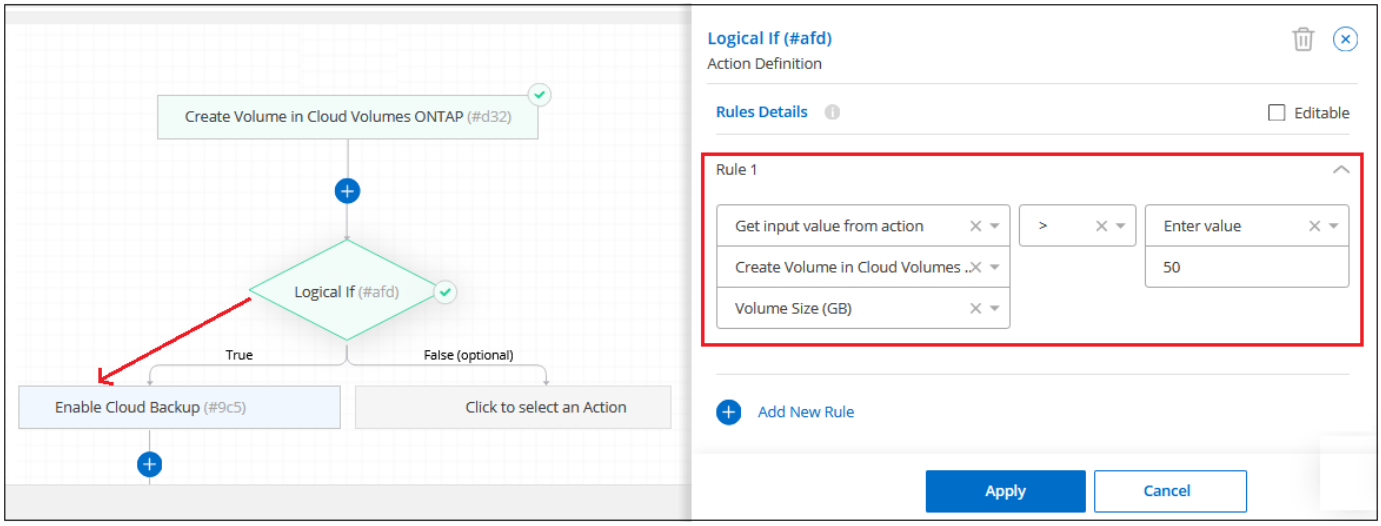


Use conditions to perform different actions based on logic statements

Conditions tell the template to execute different actions depending on whether the condition is true or false when the storage admin runs the template. You add a condition by selecting the **Logical If** action:



For example, you may have a guideline that if a volume has a capacity larger than 50 GB then Cloud Backup is required to be enabled on that volume. If the volume has a smaller capacity, then Cloud Backup is not enabled. You can implement this in your template as shown below.



Conditions consist of two parts:

- Rules - The item you are checking for being either true or false.
- And/Or statement - Allows you to use multiple rules to further refine whether additional actions are added.

A Rule is made up of three parts:

Source field - The location from which you will get the value to compare.

- Get input value from action - The actual value the storage admin entered into a field in a previous template action.
- Get output value from action - The value Cloud Manager generated after creating a resource from a previous template action.
- Enter value - This is a value that you enter; it is not accessed from a previous action in the template. This can be a value from a resource that already exists; for example an existing volume.

Operator - The operator used for the comparison. The options are **Equal**, **Not Equal**, **Greater Than**, **Less Than**, **Greater Than or Equal**, **Less Than or Equal**.

Field value - The actual value you are comparing. The options are the same as those for the *Source field*.

An And/Or statement enables you to conditionally add more actions for users when they run the template based on whether multiple rules are evaluated as True or False. **And** requires all rules to be true or false, and **Or** requires just one of the rules needs to be true or false.

When using both an And and Or statement with your rules, the evaluation process follows standard mathematical order where “AND” precedes “OR”. For example:

- <Rule1> OR <Rule2> AND <Rule3>

  This statement is evaluated in the following order:
  <Rule1> OR (<Rule2> AND <Rule3>)

Build application templates for your organization

Select one or more of the NetApp-provided "actions" and quickly build an application

template that your organization can use to start optimizing the creation of resources.

Quick start

Get started quickly by following these steps, or scroll down to the remaining sections for full details.

Verify required prerequisites

- Before users can create a volume for a Cloud Volumes ONTAP, on-premises ONTAP, or Azure NetApp Files system using a template, make sure they have access to an appropriate working environment where the volume will be deployed.
- If you plan to add a Cloud service "action" to your template, such as Cloud Backup or Cloud Data Sense, ensure that the service is active and licensed in your environment.

Launch the Application Templates service

Select the **AppTemplate** service, click the **Editor** tab, and select the template.

Build the template by selecting "actions" and defining parameters

Follow the creation steps and define the actions that will be performed by the template.

Requirements

Read the following requirements to make sure that you have a supported configuration.

- If you don’t already have a Connector, see how to create Connectors for AWS, Azure, and GCP.
- When creating a Cloud Volumes ONTAP volume template, make sure you have a Cloud Volumes ONTAP working environment available for your users. See how to launch a Cloud Volumes ONTAP system in AWS, Azure, or in GCP.
- When creating an on-premises ONTAP volume template, make sure you have an on-premises ONTAP working environment available for your users. See how to discover an on-premises ONTAP system in Cloud Manager.
- When creating an Azure NetApp Files volume template, make sure you have an Azure NetApp Files working environment available for your users. See how to create an Azure NetApp Files working environment in Cloud Manager.
- If you plan to enable Cloud Backup in the template, ensure that your environment has an active and licensed Cloud Backup service.
- If you plan to enable Cloud Data Sense in the template, ensure that your environment has an active and licensed Cloud Data Sense service.
- If you plan to enable Replication in the template, and the template is for an on-premises ONTAP volume, the ONTAP cluster must have an active SnapMirror license.

Examples of creating resources using templates

Resource templates enable you to create new volumes or a new Cloud Volumes ONTAP working environment.

Create a template for a Cloud Volumes ONTAP volume

See how to provision Cloud Volumes ONTAP volumes for details about all the parameters you need to complete in the Cloud Volumes ONTAP volume template.

For this example we'll create a template named "CVO volume for databases" and include the following 2 actions:

- Create Cloud Volumes ONTAP Volume

  Make the volume for the AWS environment, configure it with 100 GB of storage, set the Snapshot Policy to "default", and enable Storage Efficiency.

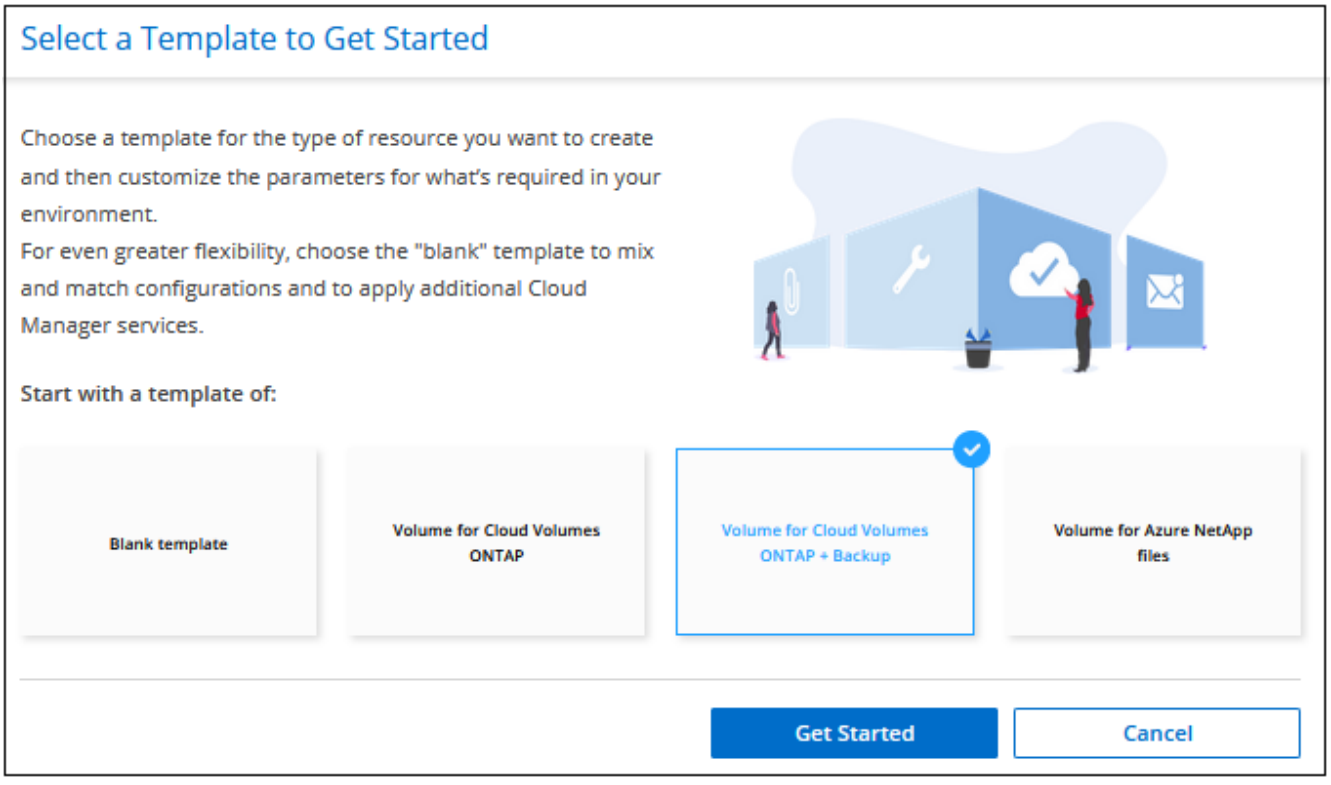
- Enable Cloud Backup

  Create daily backups with a retention value of 30 copies.

Steps

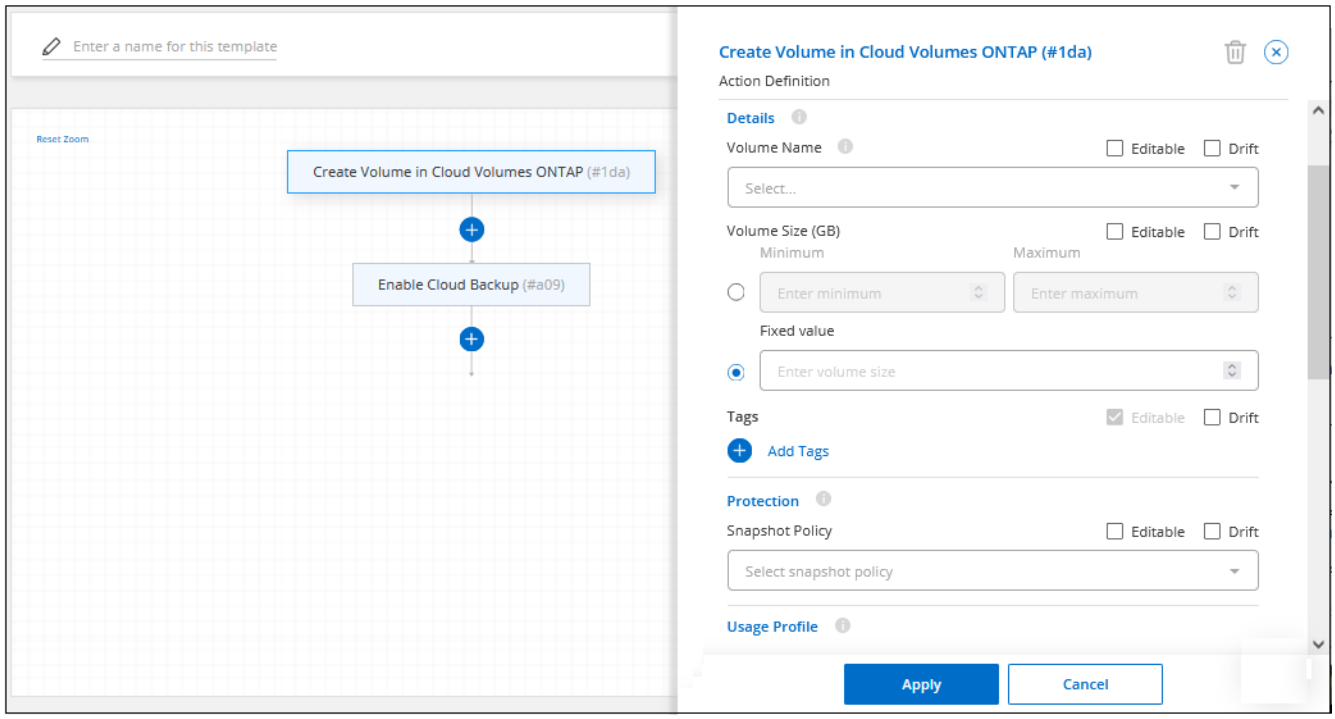
1. Select the **AppTemplate** service, click the **Templates** tab, and click **Add New Template**.

   The *Select_a Template* page is displayed.



2. Select **Volume for Cloud Volumes ONTAP + Backup** as the type of resource you want to create, and click **Get Started**.

   The *Create Volume in Cloud Volumes ONTAP Action Definition* page is displayed.



3. **Action Name**: Optionally, enter a customized action name instead of the default value.
4. **Details:** Enter the volume name and size.

Field	Description
Volume Name	Click in the field and select one of the 5 options. You can let the admin enter any name by selecting **Free Text**, or you can specify that the volume name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a regular expression (regex) you enter. For example, you could specify that "db" be a required prefix, suffix, or contains; requiring the user to add volume names like "db_vol1", "vol1_db", or "vol_db_1".
Volume Size	You can specify a range of allowable values, or you can specify a fixed size. This value is in GB. For our example we can add a fixed value **100**.
Tags	Enter a name and value pair for a tag that you want to associate with this volume. For example, you could add "Cost Center" as the tag name and the cost center code "6655829" as the value. You can associate more than one tag with a volume by adding more tag name and value pairs.

5. **Protection:** Choose whether this volume will have Snapshot copies created by selecting "Default" or some other policy, or choose "None" if you do not want to create Snapshot copies.
6. **Usage Profile:** Choose whether or not NetApp storage efficiency features are applied to the volume. This includes Thin Provisioning, Deduplication, and Compression. For our example, keep storage efficiency enabled.
7. **Disk Type:** Choose the cloud storage provider and the type of disk. For some disk selections you can also select a minimum and maximum IOPS or Throughput (MB/s) value; basically defining a certain Quality of Service (QoS).
8. **Protocol Options:** Select **NFS** or **SMB** to set the protocol of the volume. And then the provide the protocol details.

NFS Fields	Description
Access Control	Choose whether access controls are needed to access the volume.
Export Policy	Create an export policy to define the clients in the subnet that can access the volume.
NFS Version	Select the NFS version for the volume: either *NFSv3* or *NFSv4*, or you can select both.

SMB Fields	Description
Share Name	Click in the field and select one of the 5 options. You can let the admin enter any name (Free Text) or you can specify that the share name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a regular expression (regex) you enter.
Permissions	Select the level of access to a share for users and groups (also called access control lists, or ACLs).
Users / Groups	Specify local or domain Windows users or groups, or UNIX users or groups. If you specify a domain Windows user name, you must include the user's domain using the format domain\username.

9. **Tiering:** Choose the tiering policy that you would like applied to the volume, or set this to "None" if you do not want to tier cold data from this volume to object storage.

   See volume tiering policies for an overview, and see Tiering inactive data to object storage to make sure your environment is set up for tiering.

10. **Context:** Enter the Cloud Volumes ONTAP working environment context; if required.

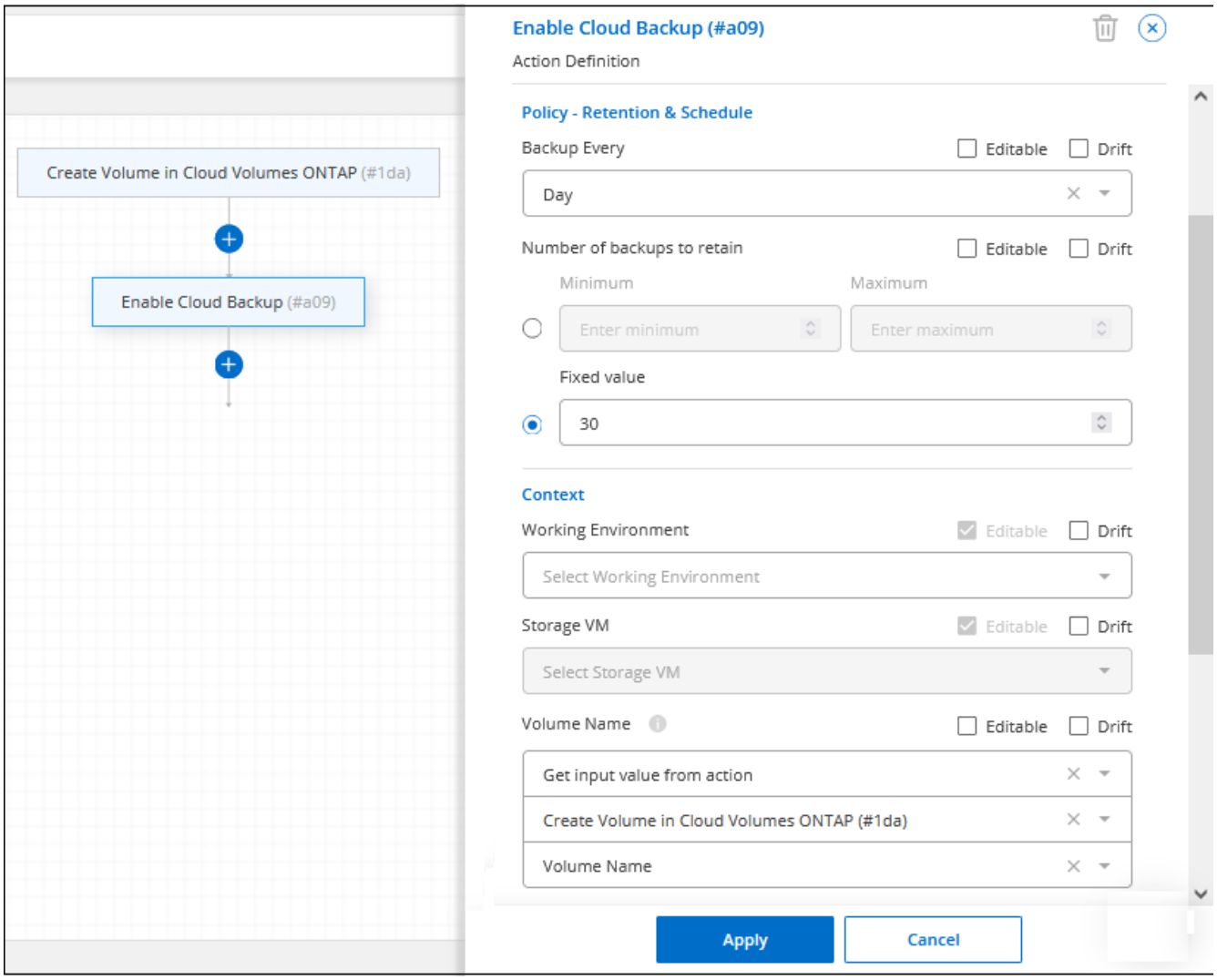
    When users launch the template from an existing working environment, this information gets filled in automatically.

    When users launch the template from the Templates Dashboard (not in a working environment context), then they need to select the working environment and the SVM where the volume will be created. That's why these fields are marked as "Editable".

11. Click **Apply** after you have defined the parameters needed for this action.

    If the template values are correctly completed, a green checkmark is added to the "Create Volume in Cloud Volumes ONTAP" box.

12. Click the **Enable Cloud Backup** box and the *Enable Cloud Backup Action Definition* dialog is displayed so you can fill in the Cloud Backup details.



13. Define the backup policy to create daily backups with a 30-day retention value.
14. Below the Volume Name field there are three fields you use to indicate which volume will have backup enabled. See how to complete these fields.
15. Click **Apply** and the Cloud Backup dialog is saved.
16. Enter the template name **CVO volume for databases** (for this example) in the top left.
17. Click **Settings & Drift** to provide a more detailed description so that this template can be distinguished from other similar templates, and so you can enable Drift for the overall template, and then click **Apply**.

    Drift allows Cloud Manager to monitor the hard-coded values you entered for parameters when creating this template.

18. Click **Save Template**.

Result

The template is created and you are returned to the Templates Dashboard where your new template appears.

See what you should tell your users about templates.

Create a template for an Azure NetApp Files volume

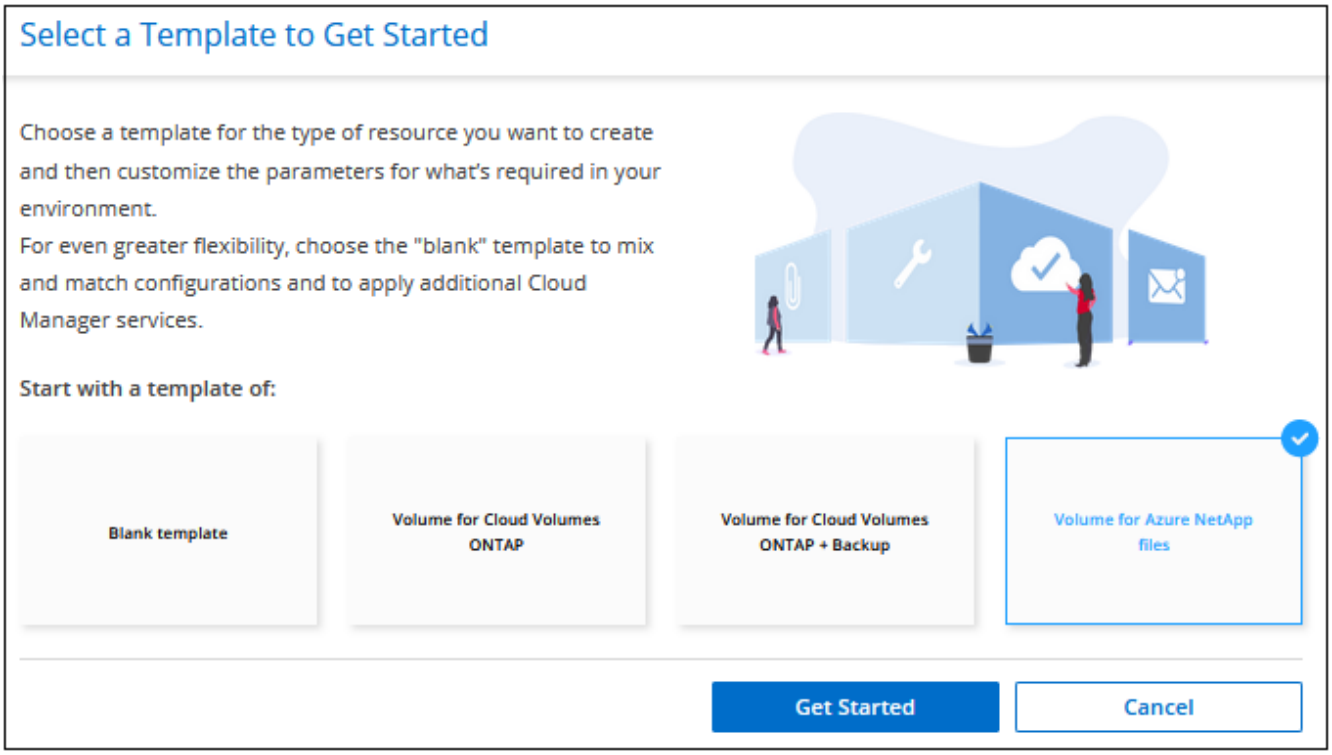
Creating a template for an Azure NetApp Files volume is done in the same manner as creating a template for a Cloud Volumes ONTAP volume.

See how to provision Azure NetApp Files volumes for details about all the parameters you need to complete in the ANF volume template.

Steps

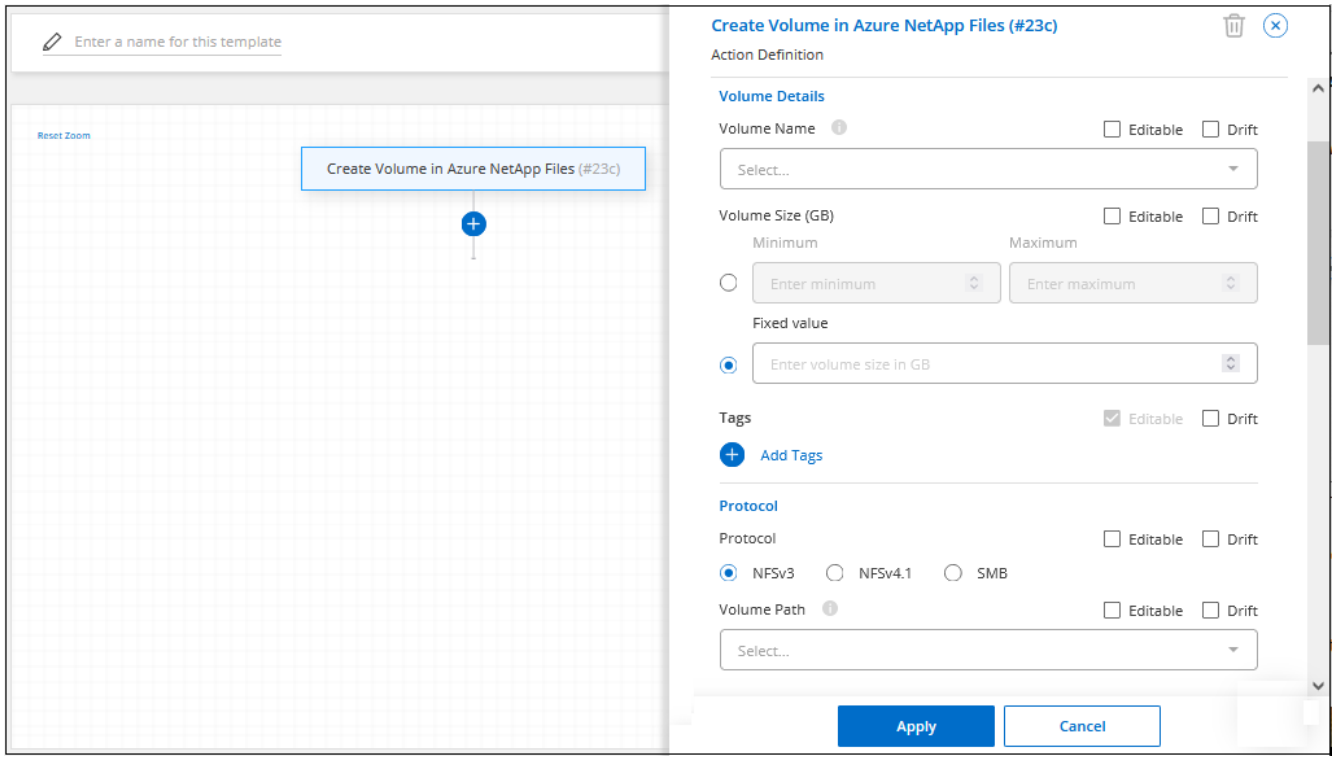
1. Select the **AppTemplate** service, click the **Templates** tab, and click **Add New Template**.

   The *Select_a Template* page is displayed.



2. Select **Volume for Azure NetApp Files** as the type of resource you want to create, and click **Get Started**.

   The *Create Volume in Azure NetApp Files Action Definition* page is displayed.



3. **Action Name**: Optionally, enter a customized action name instead of the default value.
4. **Volume Details:** Enter a volume name and size, and optionally specify tags for the volume.

Field	Description
Volume Name	Click in the field and select one of the 5 options. You can let the admin enter any name by selecting **Free Text**, or you can specify that the volume name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a regular expression (regex) you enter. For example, you could specify that "db" be a required prefix, suffix, or contains; requiring the user to add volume names like "db_vol1", "vol1_db", or "vol_db_1".
Volume Size	You can specify a range of allowable values, or you can specify a fixed size. This value is in GB.
Tags	Enter a name and value pair for a tag that you want to associate with this volume. For example, you could add "Cost Center" as the tag name and the cost center code "6655829" as the value. You can associate more than one tag with a volume by adding more tag name and value pairs.

5. **Protocol:** Select **NFSv3**, **NFSv4.1**, or **SMB** to set the protocol of the volume. And then the provide the protocol details.

NFS Fields	Description
Volume Path	Select one of the 5 options. You can let the admin enter any path by selecting **Free Text**, or you can specify that the path name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a regular expression (regex) you enter.

NFS Fields	Description
Export Policy Rules	Create an export policy to define the clients in the subnet that can access the volume.

SMB Fields	Description
Volume Path	Select one of the 5 options. You can let the admin enter any path by selecting **Free Text**, or you can specify that the path name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a regular expression (regex) you enter.

6. **Context:** Enter the Azure NetApp Files working environment, details for a new or an existing Azure NetApp Files account, and other details.

Field	Description
Working Environment	When storage admin users launch the template from an existing working environment, this information gets filled in automatically. When users launch the template from the Templates Dashboard (not in a working environment context), then they need to select the working environment where the volume will be created.
NetApp Account Name	Enter the name you want to use for the account.
Azure Subscription ID	Enter the Azure Subscription ID. This is the full ID in a format similar to "2b04f26-7de6-42eb-9234-e2903d7s327".
Region	Enter the region using the internal region name.
Resource Group Name	Enter the name of the Resource Group you want to use.
Capacity Pool Name	Enter the name of an existing capacity pool.
Subnet	Enter the VNet and subnet. This value includes the full path, in a format similar to "/subscriptions/<subscription_id>/resourceGroups/<resource_group>/providers/Microsoft.Network/virtualNetworks/<vpc_name>/subnets/<subhet_name>".

7. **Snapshot Copy:** Enter the Snapshot ID for an existing volume Snapshot if you want this new volume to be created using characteristics from an existing volume.
8. Click **Apply** after you have defined the parameters needed for this action.
9. Enter the name you want to use for the template in the top left.
10. Click **Settings & Drift** to provide a more detailed description so that this template can be distinguished from other similar templates, and so you can enable Drift for the overall template, and then click **Apply**.

    Drift allows Cloud Manager to monitor the hard-coded values you entered for parameters when creating this template.

11. Click **Save Template**.

Result

The template is created and you are returned to the Templates Dashboard where your new template appears.

See what you should tell your users about templates.

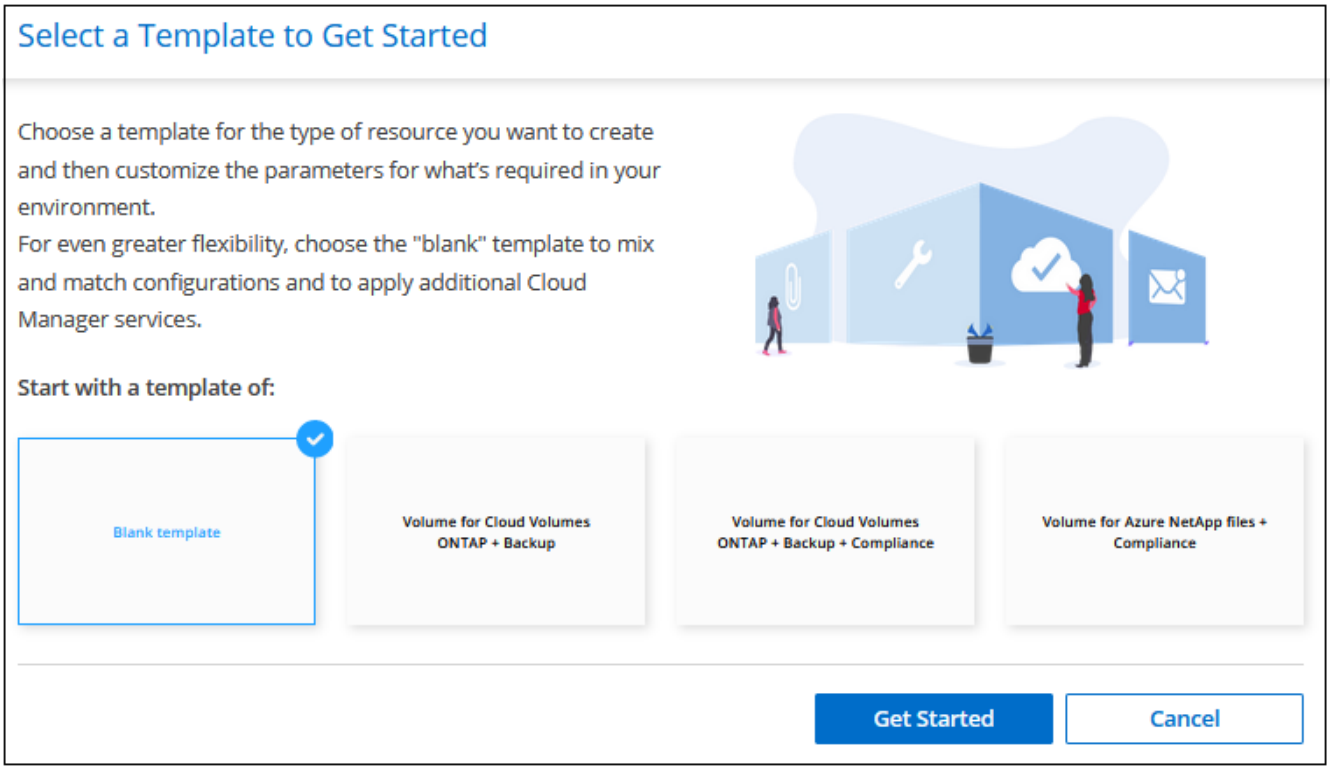
Create a template for an on-premises ONTAP volume

See how to provision on-premises ONTAP volumes for details about all the parameters you need to complete in the on-premises ONTAP volume template.

Steps

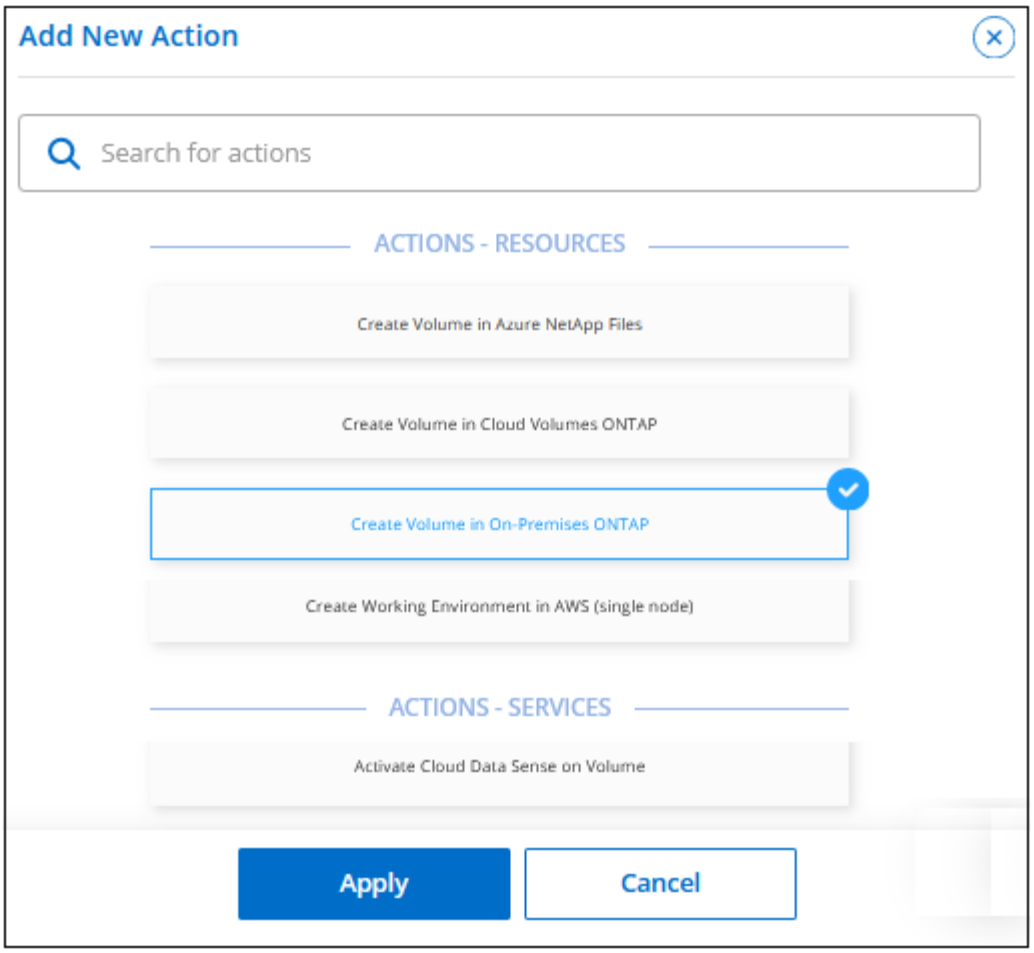
1. Select the **AppTemplate** service, click the **Templates** tab, and click **Add New Template**.

   The *Select_a Template* page is displayed.



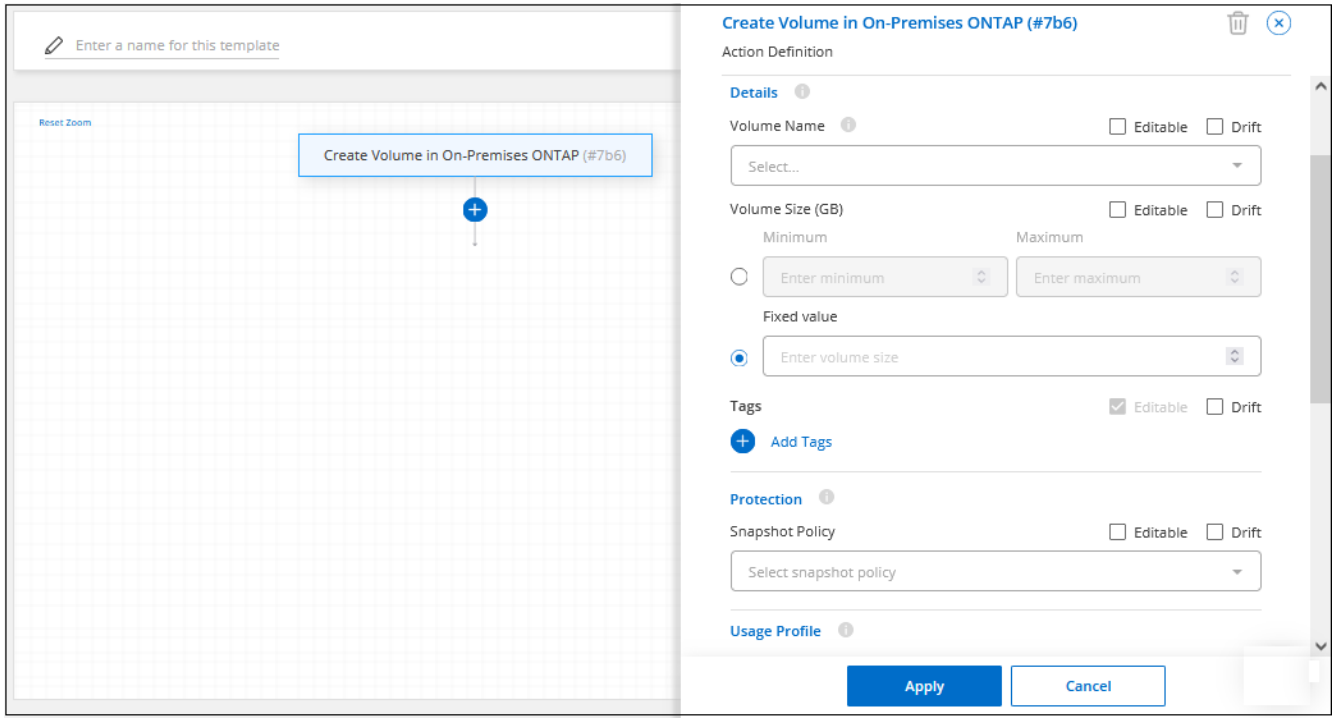
2. Select **Blank template** and click **Get Started**.

   The *Add New Action* page is displayed.



3. Select **Create Volume in On-Premises ONTAP** as the type of resource you want to create, and click **Apply**.

   The *Create Volume in On-Premises ONTAP Action Definition* page is displayed.



4. **Action Name**: Optionally, enter a customized action name instead of the default value.
5. **Details:** Enter the volume name and size.

Field	Description
Volume Name	Click in the field and select one of the 5 options. You can let the admin enter any name by selecting **Free Text**, or you can specify that the volume name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a regular expression (regex) you enter. For example, you could specify that "db" be a required prefix, suffix, or contains; requiring the user to add volume names like "db_vol1", "vol1_db", or "vol_db_1".
Volume Size	You can specify a range of allowable values, or you can specify a fixed size. This value is in GB. For our example we can add a fixed value **100**.
Tags	Enter a name and value pair for a tag that you want to associate with this volume. For example, you could add "Cost Center" as the tag name and the cost center code "6655829" as the value. You can associate more than one tag with a volume by adding more tag name and value pairs.

6. **Protection:** Choose whether this volume will have Snapshot copies created by selecting "Default" or some other policy, or choose "None" if you do not want to create Snapshot copies.
7. **Usage Profile:** Choose whether or not NetApp storage efficiency features are applied to the volume. This includes Thin Provisioning, Deduplication, and Compression.
8. **Protocol Options:** Select **NFS** or **SMB** to set the protocol of the volume. And then the provide the protocol details.

NFS Fields	Description
Access Control	Choose whether access controls are needed to access the volume.
Export Policy	Create an export policy to define the clients in the subnet that can access the volume.
NFS Version	Select the NFS version for the volume: either *NFSv3* or *NFSv4*, or you can select both.

SMB Fields	Description
Share Name	Click in the field and select one of the 5 options. You can let the admin enter any name (Free Text) or you can specify that the share name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a regular expression (regex) you enter.
Permissions	Select the level of access to a share for users and groups (also called access control lists, or ACLs).
Users / Groups	Specify local or domain Windows users or groups, or UNIX users or groups. If you specify a domain Windows user name, you must include the user’s domain using the format domain\username.

9. **Context:** Enter the on-premises ONTAP working environment context; if required.

When users launch the template from an existing working environment, this information gets filled in automatically.

When users launch the template from the Templates Dashboard (not in a working environment context), then they need to select the working environment, the SVM, and the aggregate where the volume will be created.

10. Click **Apply** after you have defined the parameters needed for this action.

    If the template values are correctly completed, a green checkmark is added to the "Create Volume in On-Premises ONTAP" box.

11. Enter the template name in the top left.
12. Click **Settings & Drift** to provide a more detailed description so that this template can be distinguished from other similar templates, and so you can enable Drift for the overall template, and then click **Apply**.

    Drift allows Cloud Manager to monitor the hard-coded values you entered for parameters when creating this template.

13. Click **Save Template**.

Result

The template is created and you are returned to the Template Dashboard where your new template appears.

See what you should tell your users about templates.

Create a template for a Cloud Volumes ONTAP working environment

You can create a Cloud Volumes ONTAP working environment using templates.

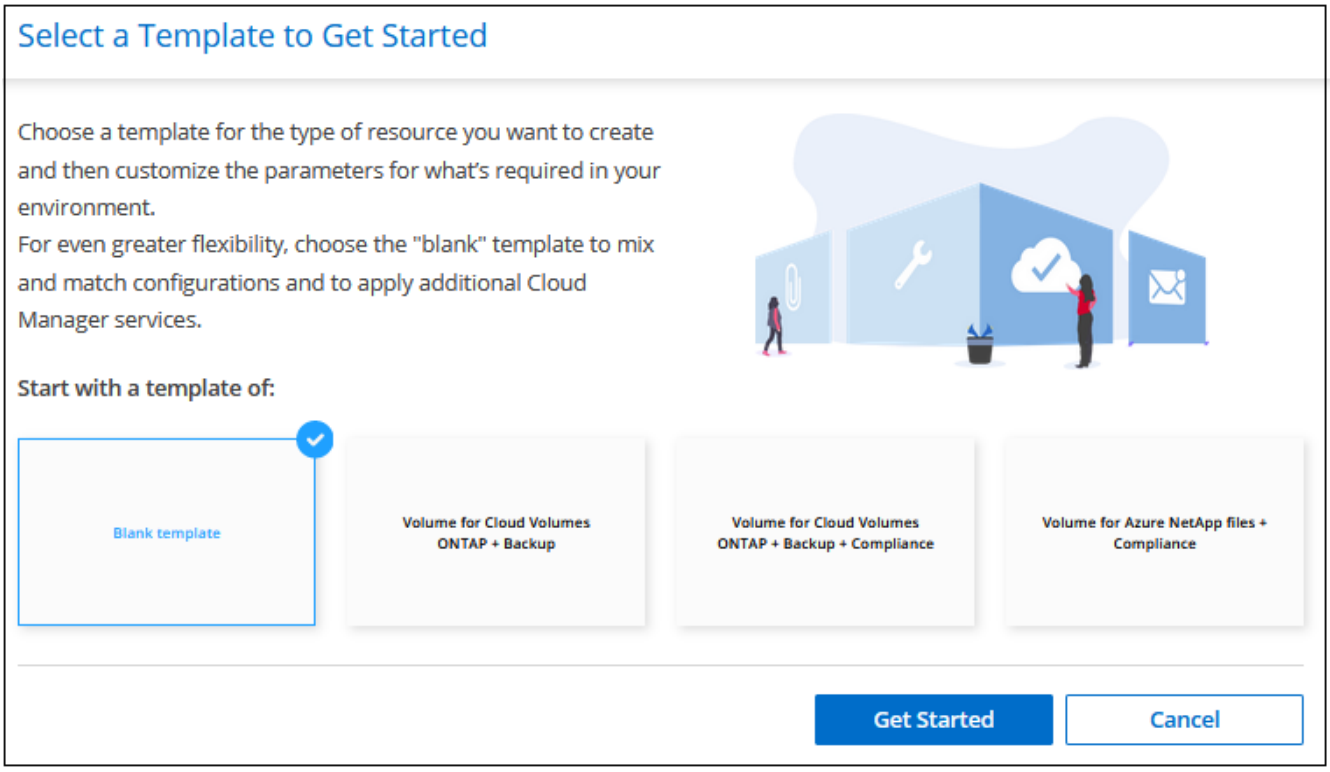
- This support is provided only for AWS environments at this time, and only for single-node clusters.
- This template doesn't create the first volume in the working environment. You must add a "Create Volume in Cloud Volumes ONTAP" action in the template to create the volume.

See how to launch a single-node Cloud Volumes ONTAP system in AWS for the prerequisites that must be in place, and for details about all the parameters you need to complete in this template.

Steps

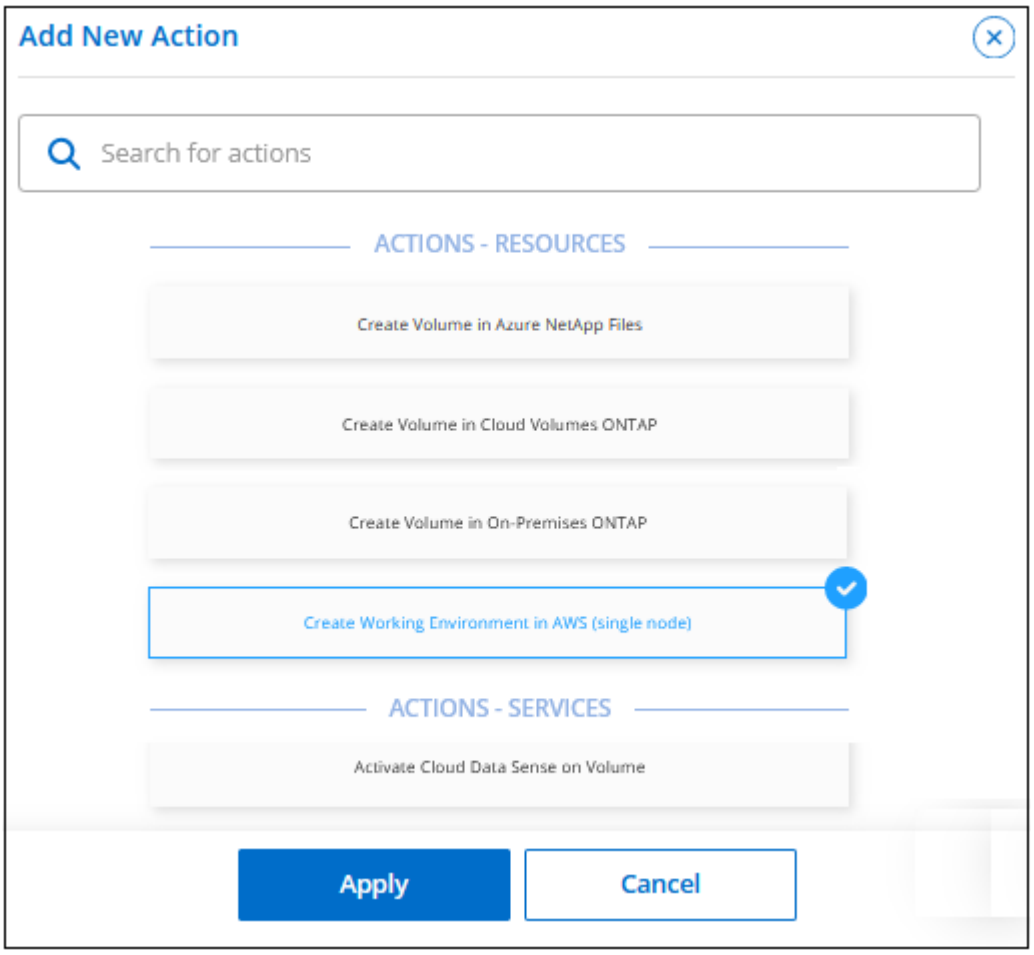
1. Select the **AppTemplate** service, click the **Templates** tab, and click **Add New Template**.

   The *Select_a Template* page is displayed.



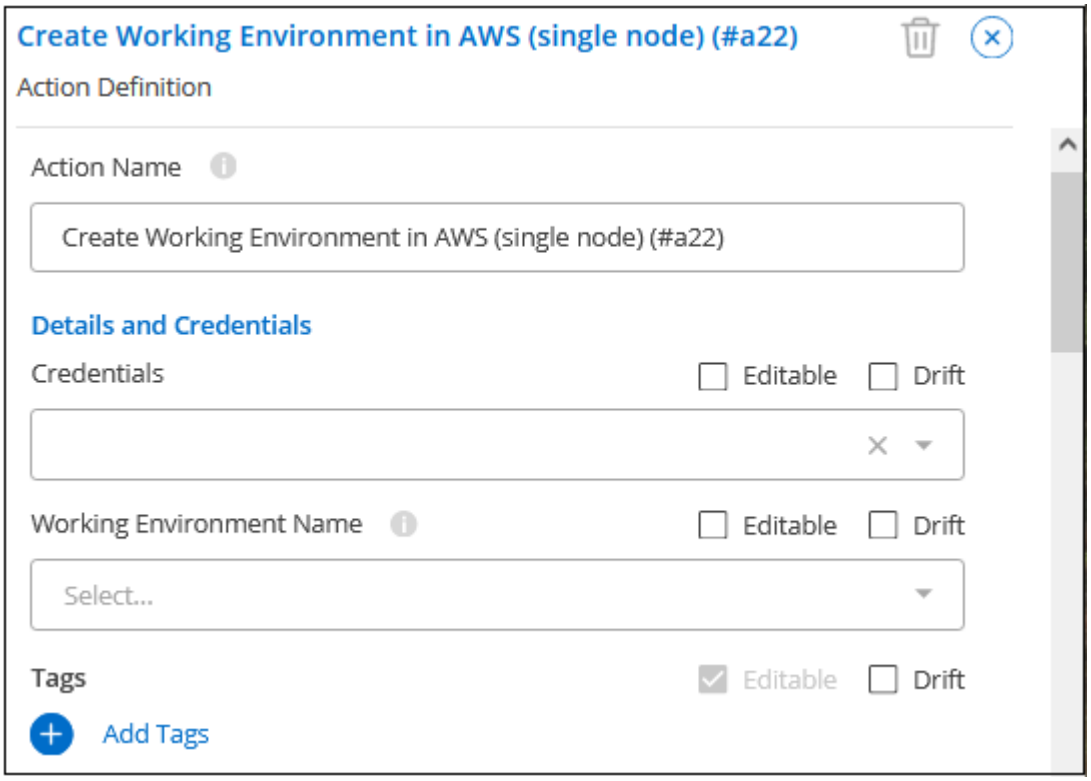
2. Select **Blank template** and click **Get Started**.

   The *Add New Action* page is displayed.



3. Select **Create Working Environment in AWS (single node)** as the type of resource you want to create, and click **Apply**.

   The *Create Working Environment in AWS (single node)* page is displayed.



4. **Action Name**: Optionally, enter a customized action name instead of the default value.
5. **Details and Credentials**: Select the AWS credentials to use, enter a working environment name, and add tags, if needed.

   Some of the fields in this page are self-explanatory. The following table describes fields for which you might need guidance:

Field	Description
Credentials	These are the credentials for the Cloud Volumes ONTAP cluster admin account. You can use these credentials to connect to Cloud Volumes ONTAP through ONTAP System Manager or its CLI.
Working Environment Name	Cloud Manager uses the working environment name to name both the Cloud Volumes ONTAP system and the Amazon EC2 instance. It also uses the name as the prefix for the predefined security group, if you select that option. Click in the field and select one of the 5 options. You can let the admin enter any name by selecting **Free Text**, or you can specify that the working environment name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a regular expression (regex) you enter.

Field	Description
Tags	AWS tags are metadata for your AWS resources. Cloud Manager adds the tags to the Cloud Volumes ONTAP instance and each AWS resource associated with the instance. For information about tags, refer to AWS Documentation: Tagging your Amazon EC2 Resources.

6. **Location & Connectivity**: Enter the network information that you recorded in the AWS worksheet. This includes the AWS Region, VPC, Subnet, and Security Group.

   If you have an AWS Outpost, you can deploy a single node Cloud Volumes ONTAP system in that Outpost by selecting the Outpost VPC. The experience is the same as any other VPC that resides in AWS.

7. **Authentication Method**: Select the SSH authentication method you want to use; either a password or a key pair.
8. **Data Encryption**: Choose no data encryption or AWS-managed encryption.

   For AWS-managed encryption, you can choose a different Customer Master Key (CMK) from your account or another AWS account.

   Learn how to set up the AWS KMS for Cloud Volumes ONTAP.

9. **Charging Method**: Specify which charging option would you like to use with this system.

   Learn about these charging methods.

10. **NSS Account**: Select a NetApp Support Site account.
11. **Preconfigured Packages**: Select one of the four preconfigured packages that will determine several factors for volumes created in the working environment.
12. **SMB Configuration**: If you plan to deploy volumes using SMB on this working environment, you can set up a CIFS server and related configuration elements.
13. Click **Apply** after you have defined the parameters needed for this action.

    If the template values are correctly completed, a green checkmark is added to the "Create Working Environment in AWS (single node)" box.

14. You may want to add another action in this template to create a volume for this working environment. If so, click + and add that action. See how to Create a template for a Cloud Volumes ONTAP volume for details.
15. Enter the template name in the top left.
16. Click **Settings & Drift** to provide a more detailed description so that this template can be distinguished from other similar templates, and so you can enable Drift for the overall template, and then click **Apply**.

    Drift allows Cloud Manager to monitor the hard-coded values you entered for parameters when creating this template.

17. Click **Save Template**.

Result

The template is created and you are returned to the Template Dashboard where your new template appears.

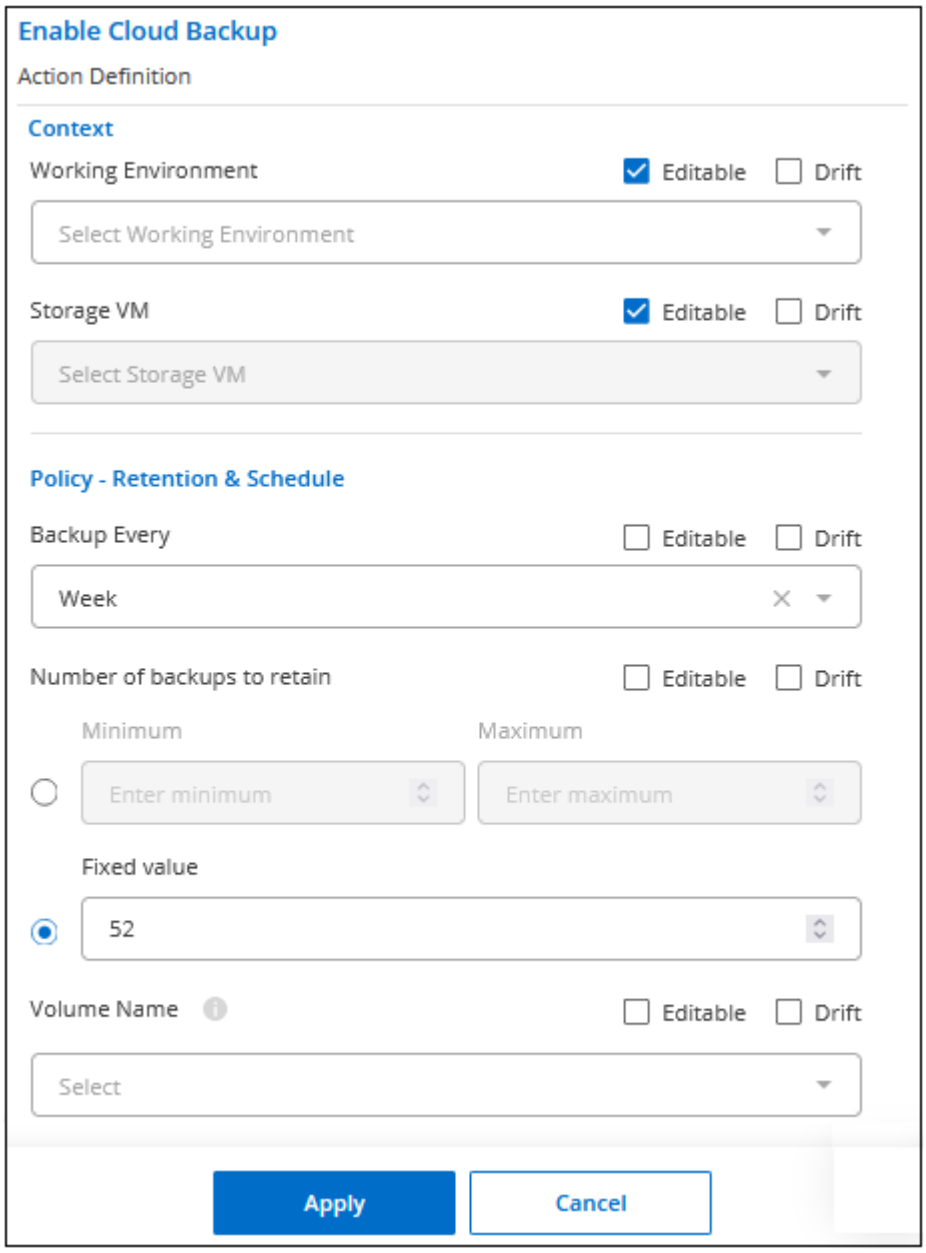
See what you should tell your users about templates.

Examples of enabling services using templates

Service templates enable you to activate Cloud Backup, Cloud Data Sense, or Replication (SnapMirror) services on a newly created volume.

Add Backup functionality to a volume

When creating a volume template, you can add in the template that you want to create backups of the volume periodically using the Cloud Backup service. This action is not applicable for Azure NetApp Files volumes.

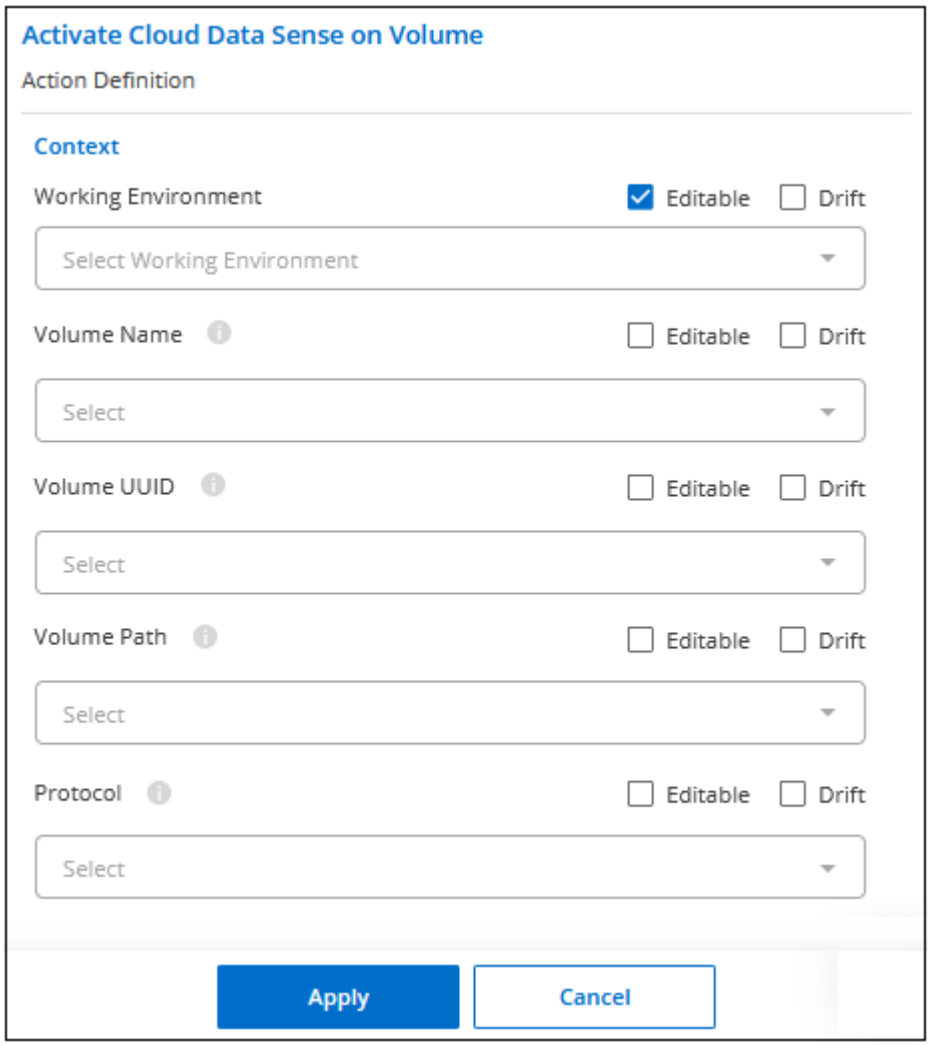


1. **Context**: You can enter a working environment Name and storage VM name if you are using this action in a template without first creating a volume. Otherwise, leave these fields as "Editable."
2. **Policy**: Define the backup policy to create daily, weekly, or monthly backups with a specific number of backup copies to retain.

3. **Volume Name**: Typically the volume is the one created prior to the backup action in the same template. In this case, see how to complete the fields within the volume name to indicate that volume.
4. Click **Apply** to save your changes.

Add Data Sense functionality to a volume

When creating a volume template, you can add in the template that you want to scan the volume for compliance and classification using the Cloud Data Sense service.



1. **Working Environment**: You can enter a working environment Name if you are using this action in a template without first creating a volume. Otherwise, leave this field as "Editable."
2. **Volume Name**: Typically the volume is the one created prior to the Data Sense action in the same template. In this case, see how to complete the fields within the volume name to indicate that volume.
3. **Volume UUID**: Data Sense needs the UUID of the volume before it can scan the volume. See how to complete the three fields below the volume name to indicate that volume.
4. **Volume Path**: Typically this is the mount point from the volume you are creating in the template. So you can get the "mountpoint" value from the output of that volume.
5. **Protocol**: Data Sense needs to know the protocol so it can scan the data. So you can get the "Protocol" value from the output of that volume.
6. Click **Apply** to save your changes.

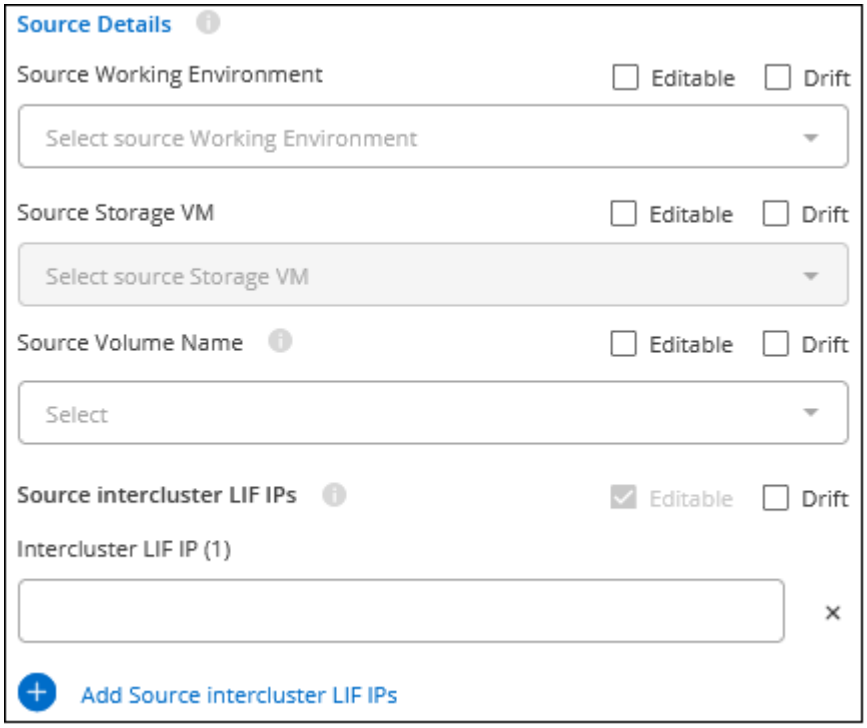
Add Replication functionality to a volume

When creating a volume template, you can add in the template that you want to replicate the data in the volume to another volume using the Replication service. You can replicate data to a Cloud Volumes ONTAP cluster or to an on-prem ONTAP cluster.

This action is not applicable for Azure NetApp Files volumes.

Replication functionality consists of three parts: selecting the source volume, selecting the destination volume, and defining the replication settings. Each section is described below.

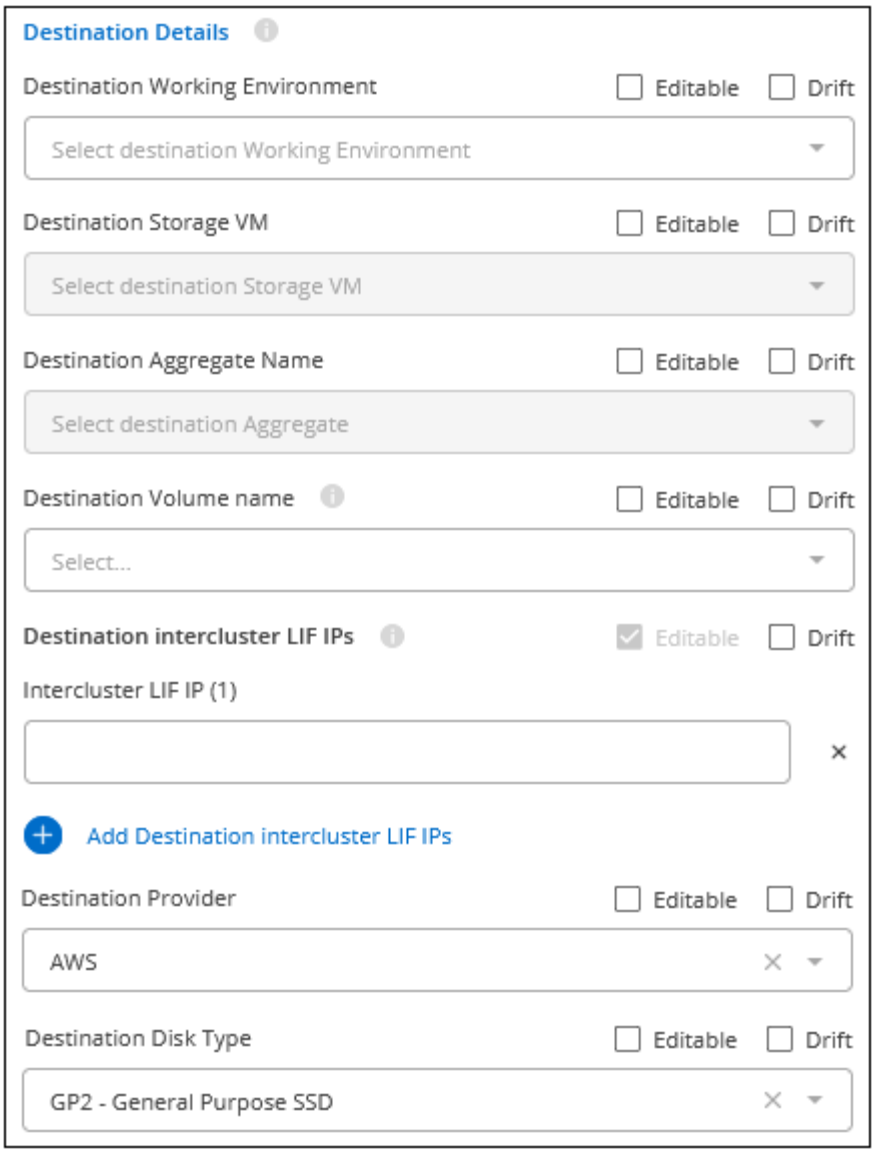
1. **Source Details**: Enter the details about the source volume you want to replicate:



   a. Select the working environment where the volume resides.
   b. Select the storage VM on which the volume resides.
   c. Typically the volume is the one created prior to the replication action in the same template. In this case, see how to complete the fields within the Source Volume Name field to indicate that volume.
   d. Replication requires that the source and destination working environments are connected through their intercluster LIFs. Enter the intercluster LIF IP address for the source working environment.

      To get this information: double-click the working environment, click the menu icon, and click Information.

2. **Destination Details**: Enter the details about the destination volume that will be created by the replication operation:



a. Select the working environment where the volume will be created.

b. Select the storage VM on which the volume will reside.

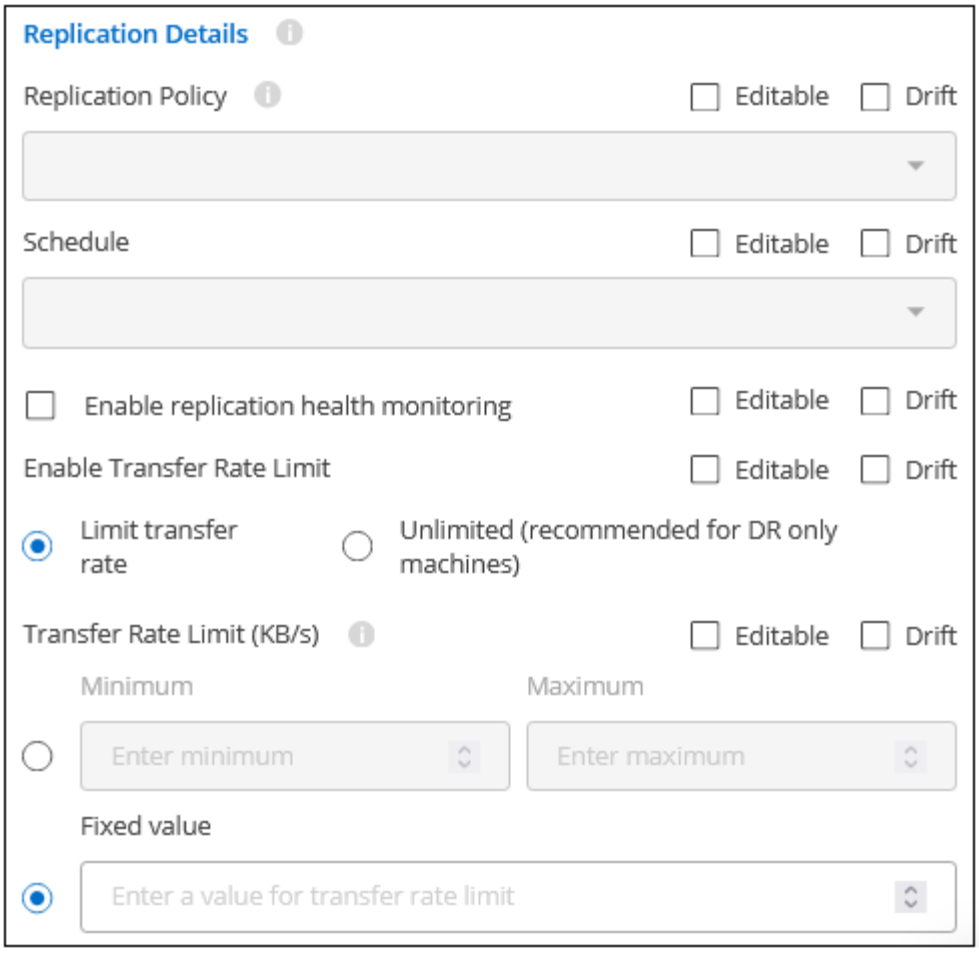
c. Select the aggregate on which the volume will reside.

d. For the destination volume, click in the field and select one of the 5 options. You can let the admin enter any name by selecting **Free Text**, or you can specify that the volume name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a regular expression (regex) you enter.

e. Replication requires that the source and destination working environments are connected through their intercluster LIFs. Enter the intercluster LIF IP address for the destination working environment.

f. When replicating a volume to a Cloud Volumes ONTAP cluster (not to an on-prem ONTAP cluster), you need to specify the Destination Provider (AWS, Azure, or GCP) and the type of disk that will be used for the new volume.

3. **Replication Details**: Enter the details about the type and frequency of the replication operation:



a. Select the replication policy that you want to use.

b. Choose a one-time copy or a recurring replication schedule.

c. Enable replication health monitoring if you want the drift report to include the replication health of the SnapMirror relationship along with the lag time, status, and last transfer time. See what this looks like in the drift report.

d. Select whether you want to set a transfer rate limit, and then enter the maximum rate (in kilobytes per second) at which data can be transferred. You can enter a fixed value, or you can provide a minimum and maximum and let the storage admin select a value in that range.

4. Click **Apply** to save your changes.

What to do after you have created the template

After you have created a template, you should inform your storage administrators to use the template when creating new working environments and volumes.

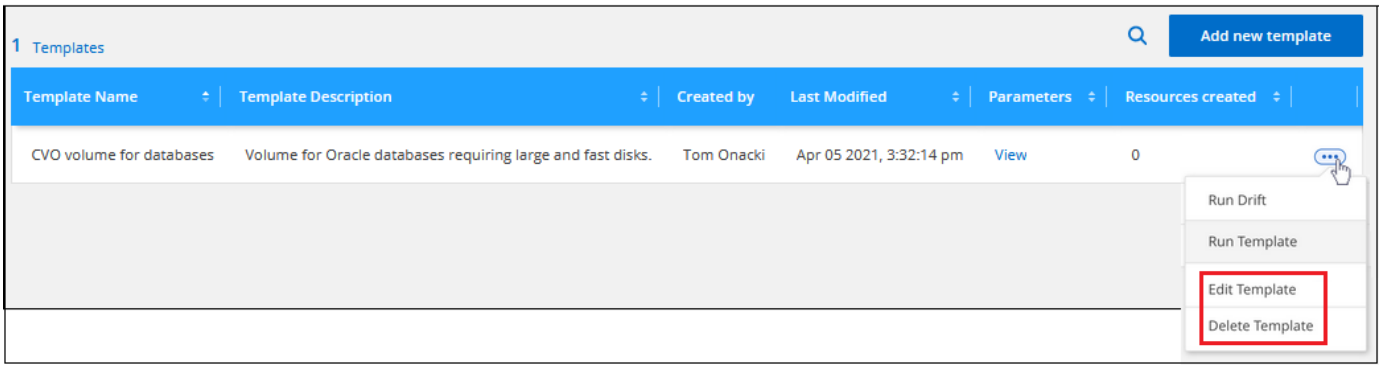
You can point them to Creating resources using templates for details.

Edit or delete a template

You can modify a template if you need to change any of the parameters. After you save your changes, all future resources created from the template will use the new parameter values.

You can also delete a template if you no longer need it. Deleting a template does not affect any of the resources that were created with the template. However, no Drift compliance checking can be done after the

template is deleted.



Check resources for template compliance

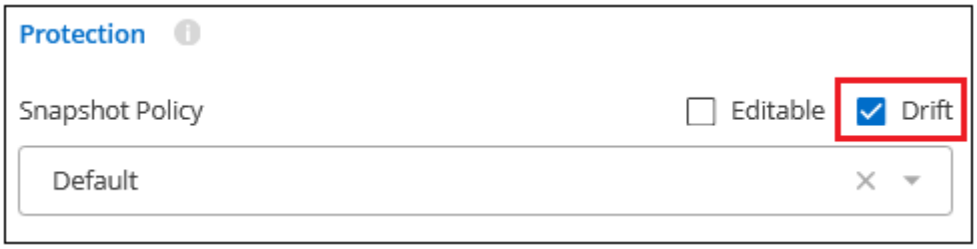
Cloud Manager can monitor the parameter values used when a resource was created with a template using the "drift" feature. Drift identifies resources that have been changed and that are no longer compliant with the template settings.

At this time, drift identifies the changed parameters in a resource — you must manually make adjustments to the resource to bring it back into compliance with the template.

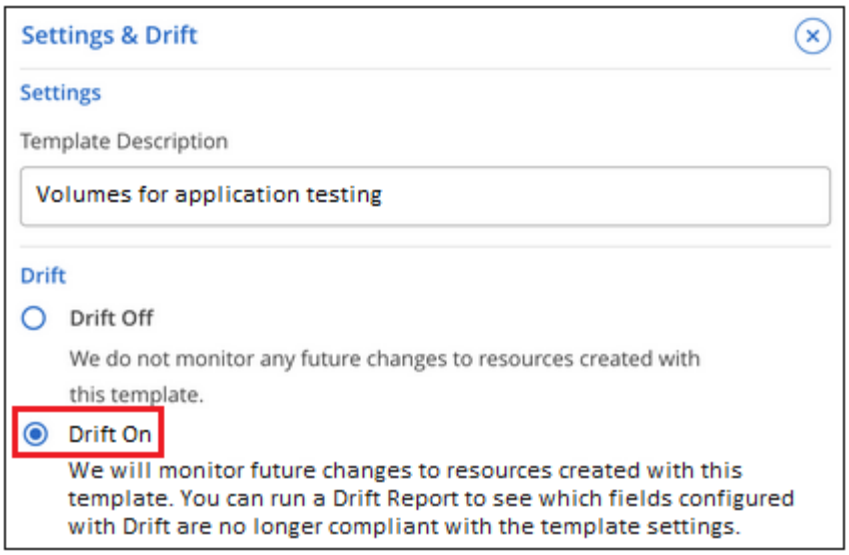
How does drift work

Drift identifies non-compliant parameters like this:

1. When creating a template, you turn drift on for certain parameters that you do not want users to change. For example, you may require that Snapshot copies are created using the "Default" policy for all volumes created from a template.



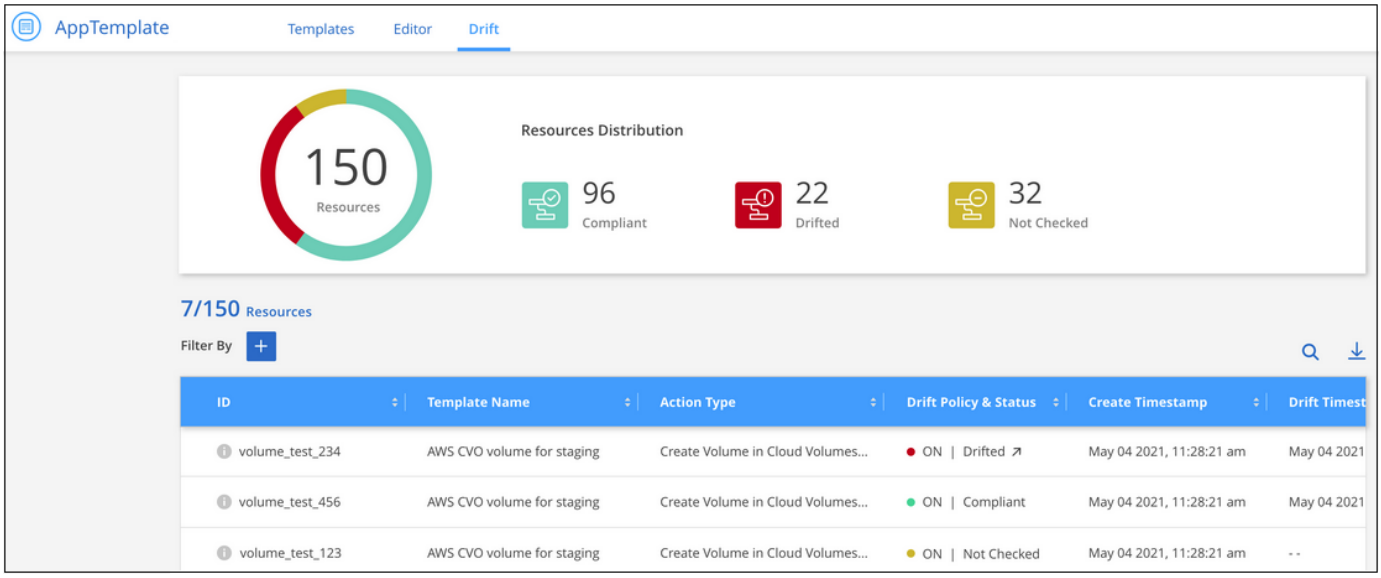
2. You turn drift on for the template, and then save the template.



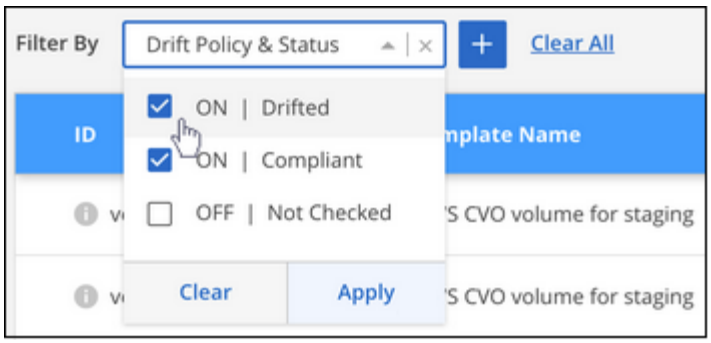
3. Storage admins run the template to create volumes.
4. Later, a storage admin edits a volume and disables Snapshot copies.
5. You run drift checking on all templates, and the AppTemplates service compares the Snapshot copies template setting to the current setting in the volume. Any non-compliant values are flagged so you can fix the incorrect setting.

The Drift Dashboard

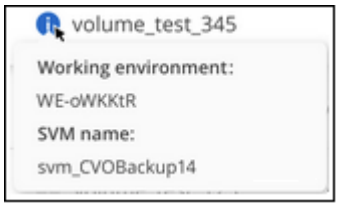
The Drift Dashboard shows the total number of resources (for example, volumes) that have been created using your templates, the number that are still compliant with the template, the number that are not compliant (drifted), and the number that were created with Drift disabled.



- The controls at the top of each column allow you to sort the results in numerical or alphabetical order.
- The + enables you to filter the results by Template Name, Drift Policy & Status, and Action Type. For example:



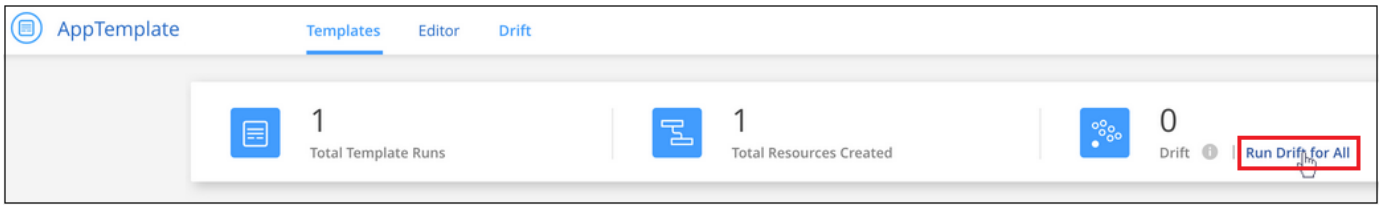
- The search bar enables you to search for a specific volume name or template name.
- To find out more details about the actual resource (or volume), such as the working environment and storage VM, you can click the .



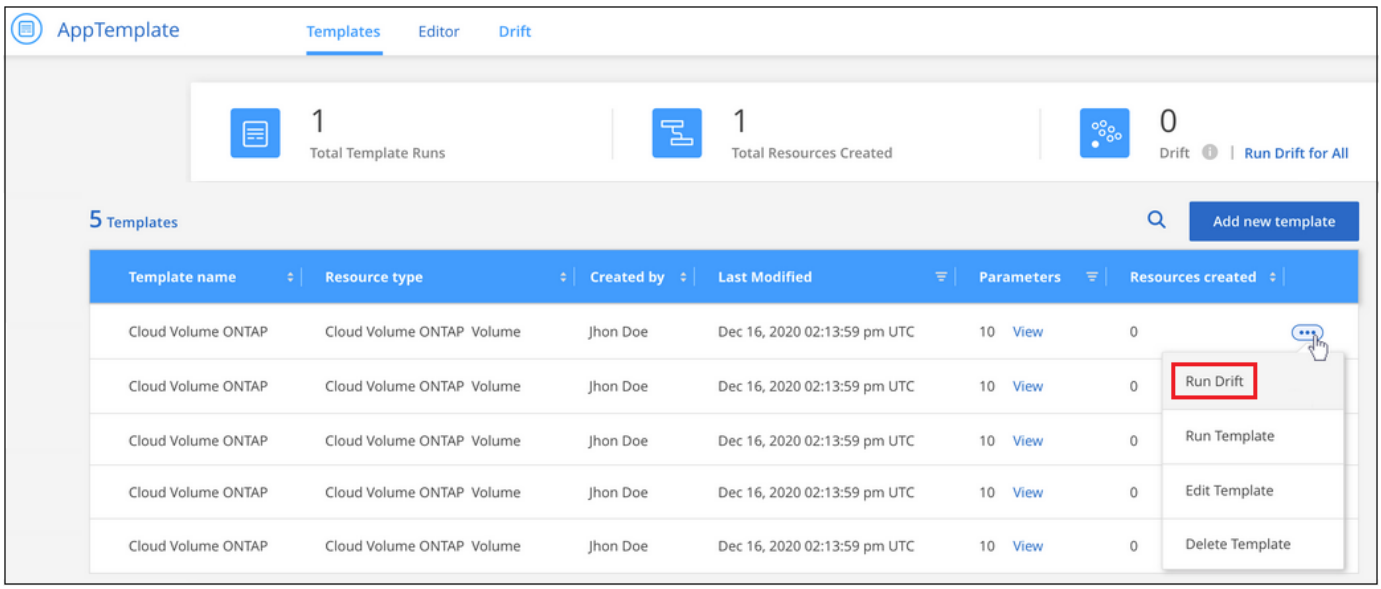
Populate the Drift Dashboard

You must run drift checking on a template before it populates the values in the Drift Dashboard.

You can run drift checking for all templates from the Templates Dashboard:



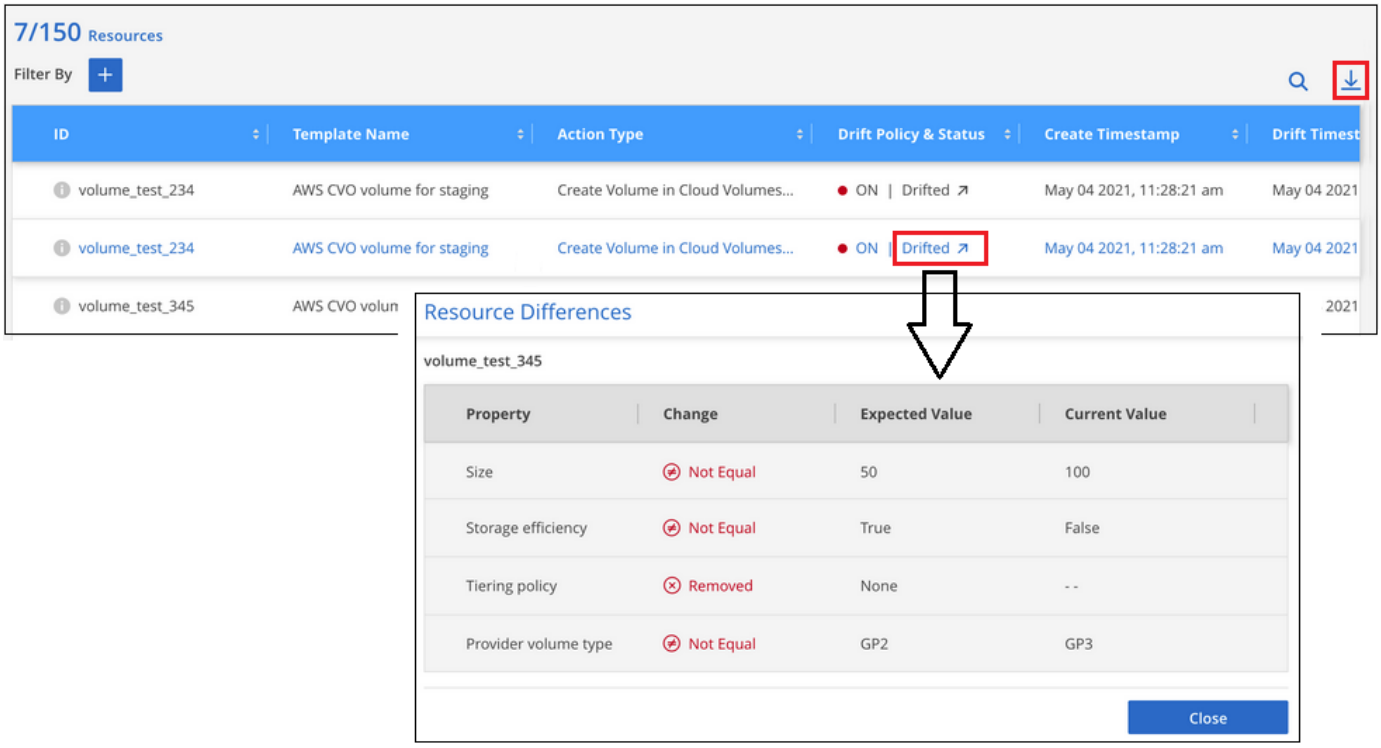
You can run drift checking on a single template from the Templates Dashboard:



Create a drift report for non-compliant resources

You can view a drift report for a single resource, or run a report to download a report for all resources. Using this report you can assign actions to system admins to make changes that bring the resources back into compliance with the template.

You can click the Drift icon for a resource in the Drift Dashboard to view a list of the parameters in each resource that is non-compliant.

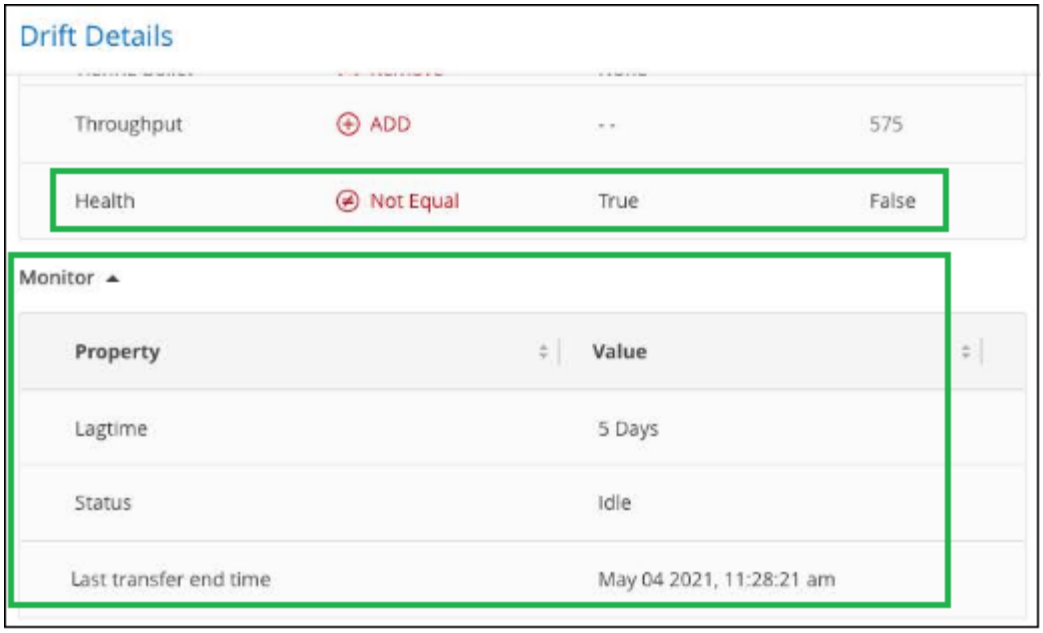


To view a drift report for resources that have been created from your templates, click to download a .CSV file. The drift report reflects what is currently filtered on the page - it does not show all resources unless you haven't applied any filters on the page.

Replication health details in the drift report

When enabling Replication on a volume using templates, you can choose to show more detailed replication information in the drift report by enabling drift in the "Enable replication health monitoring" field. When enabled, the drift report shows whether the health of the Replication relationship is healthy or unhealthy (drifted), along with the SnapMirror lag time, status, and last transfer time.

This screenshot shows the replication details for a SnapMirror relationship that is unhealthy in the drift report.



Note: As replication is initially being applied to the volume the health will be returned as "False", meaning it is unhealthy. After a few minutes the real replication status will be displayed.

Create resources using templates

Select one of the application templates that your organization has built to create working environments or volumes that are optimized for specific workloads and applications. Templates also enable you to activate Cloud Backup, Cloud Data Sense, and Replication (SnapMirror) on the created volumes.

Templates enable you to create volumes for Cloud Volumes ONTAP, Azure NetApp Files, and on-premises ONTAP systems.

Quick start

Get started quickly by following these steps, or scroll down to the remaining sections for full details.

Verify required prerequisites

- Before you can create a volume for a Cloud Volumes ONTAP, on-premises ONTAP, or Azure NetApp Files system using a template, make sure you have access to an appropriate working environment where the volume will be deployed.
- If the template activates a cloud service on the volume, such as Cloud Backup or Cloud Data Sense, ensure that the service is active and licensed in your environment.

Launch the Application Templates service

Select the **AppTemplate** service and click the **Templates** tab.

Build the resource by running the template and defining parameters

Select the template, click **Run Template**, and enter values in the editable fields to create the resource.

Requirements

Read the following requirements to make sure that you have a supported configuration.

- If you don't already have a Connector, see how to create Connectors for AWS, Azure, and GCP.
- When creating a Cloud Volumes ONTAP volume, make sure you have a Cloud Volumes ONTAP working environment available.
- When creating an on-premises ONTAP volume, make sure you have an on-premises ONTAP working environment available.
- When creating an Azure NetApp Files volume, make sure you have an Azure NetApp Files working environment available.
- If the template activates a cloud service on the volume, such as Cloud Backup, Cloud Data Sense, or Replication (SnapMirror), ensure that the service is active and licensed in your environment.

Select and run the volume template

There are multiple ways to select and run a template to create new volumes:

- Run the volume template from the working environment
- Run the volume template from the Templates dashboard

Regardless of the method you choose, the details about the required volume parameters that you must define are available in these sections:

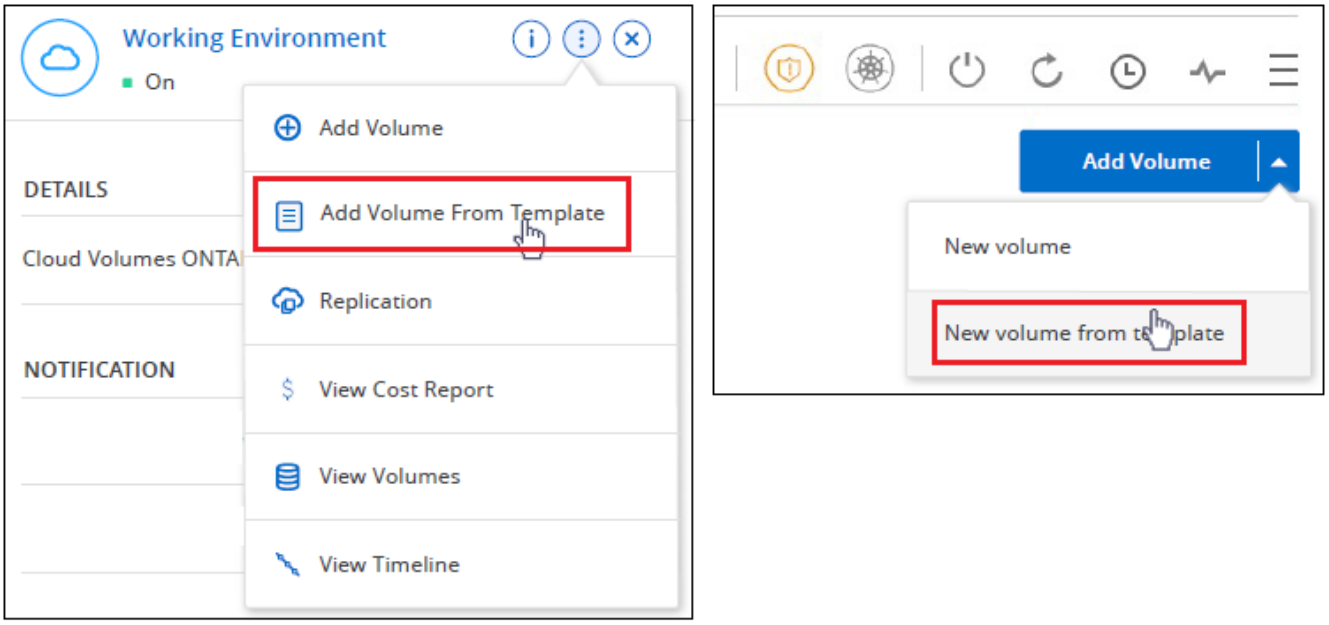
- How to provision Cloud Volumes ONTAP volumes
- How to provision Azure NetApp Files volumes
- How to provision on-premises ONTAP volumes

Run a volume template from the working environment

You can add a volume to an existing working environment from the *Working Environment* page and from the *Volume Details* page.

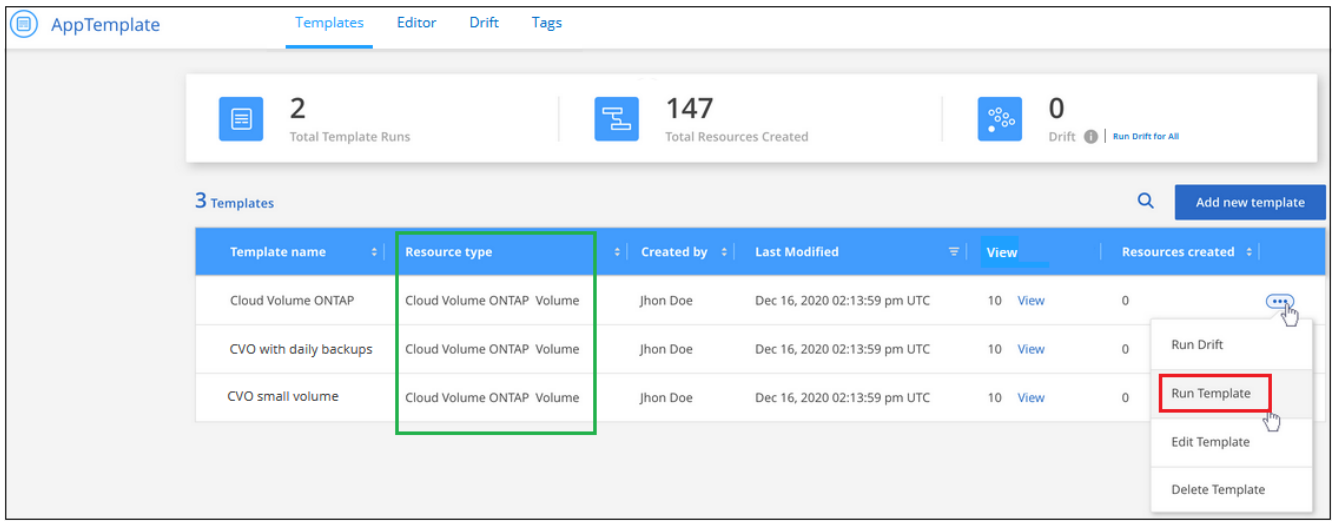
Steps

1. From the *Working Environment* page or from the *Volume Details* page, click **Add Volume From Template**.



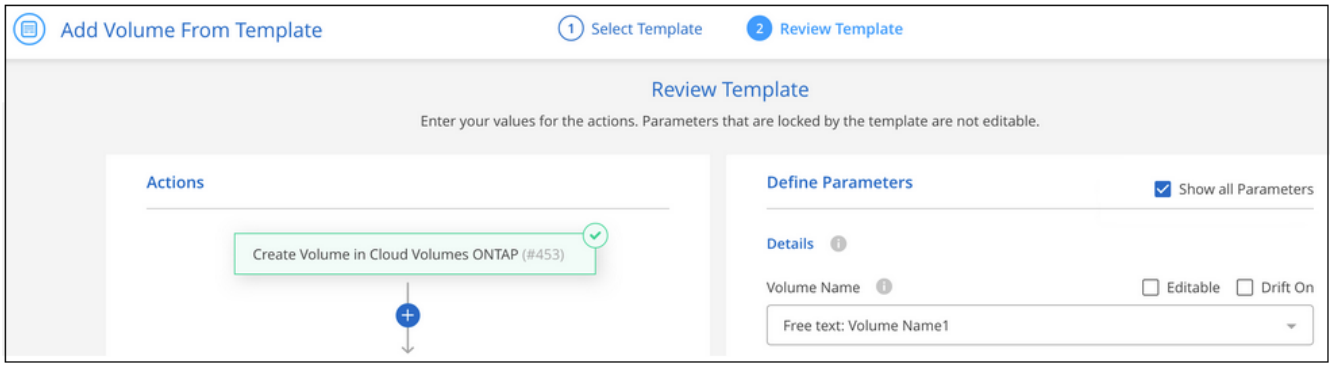
The *Templates Dashboard* is displayed and it lists only those templates that are applicable to the selected working environment — for example, it only shows Cloud Volumes ONTAP templates.

2. Click ••• and **Run Template**.



The *Add Volume from Template* page appears.

3. Enter values in the editable fields to create the volume and click **Run Template**.



Run a volume template from the Templates Dashboard

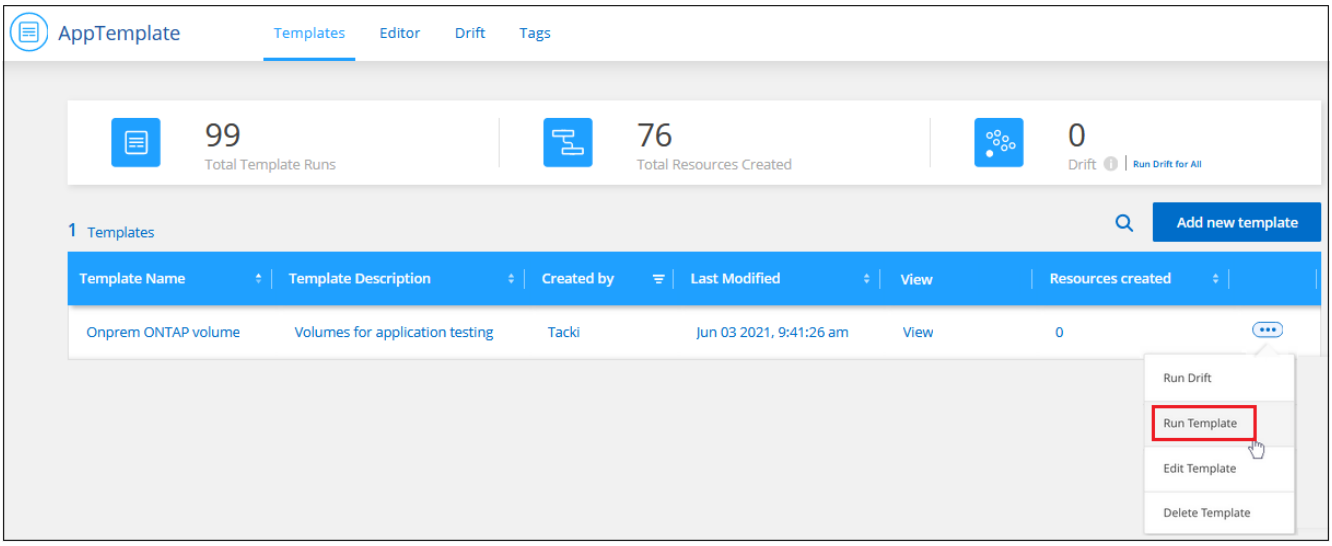
You can add a volume to an existing working environment from the *Templates Dashboard*.

Steps

1. Select the **AppTemplate** service and click the **Templates** tab.

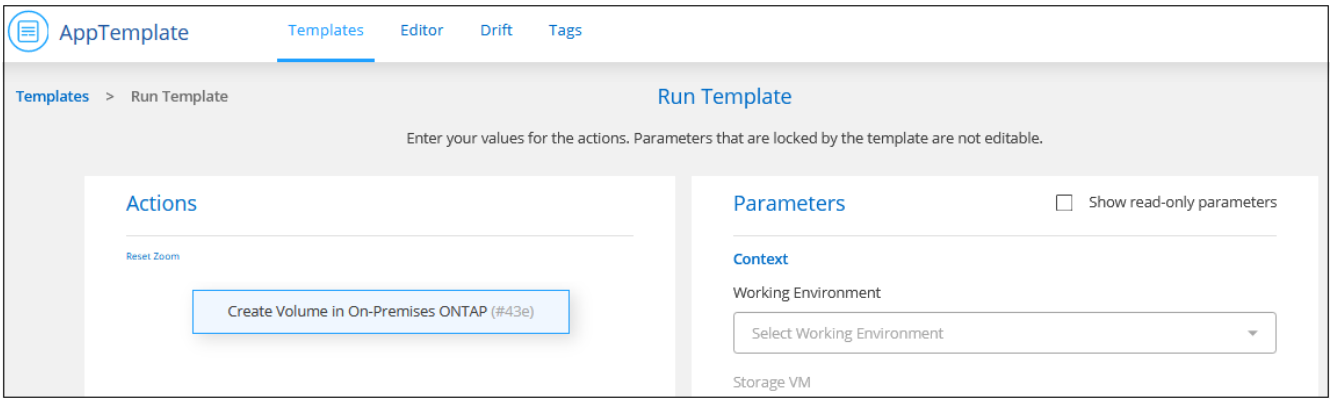
   The *Templates Dashboard* is displayed.

2. For the template that you want to use, click ••• and **Run Template**.



   The *Run Template* page appears.

3. Enter values in editable fields to create the volume and click **Run Template**.



   Note that when you run the template from the dashboard that you need to select the working environment and other variables (for example, the storage VM and/or aggregate). When you run the template from the working environment, the working environment gets filled in automatically.

Select and run a working environment template

You can create a new working environment from the *Templates Dashboard* if your company has created a template for this functionality.

If you have any questions about the details required to create the working environment, see Launching Cloud

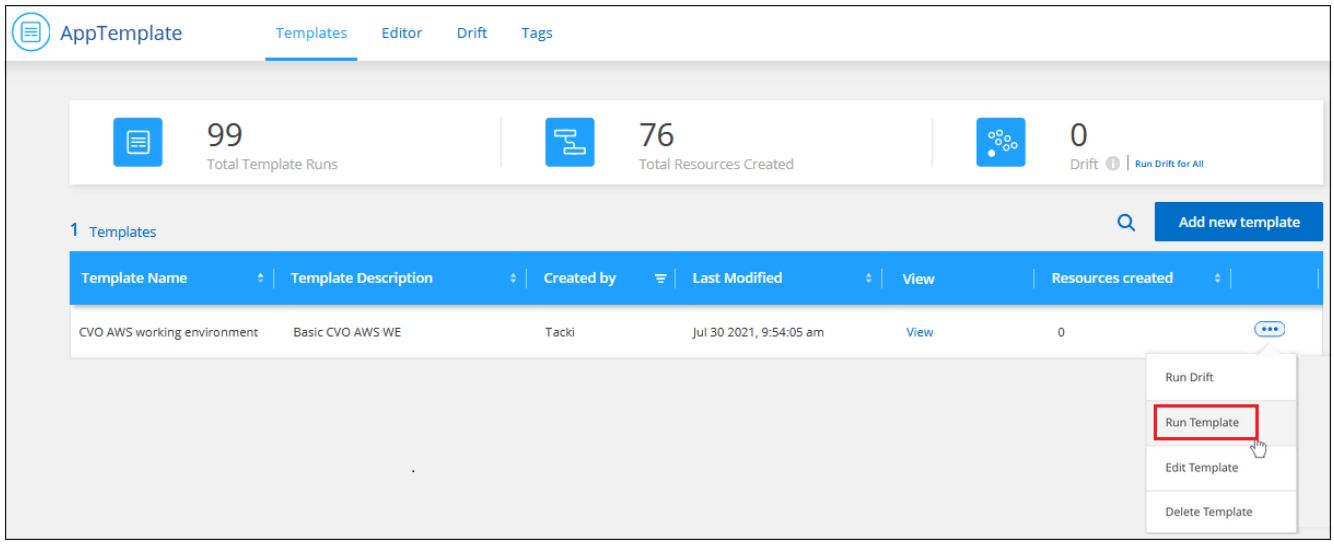
Volumes ONTAP in AWS.

Steps

1. Select the **AppTemplate** service and click the **Templates** tab.

   The *Templates Dashboard* is displayed.

2. For the template that you want to use, click ••• and **Run Template**.



   The *Run Template* page appears.

3. Enter values in editable fields to create the volume and click **Run Template**.