# Use templates to standardize resource creation

## AppTemplate

NetApp
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# Use templates to standardize resource creation

## 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 actions you'll use in your 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 use Cloud Backup to backup up a volume in the template, ensure that your environment has activated Cloud Backup.
- If you plan to use Cloud Data Sense to scan volumes in the template, ensure that your environment has activated Cloud Data Sense.

- 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.

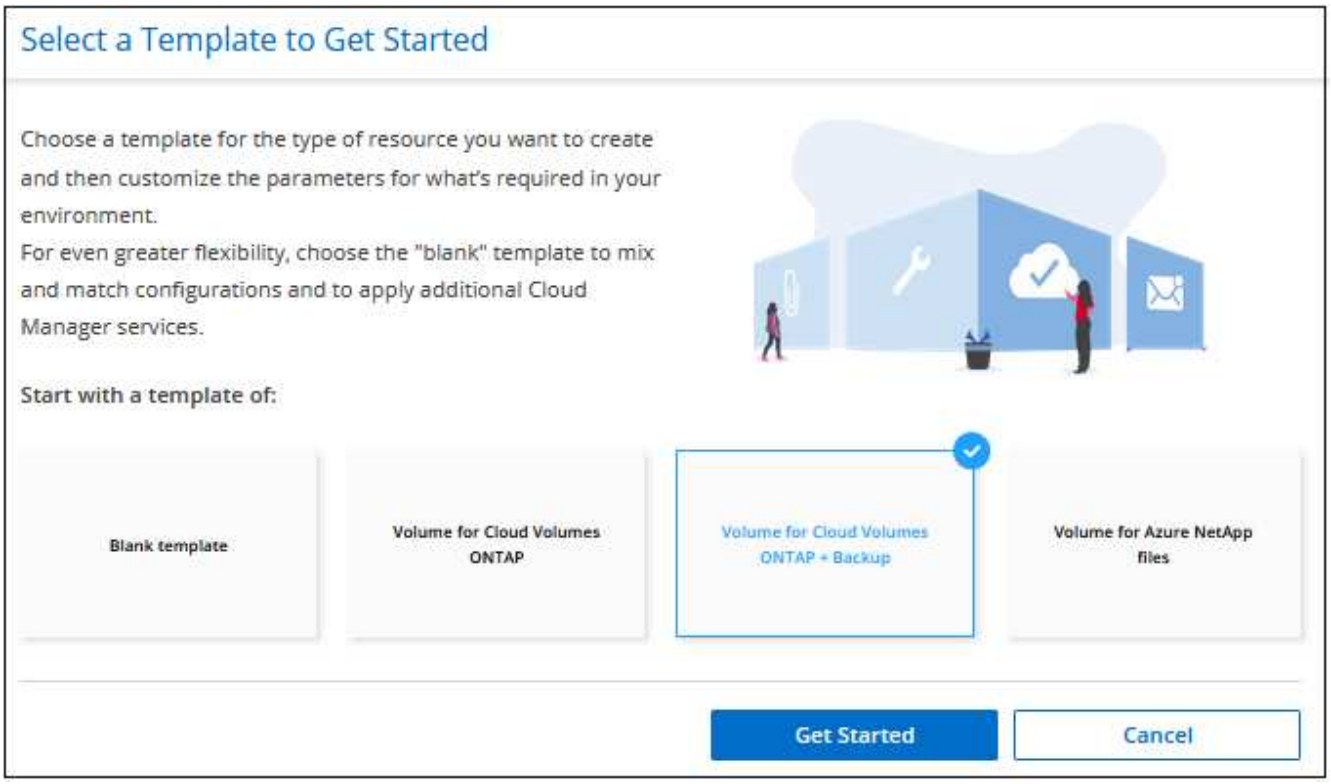
- Enable Cloud Backup

  Create 30 daily, 13 weekly, and 3 monthly backups (using the *3 Months Retention* policy).

**Steps**

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

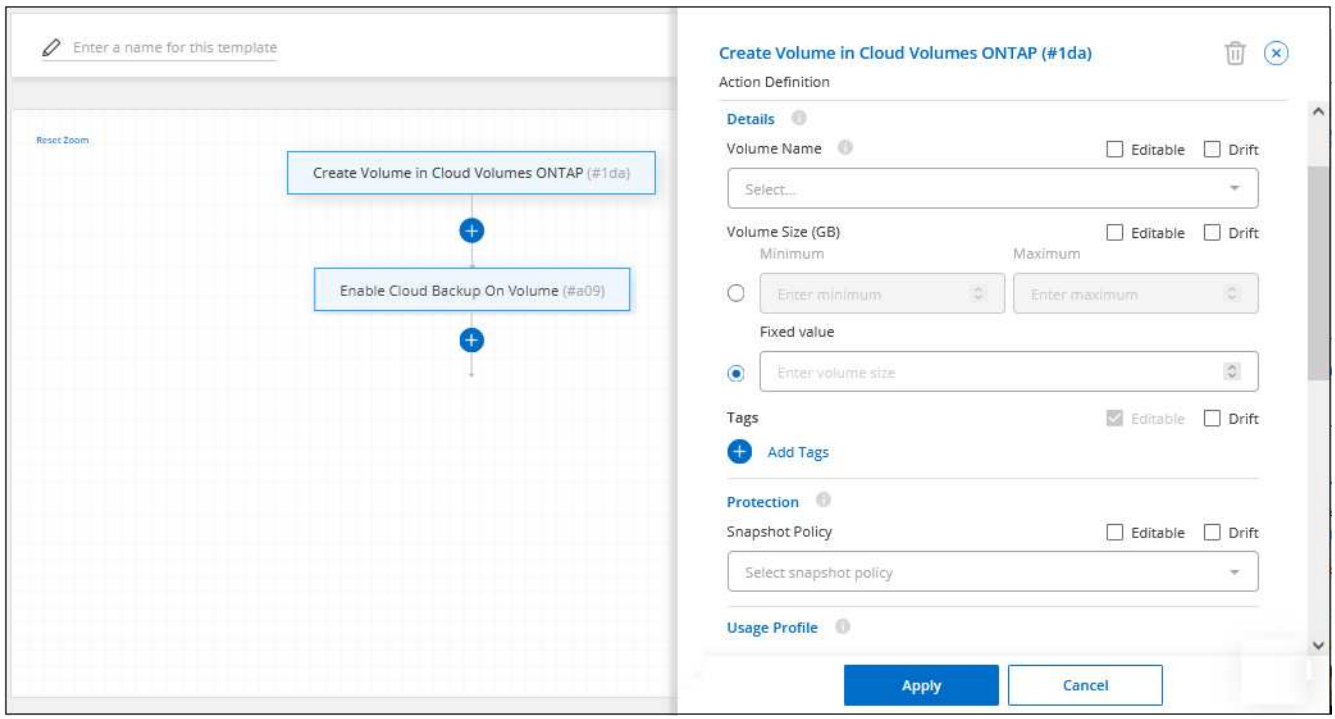
   The *Select_a Template* page is displayed.




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. **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".

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.<br><br>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**. |

| Field | Description |
|---|---|
| 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. For our example, keep storage efficiency enabled.
8. **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).
9. **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. |

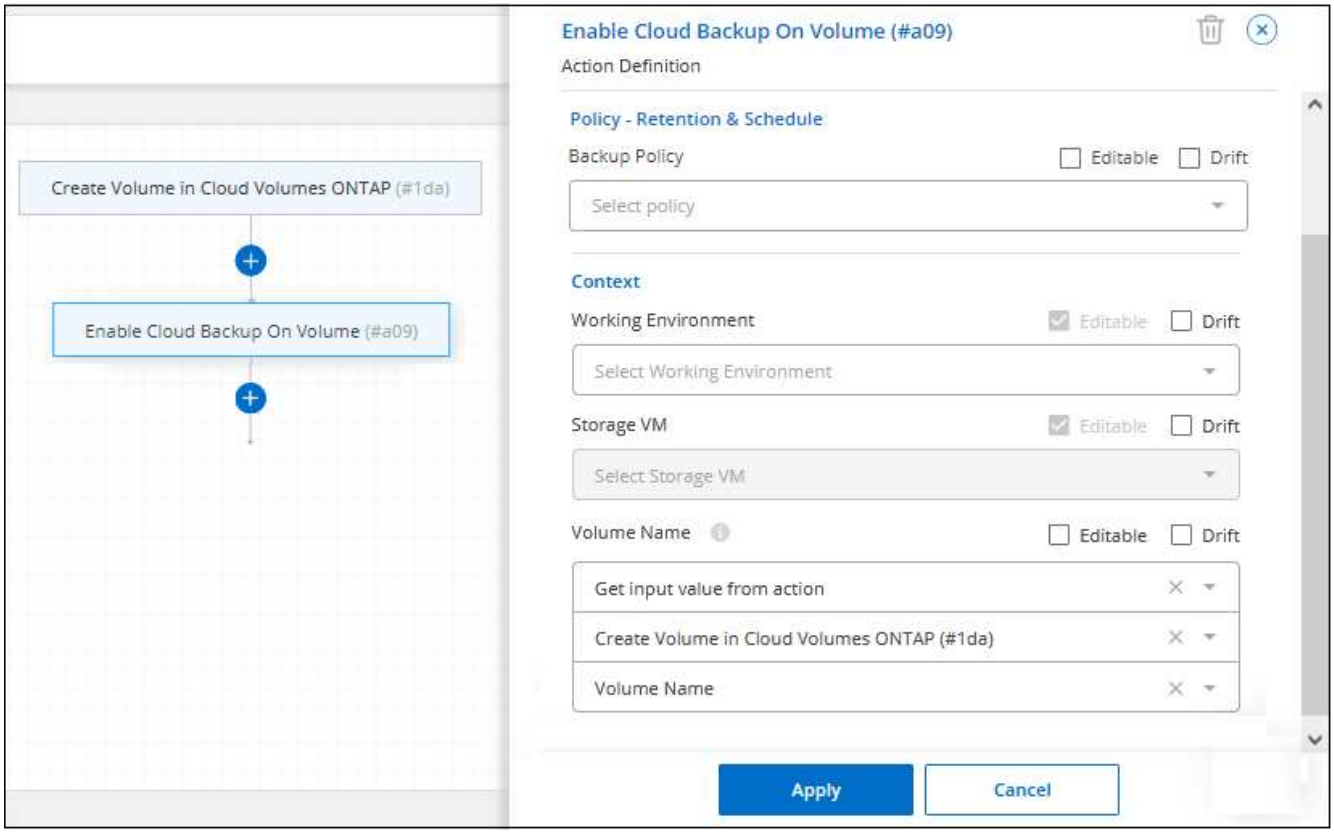
10. **Tiering:** Choose the tiering policy that you would like applied to the volume, or set this to "None" if you do not want to tier cold data from this volume to object storage.

    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.

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




13. Select the **3 Months Retention** backup policy to create 30 daily, 13 weekly, and 3 monthly backups.
14. Below the Working Environment and Volume Name fields there are three selections 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

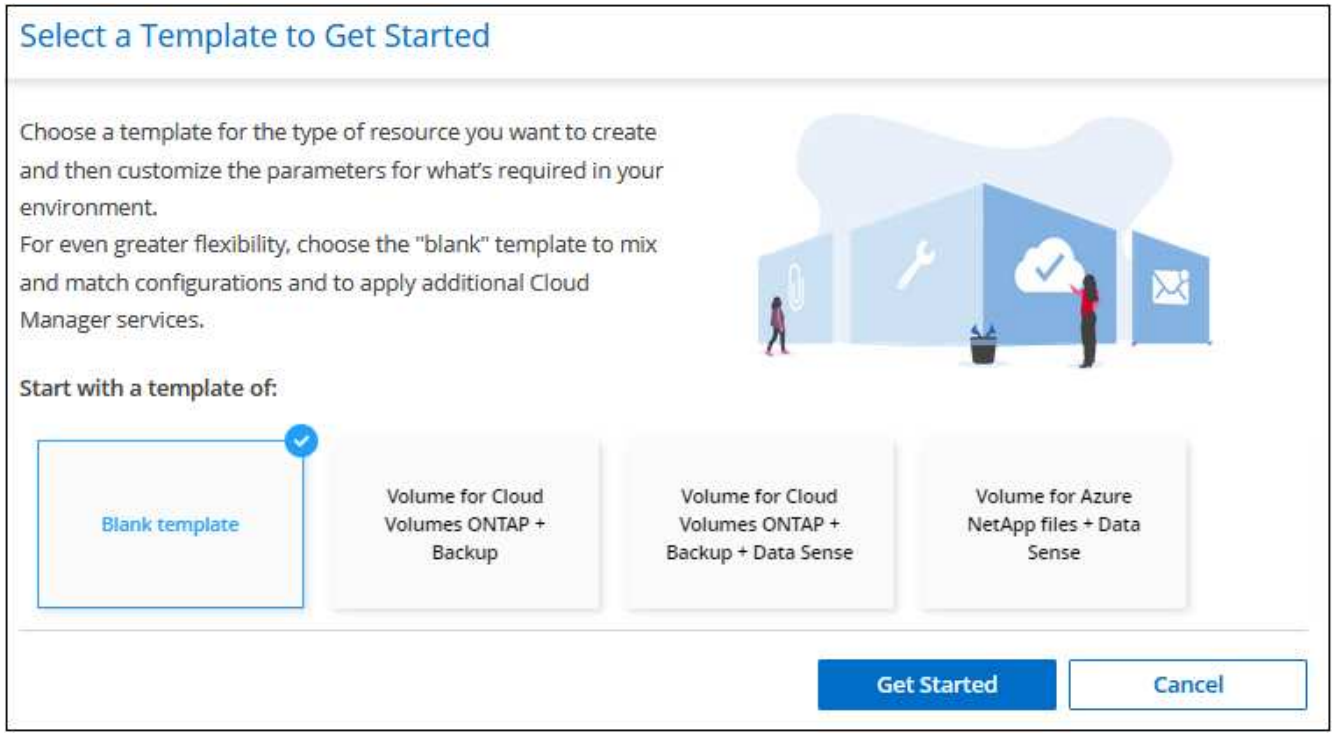
Creating a template for an Azure NetApp Files volume is done in the same manner as creating a template for a Cloud Volumes ONTAP volume.

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

**Steps**

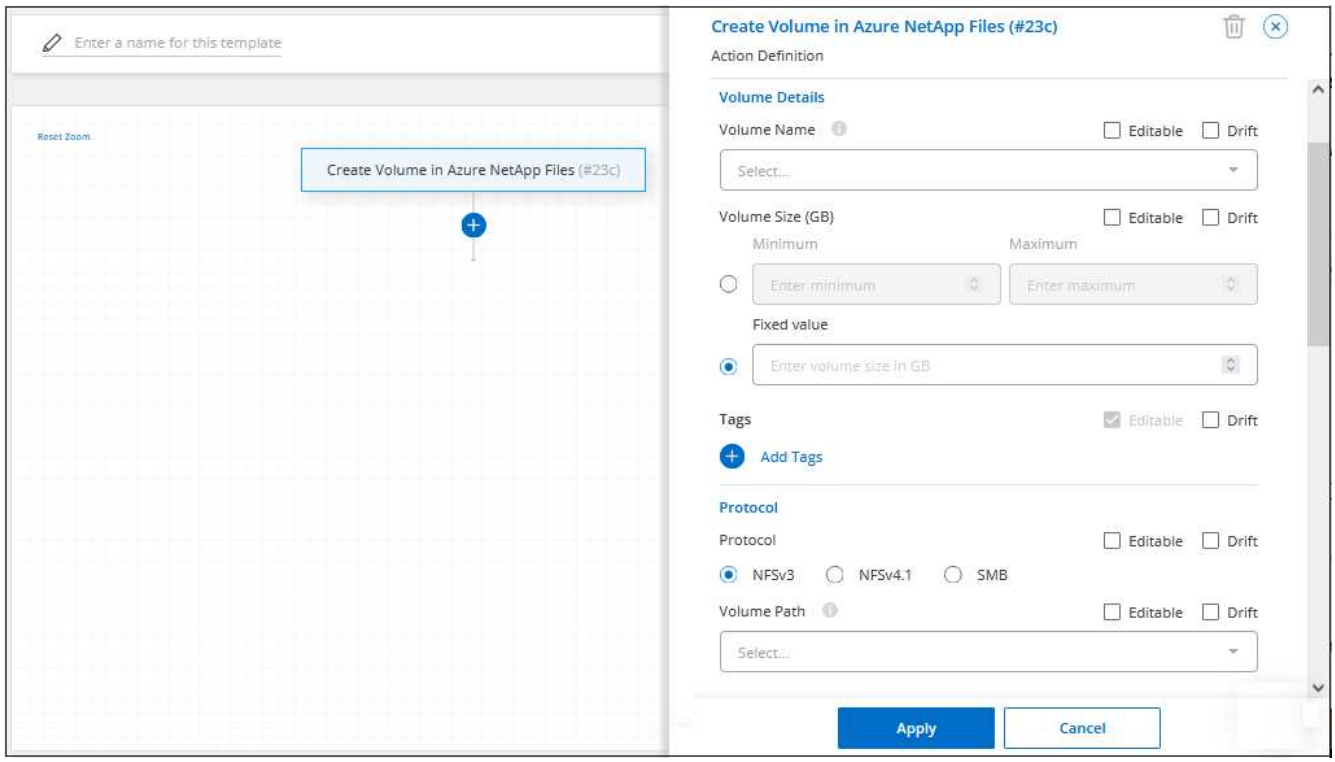
1. Select the **AppTemplate** service, click the **Templates** tab, and click **Add New Template**.

   The *Select_a Template* page is displayed.




2. Select **Blank template** and click **Get Started**.
3. Select **Create Volume in Azure NetApp Files** as the type of resource you want to create, and click **Apply**.

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



4. **Action Name**: Optionally, enter a customized action name instead of the default value.
5. **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.<br><br>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. |

6. **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. |
| 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. |

7. **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.<br><br>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. |

| Field | Description |
| --- | --- |
| 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>". |

8. **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.
9. Click **Apply** after you have defined the parameters needed for this action.
10. Enter the name you want to use for the template in the top left.
11. 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.

12. 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.

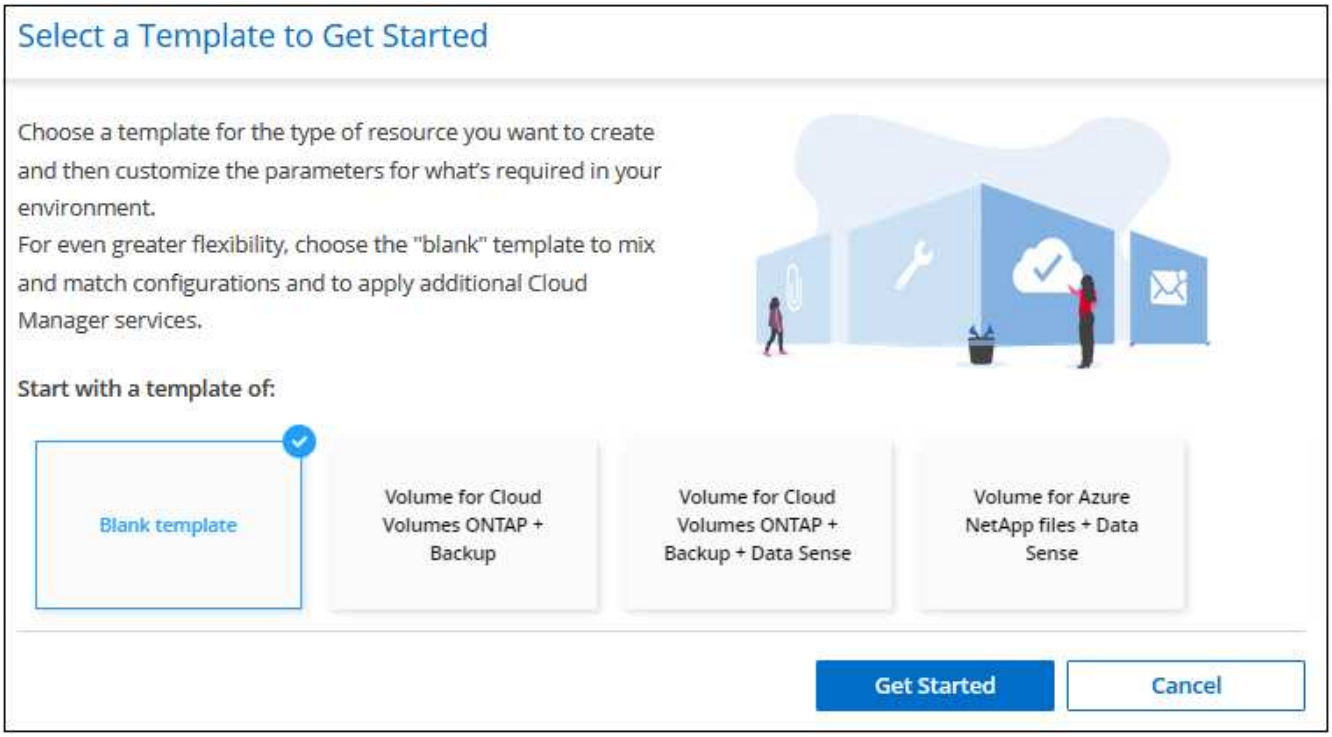
### Create a template for an on-premises ONTAP volume

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**

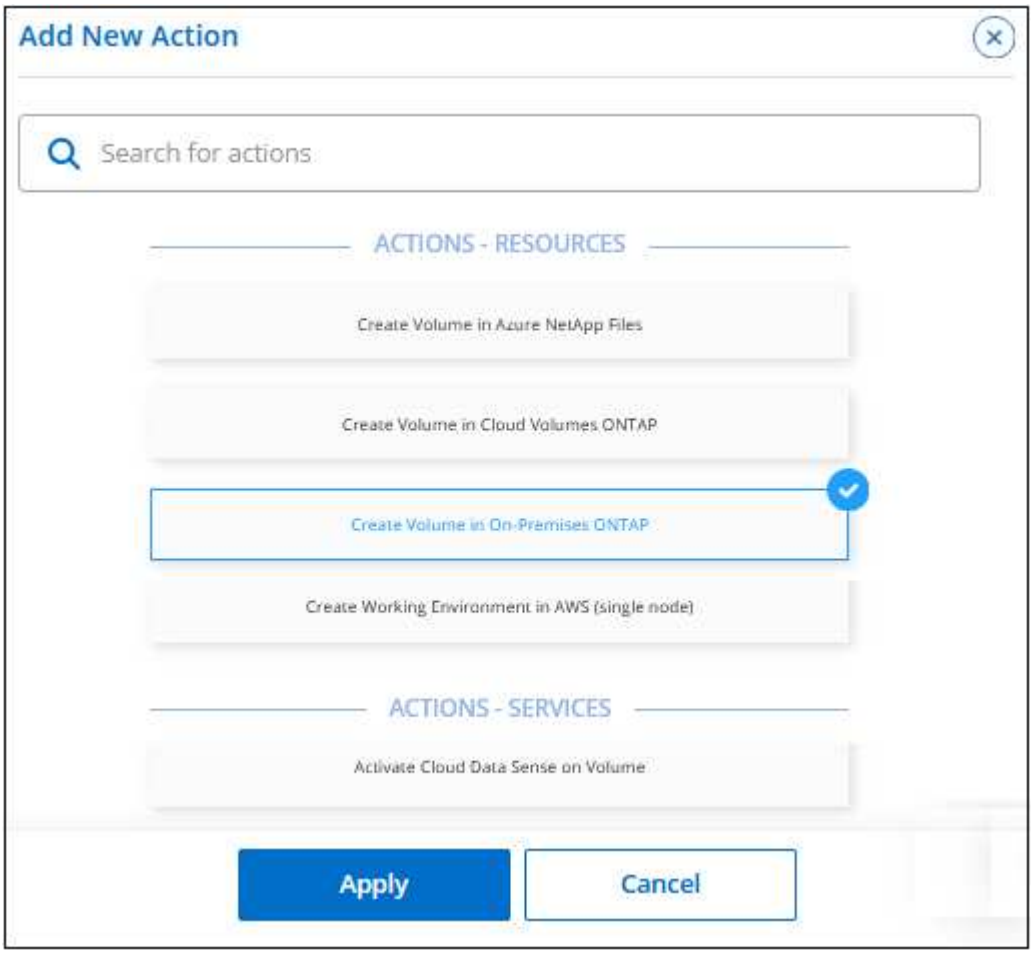
1. Select the **AppTemplate** service, click the **Templates** tab, and click **Add New Template**.

   The *Select_a Template* page is displayed.



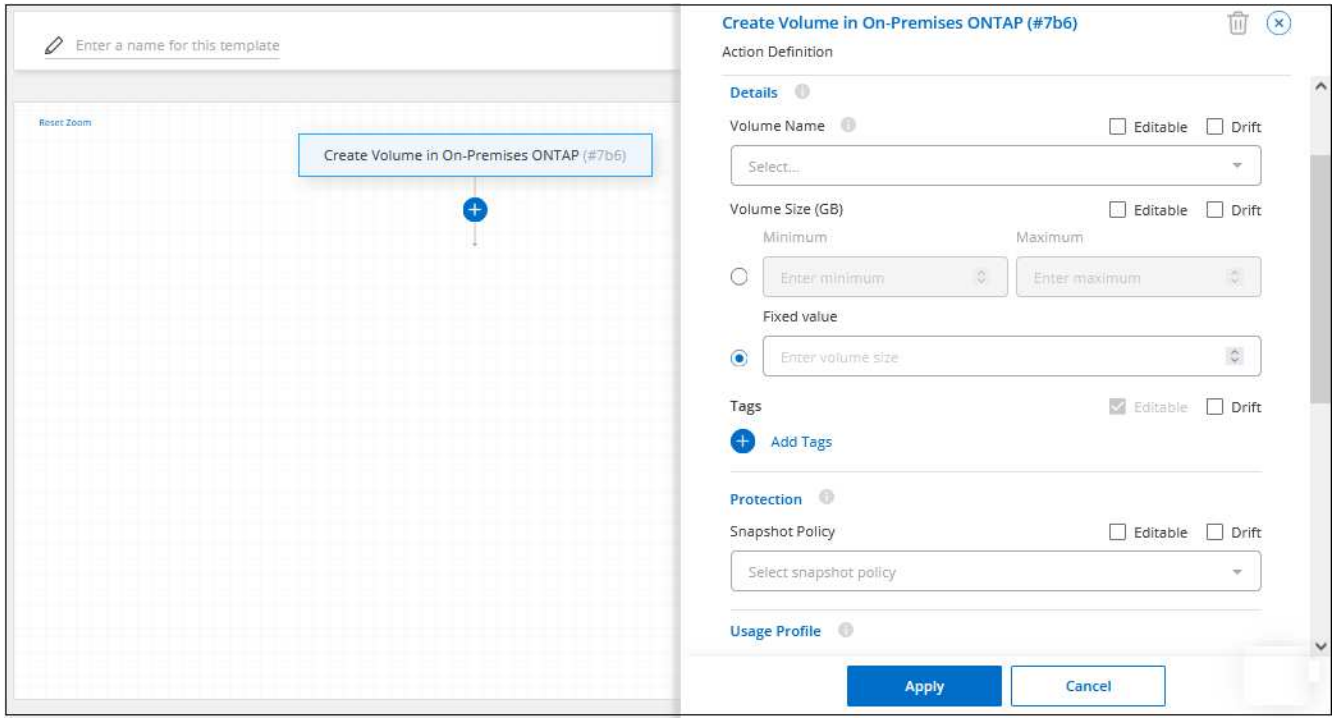

2. Select **Blank template** and click **Get Started**.

   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. **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.

6. **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.<br><br>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**. |

| Field | Description |
|---|---|
| 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. |

7. **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.
8. **Usage Profile:** Choose whether or not NetApp storage efficiency features are applied to the volume. This includes Thin Provisioning, Deduplication, and Compression.
9. **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. |

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 single-node or high-availability Cloud Volumes ONTAP working environment using templates.

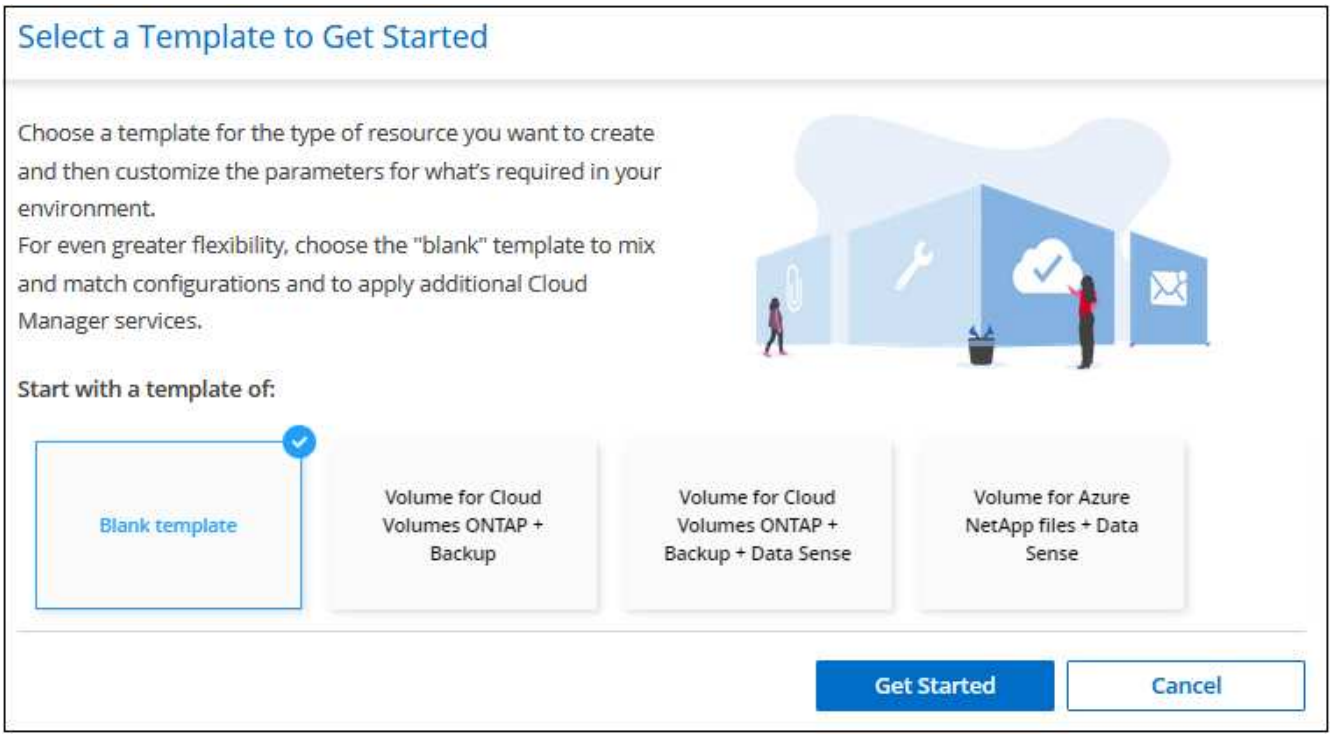
- This support is provided only for AWS environments at this time.
- This template doesn't create the first volume in the working environment. You must add a "Create Volume in Cloud Volumes ONTAP" action in the template to create the volume.

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

#### Steps

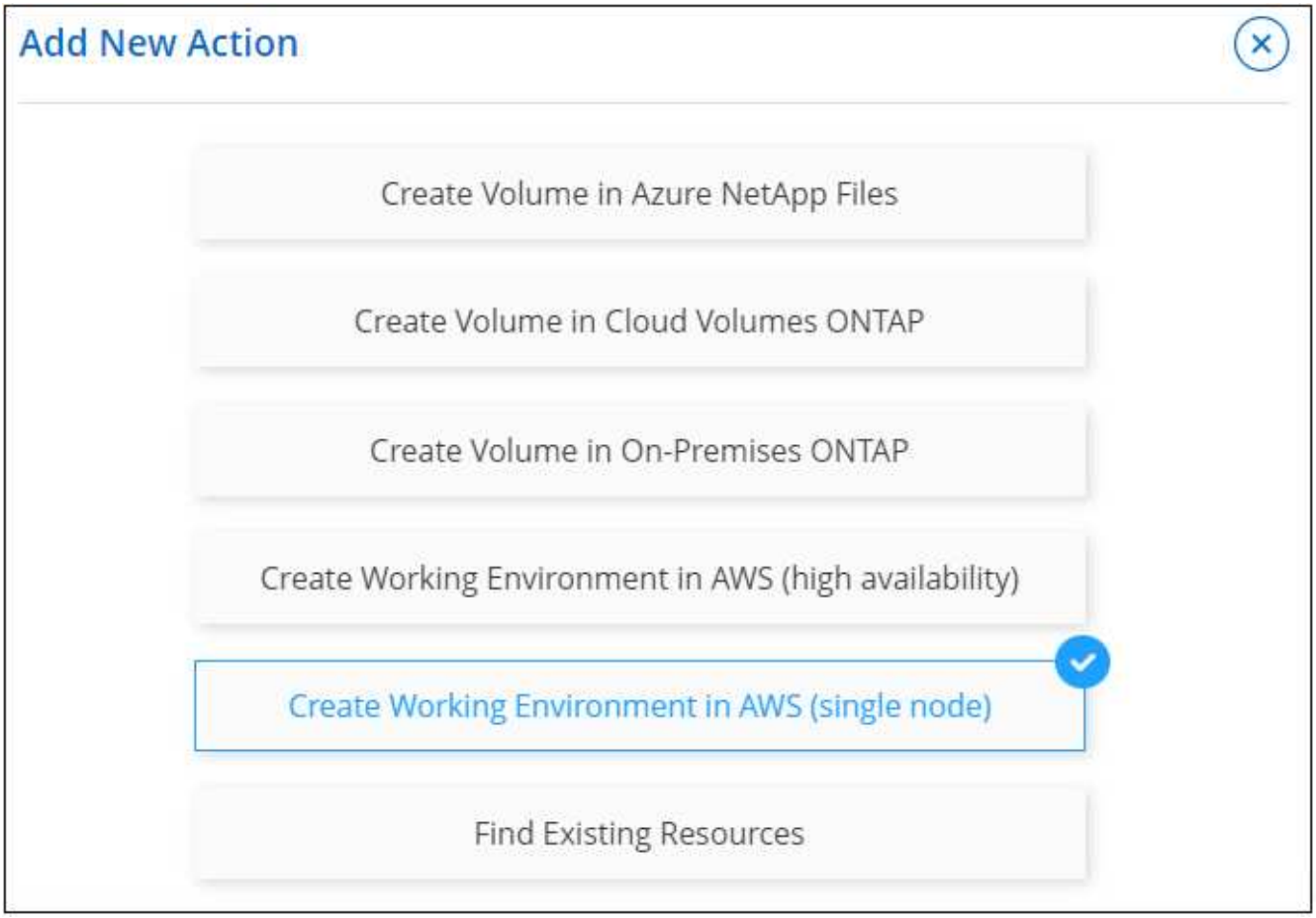
1. Select the **AppTemplate** service, click the **Templates** tab, and click **Add New Template**.

   The *Select_a Template* page is displayed.



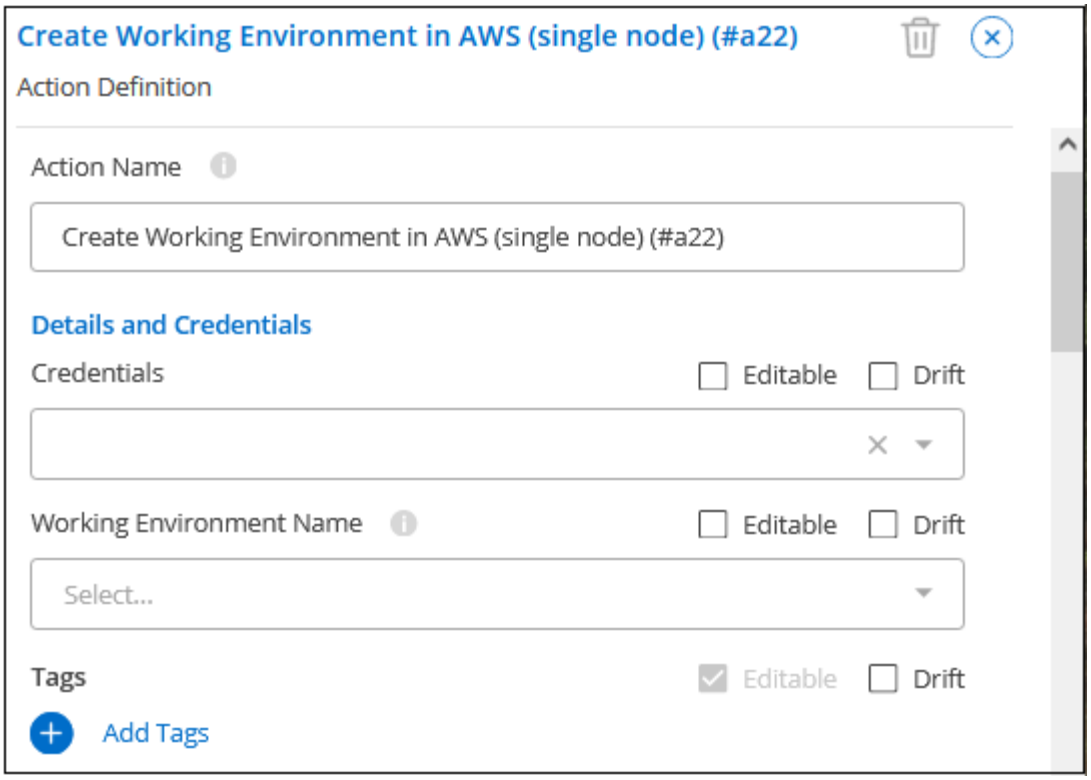

2. Select **Blank template** and click **Get Started**.

   The *Add New Action* page is displayed.




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

   For this example, 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.<br><br>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. |
| 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.<br><br>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. **NetApp Support Site 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 finding existing resources using templates

Using the *Find Existing Resources* action you can find specific working environments or find existing volumes by providing a variety of filters so you can narrow your search to just the resources you are interested in. After finding the correct resources, you can add volumes to a working environment, or enable a cloud service on the resulting volumes.

At this time you can find volumes within Cloud Volumes ONTAP, on-premises ONTAP, and Azure NetApp Files systems. And you can enable Cloud Backup on Cloud Volumes ONTAP and on-premises ONTAP volumes. Additional resources and services will be available at a later time.

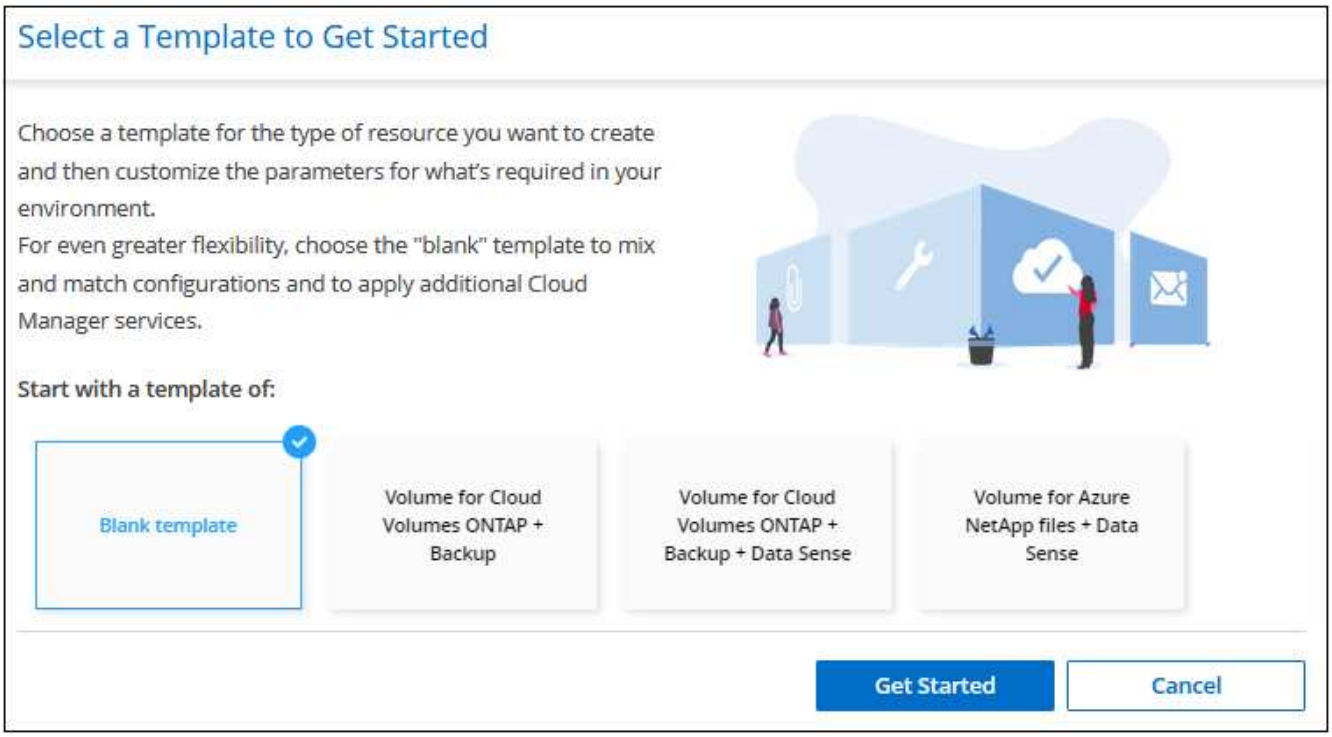
### Find existing volumes and activate a cloud service

The current *Find Existing Resources* action functionality enables you to find volumes on Cloud Volumes ONTAP and on-premises ONTAP working environments that do not currently have Cloud Backup or Cloud Data Sense enabled. When you enable Cloud Backup on specific volumes, this action also sets the backup policy you configured as the default policy for that working environment - so all future volumes on those working environments can use the same backup policy.

#### Steps

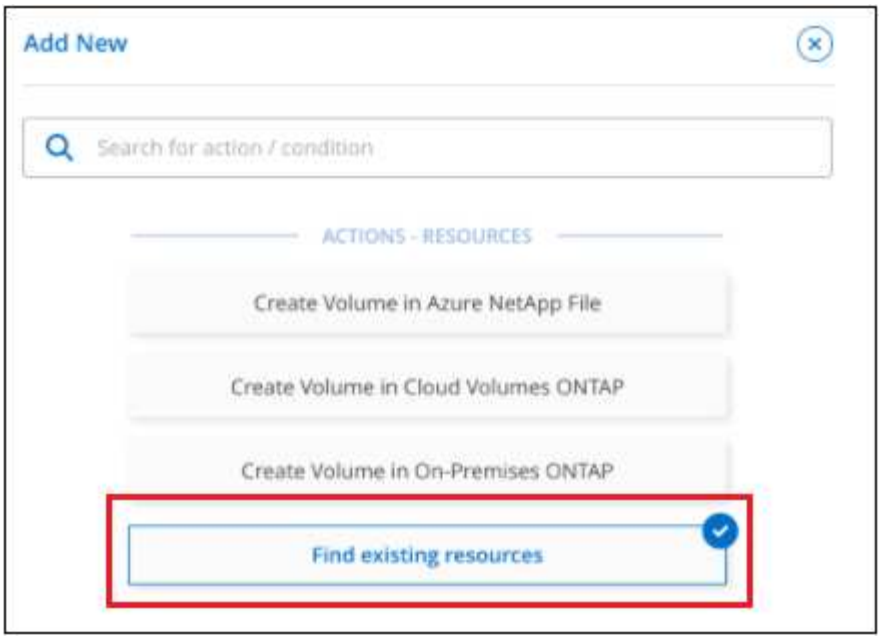
1. Select the **AppTemplate** service, click the **Templates** tab, and click **Add New Template**.

   The *Select_a Template* page is displayed.



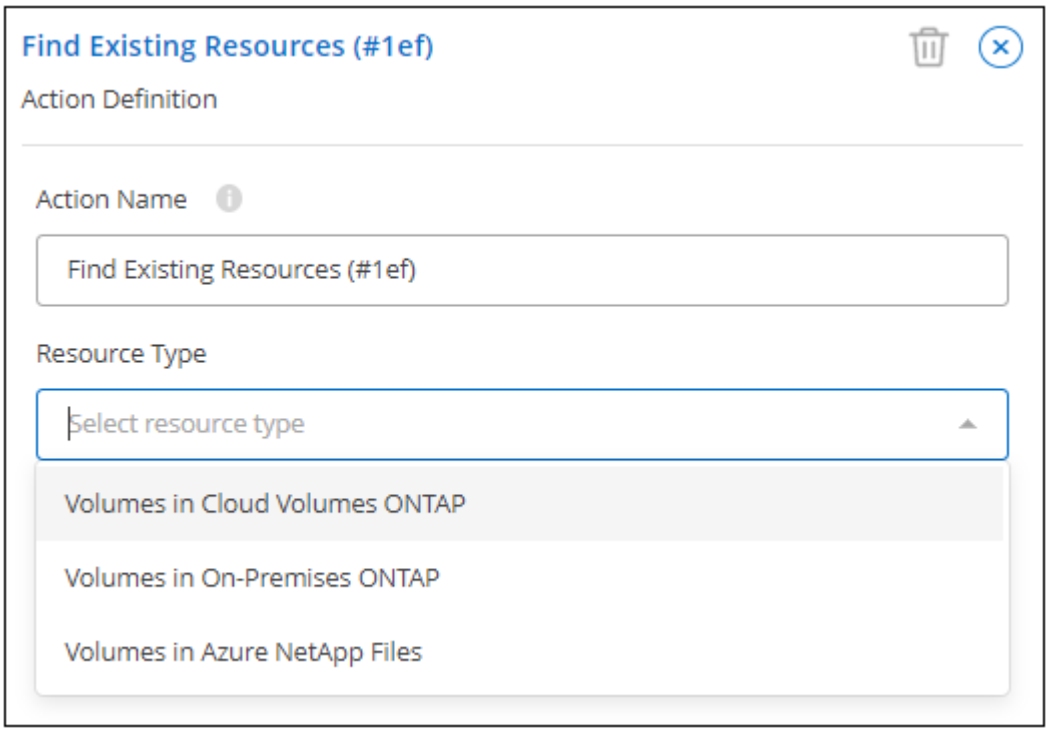

2. Select **Blank template** and click **Get Started**.

   The *Add New Action* page is displayed.




3. Select **Find Existing Resources** as the type of action you want to define, and click **Apply**.

   The *Find Existing Resources Action Definition* page is displayed.



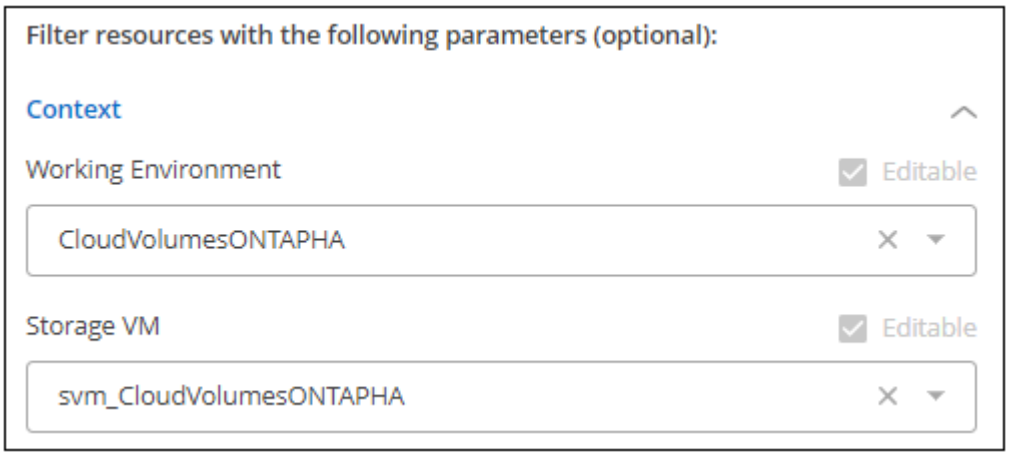

4. **Action Name**: Enter a customized action name instead of the default value. For example, "Find large volumes on cluster ABC and enable Backup".
5. **Resource Type:** Select the type of resource you want to find. In this case you might select **Volumes in Cloud Volumes ONTAP**.

   This is the only required entry for this action. You could click **Continue** now and you'll receive a list of all volumes on all Cloud Volumes ONTAP systems in your environment.

   Instead, it is recommended that you fill out a few filters to reduce the number of results (in this case,

volumes) on which you'll apply the Cloud Backup action.

6. In the *Context* area you can select a specific working environment and some other details about that working environment.

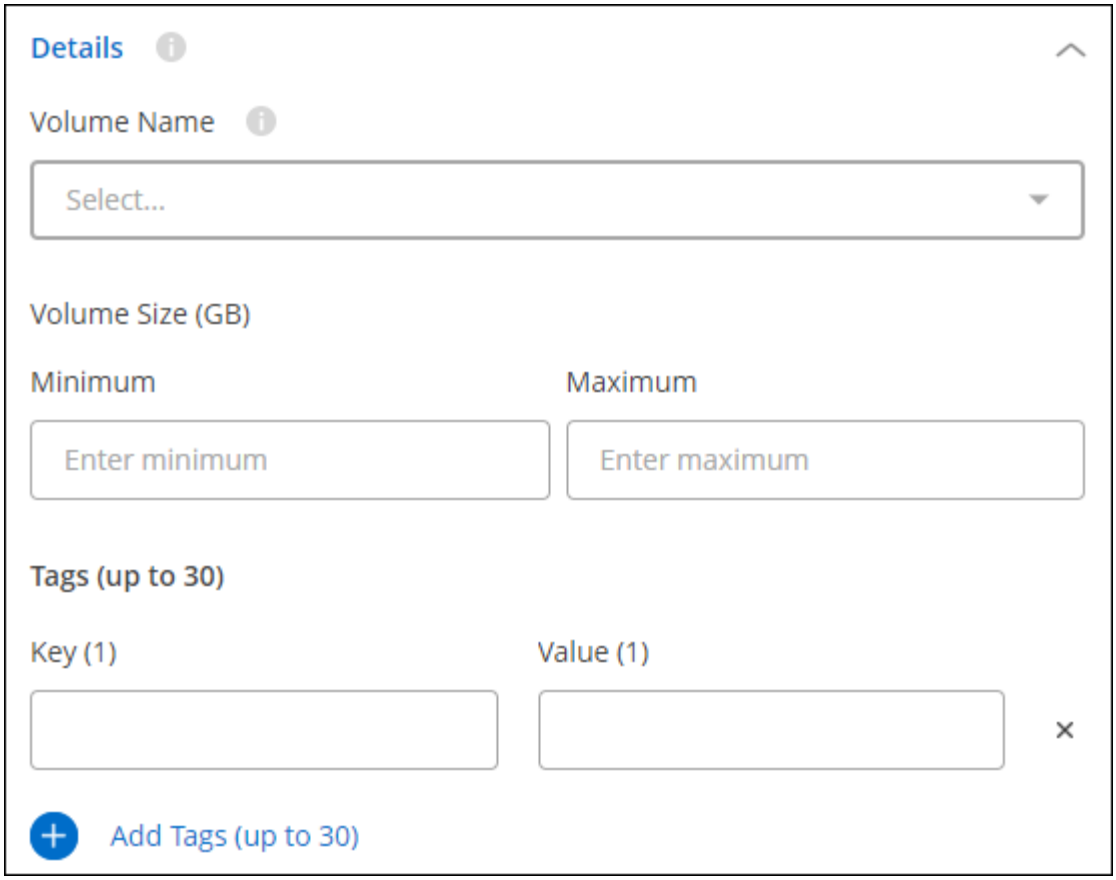



7. In the *Details* area you can select the volume name, the volume size range, and any tags assigned to the volumes.

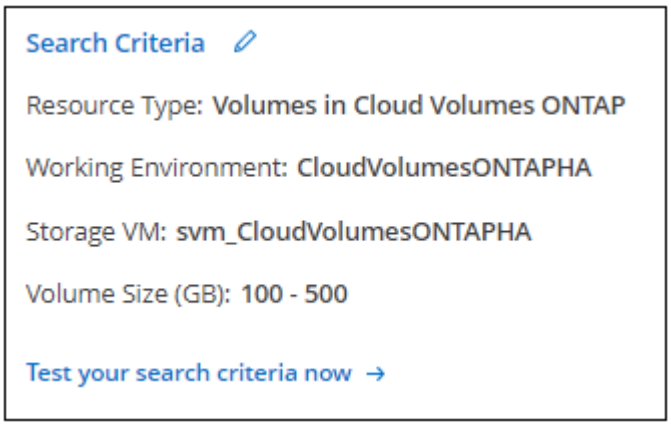
   For the volume name, click in the field and select one of the 5 options. You can let the admin enter any name by selecting **Free Text**, or you can specify that the volume name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a regular expression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

   For volume size you can specify a range; for example, all volumes between 100 GiB and 500 GiB.

   For tags you can narrow the search further so that the results display only volumes with certain tag key/value pairs.




8. Click **Continue** and the page updates to show the Search Criteria that you've defined in the template.

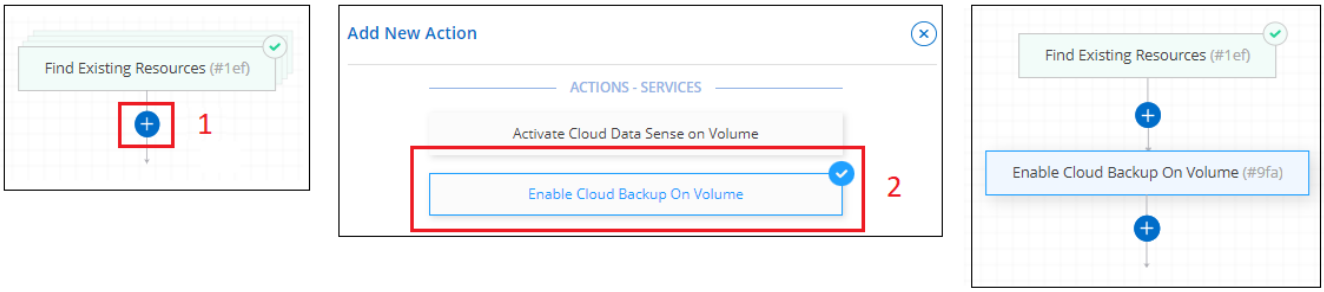



9. Click **Test your search criteria now** to see the current results.
   - If the results are not what you expected, click  next to *Search Criteria* and refine your search further.
   - When the results are good, click **Done**.

     Your completed *Find Existing Resources* action appears in the editor window.

10. Click the Plus sign to add another action, select **Enable Cloud Backup On Volume**, and click **Apply**.

    The *Enable Cloud Backup On Volume* action is added to the window.




11. Now you can define the Backup criteria as described in Adding Backup functionality to a volume so that the template applies the correct backup policy to the volumes you select from the *Find Existing Resources* action.
12. Click **Apply** to save the customization you made to the Backup action, and then click **Save Template** when you are done.

**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.

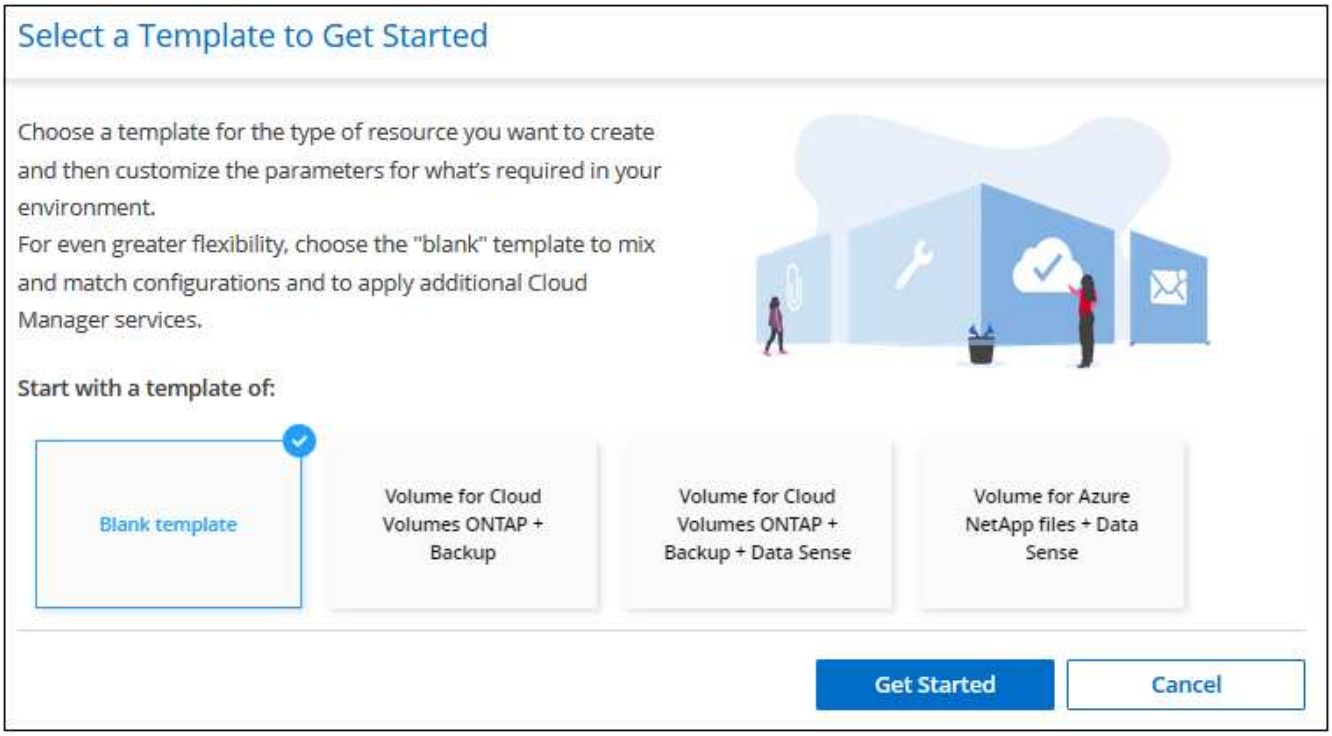
### Find existing working environments

Using the *Find Existing Resources* action you can find the working environment, and then use other template actions, such as creating a volume, to easily perform actions on the existing working environment.

**Steps**

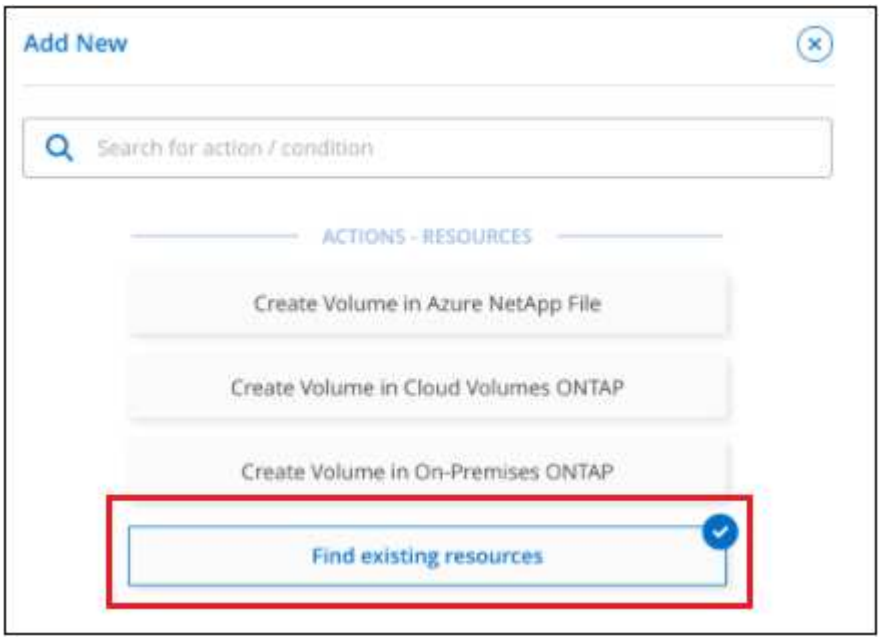
1. Select the **AppTemplate** service, click the **Templates** tab, and click **Add New Template**.

   The *Select_a Template* page is displayed.



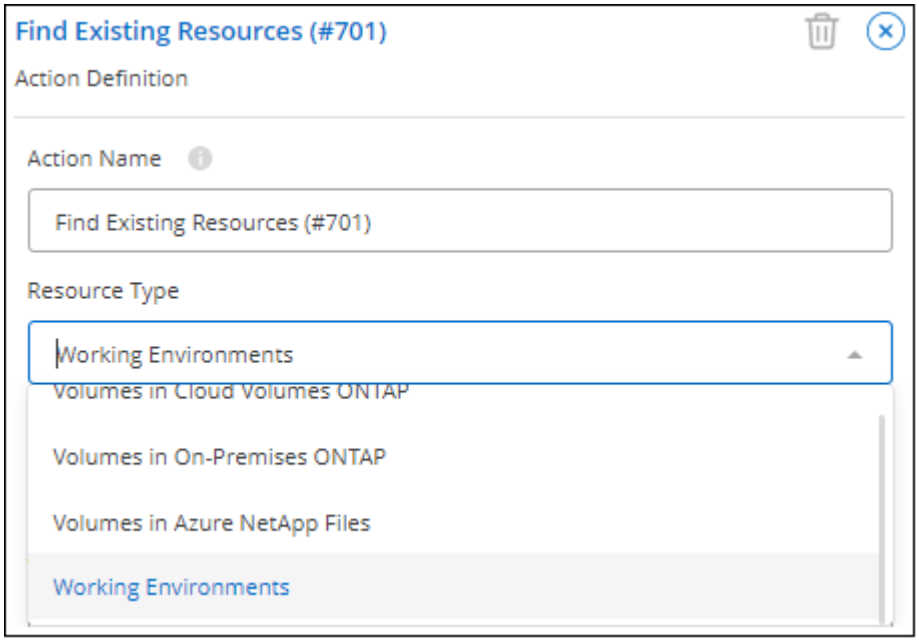

2. Select **Blank template** and click **Get Started**.

The *Add New Action* page is displayed.




3. Select **Find Existing Resources** as the type of action you want to define, and click **Apply**.

   The *Find Existing Resources Action Definition* page is displayed.




4. **Action Name**: Enter a customized action name instead of the default value. For example, "Find work environments that include Dallas".
5. **Resource Type:** Select the type of resource you want to find. In this case you would select **Working Environments**.

   This is the only required entry for this action. You could click **Continue** now and you'll receive a list of all working environments in your environment.

   Instead, it is recommended that you fill out a few filters to reduce the number of results (in this case,

working environments).

6. After defining a few filters in the *Details* area, you can select a specific working environment.
7. Click **Continue** to save your settings, and then click **Done**.
8. Enter the template name in the top left, and then 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.

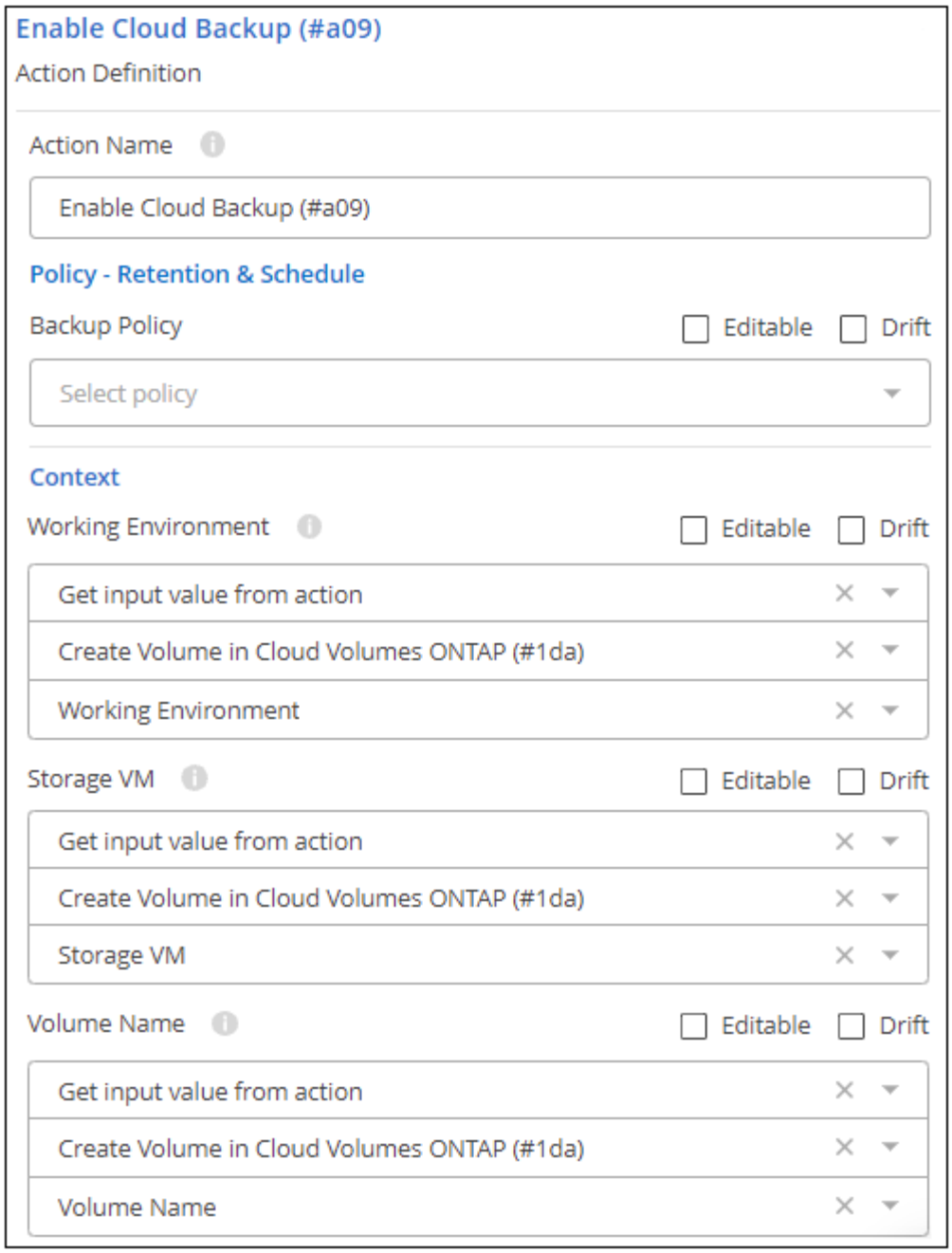
## Examples of enabling services using templates

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.



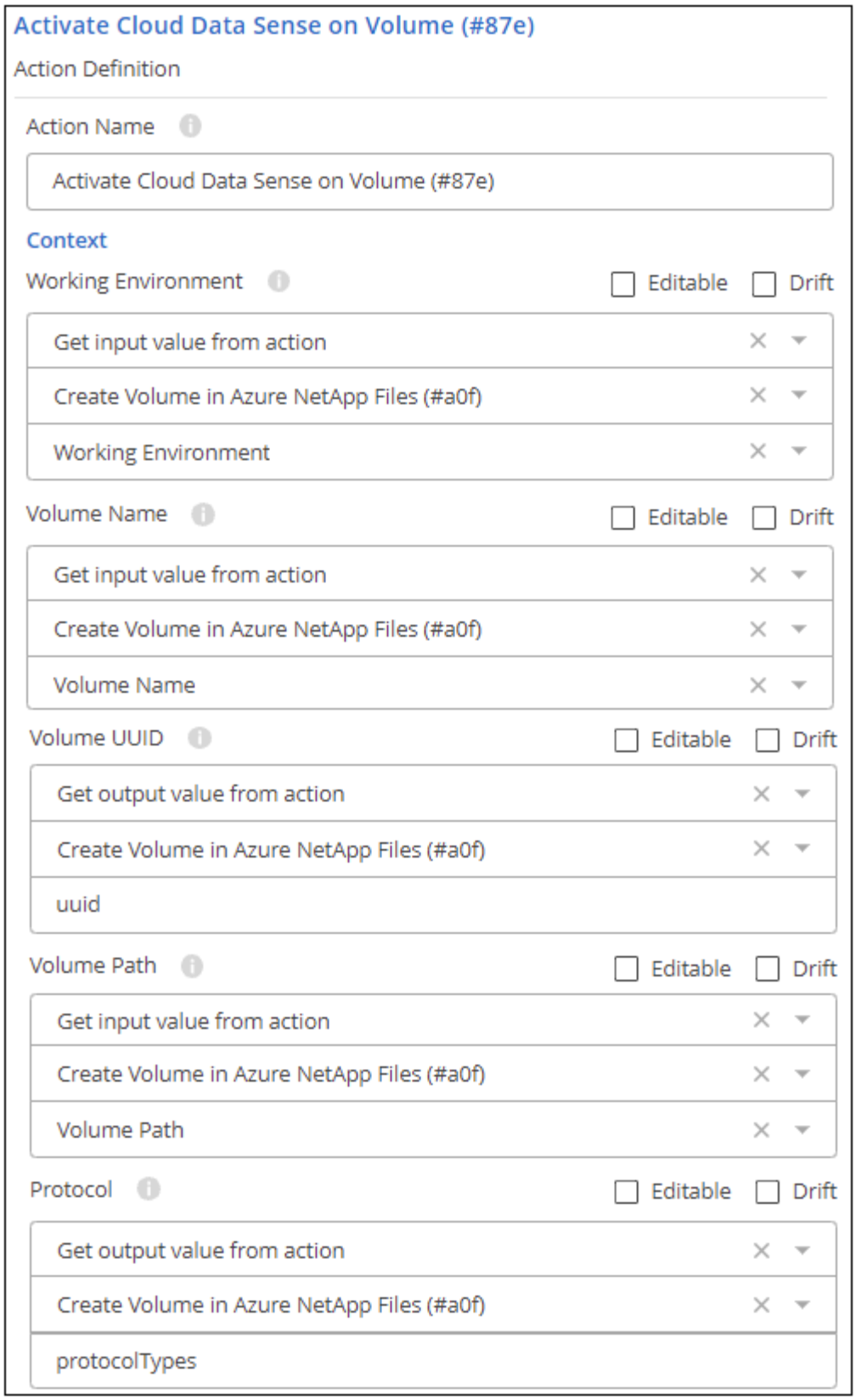

1. **Policy**: Select the backup policy that you want to use.
2. **Context**: By default, the variables are filled out for the working environment, storage VM, and volume to indicate that you will be creating backups for the volume created previously in this same template. So if that's what you want to do, you're all set.

   If you want to create backups for a different volume, you can enter those details manually. See how to complete the Context fields to indicate a different volume.

3. 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. **Context**: By default, the variables are filled out for the working environment, volume name, volume UUID, volume path, and protocol to indicate that you will be scanning data for the volume created previously in this same template. So if that's what you want to do, you're all set.

   If you want to scan data for a different volume, you can enter those details manually. See how to complete the Context fields to indicate a different volume.

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

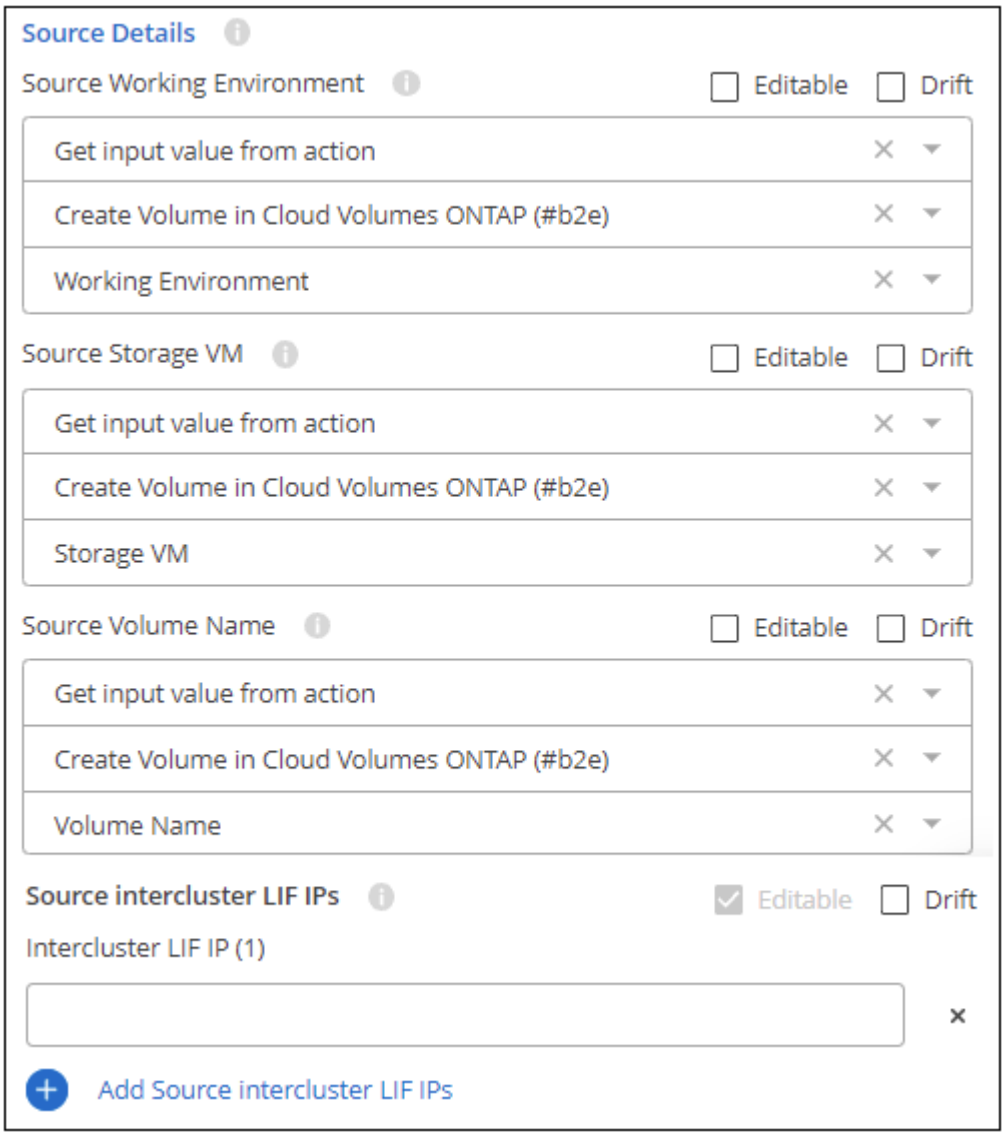
### Add Replication functionality to a volume

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. By default, the first three variables are filled out for the working environment, storage VM, and volume to indicate that you will be replicating the volume created previously in this same template. So if that's what you want to do, you're all set.

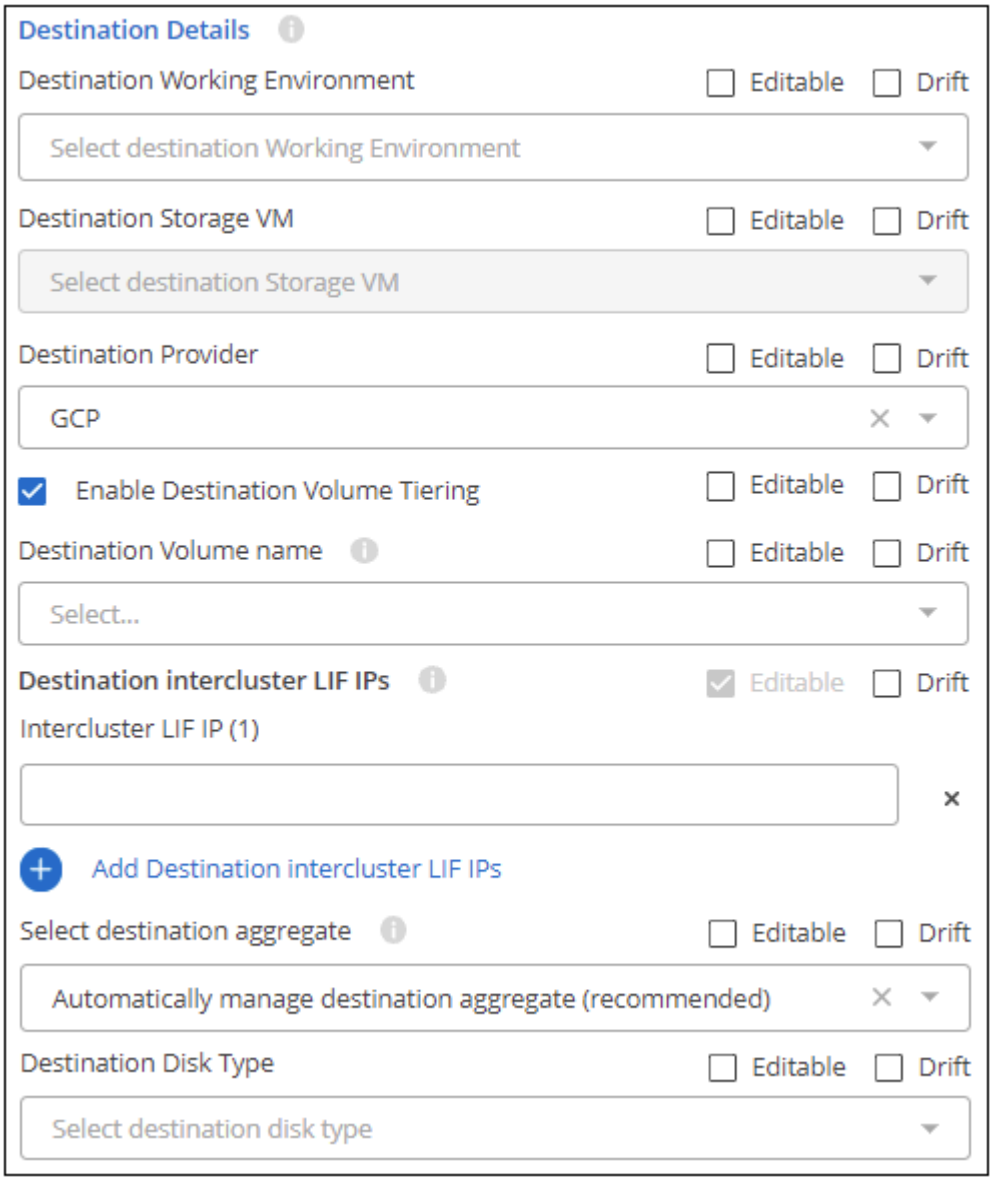
      If you want to replicate a different volume, you can enter those details manually. See how to complete

the Context fields to indicate a different volume.

b. 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. 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).

d. When replicating a volume to a Cloud Volumes ONTAP cluster, you can specify whether volume tiering is enabled on the destination volume.

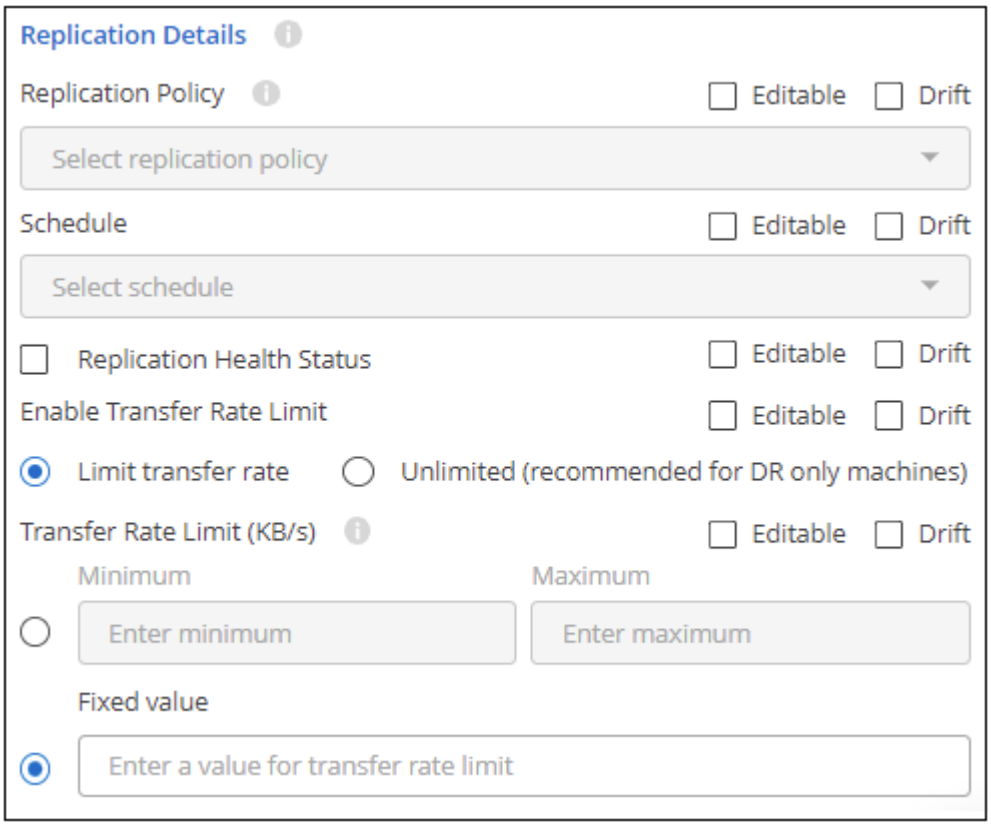
e. For the destination volume name, click in the field and select one of the 5 options. You can let the admin enter any name by selecting **Free Text**, or you can specify that the volume name must have a certain prefix or suffix, that it *contains* certain characters, or that it follows rules from a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

f. 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.

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

h. When replicating a volume to a Cloud Volumes ONTAP cluster (not to an on-prem ONTAP cluster), you need to specify 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 status 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

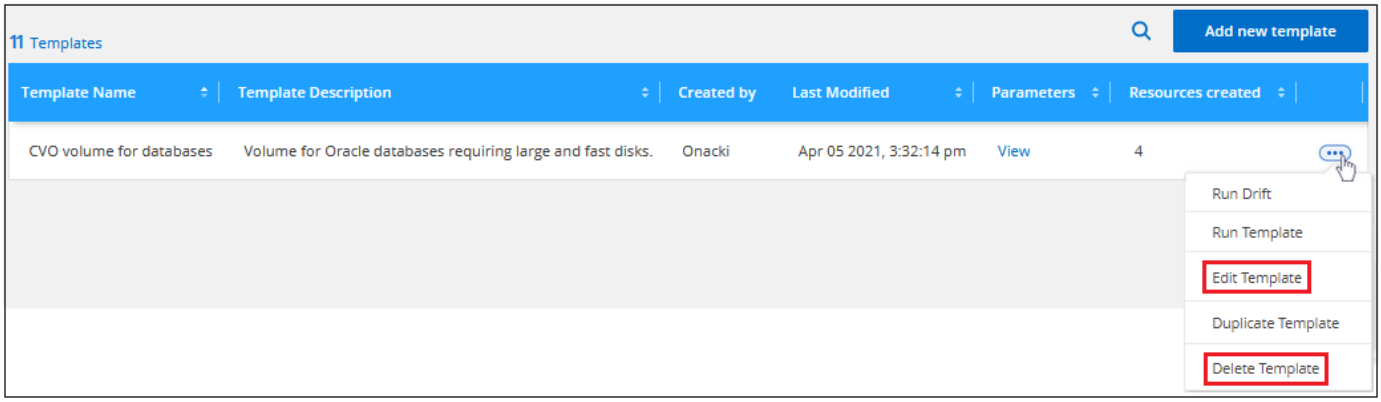
After you have created a template, you should inform your storage administrators to use the template when creating new working environments and volumes.

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

### Edit or delete a template

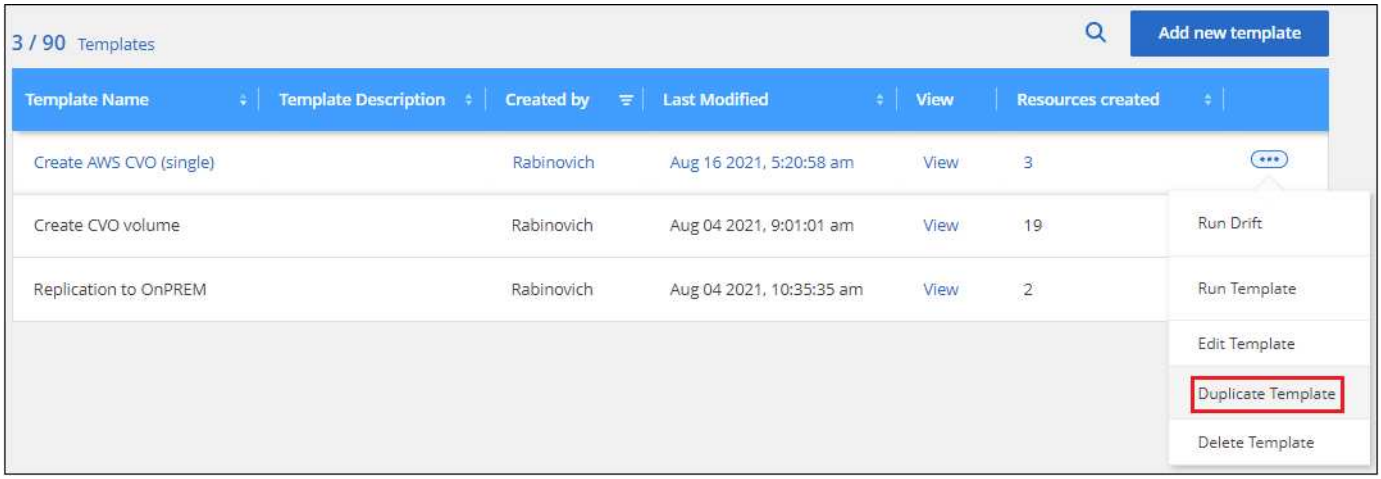
You can modify a template if you need to change any of the parameters. After you save your changes, all future resources created from the template will use the new parameter values.

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.




### Make a copy of a template

You can create a copy of an existing template. This can save a lot of time in case you want to create a new template that is very similar to an existing template. Just make the duplicate with a new name, and then you can edit the template to change the couple items that make the template unique.




# Check resources for template compliance

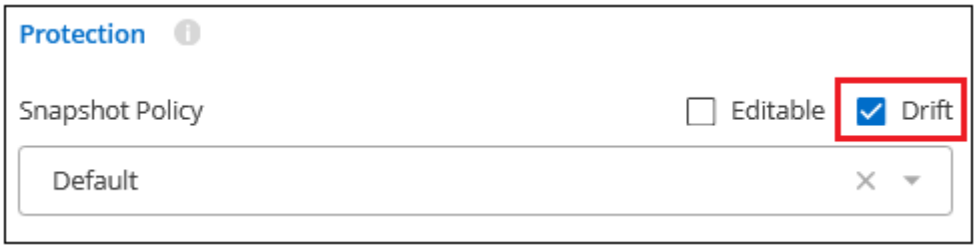
Cloud Manager can monitor the parameter values used when a resource was created with a template using the "drift" feature. Drift identifies resources that have been changed and that are no longer compliant with the template settings.

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.

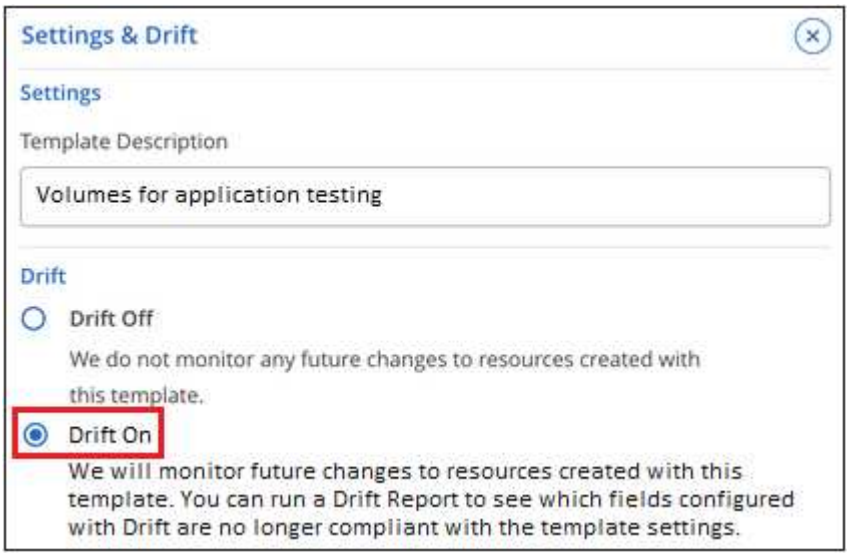
## How does drift work

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.



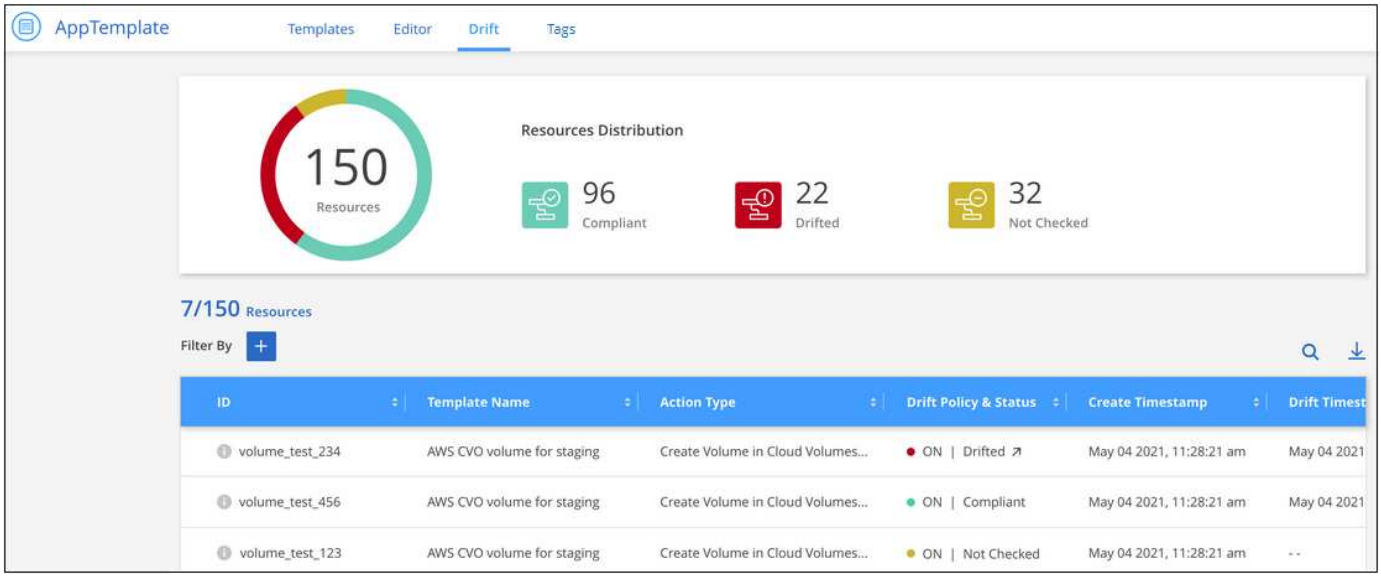

2. You turn drift on for the template, and then save the template.



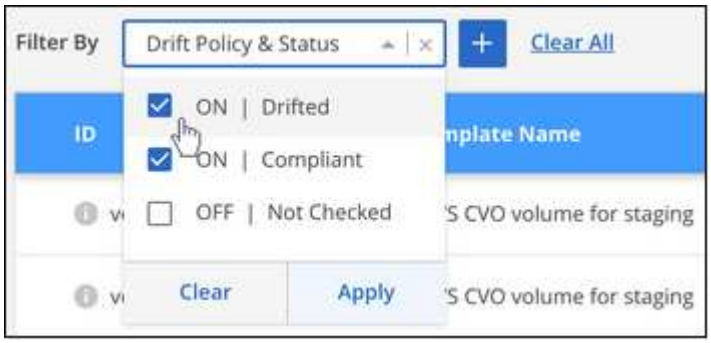

3. Storage admins run the template to create volumes.
4. Later, a storage admin edits a volume and disables Snapshot copies.
5. You run drift checking on all templates, and the AppTemplates service compares the Snapshot copies template setting to the current setting in the volume. Any non-compliant values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

## The Drift Dashboard

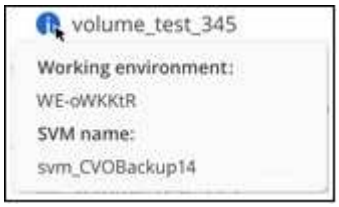
The Drift Dashboard shows the total number of resources (for example, volumes) that have been created using your templates, the number that are still compliant with the template, the number that are not compliant (drifted), and the number that were created with Drift disabled.




- 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:



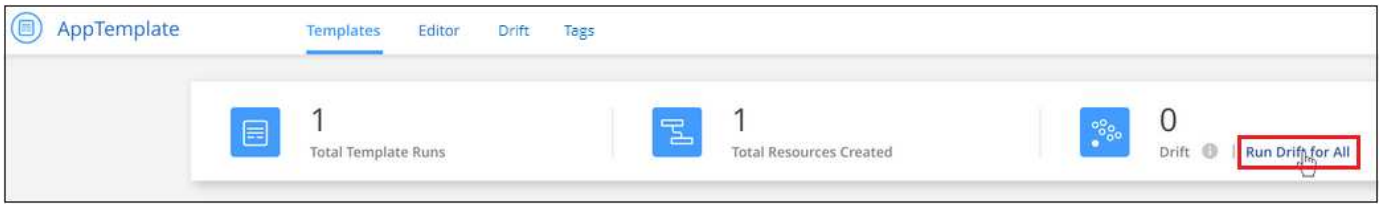

- The search bar enables you to search for a specific volume name or template name.
- To find out more details about the actual resource (or volume), such as the working environment and storage VM, you can click the ⓘ.



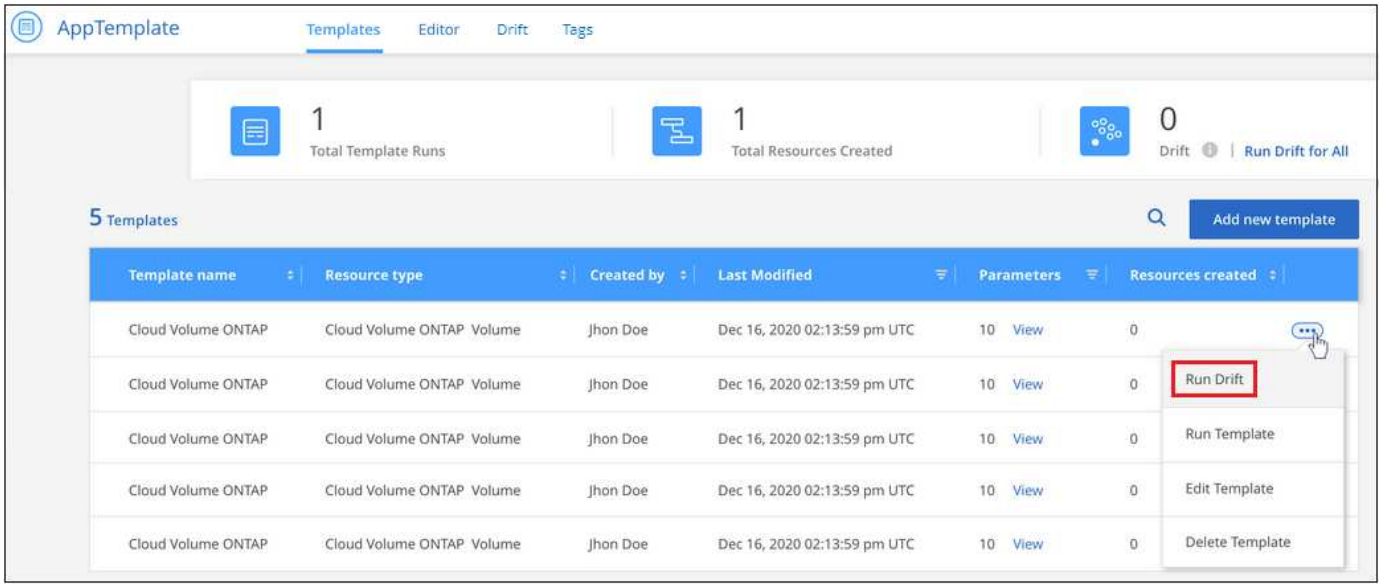

## Populate the Drift Dashboard

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:



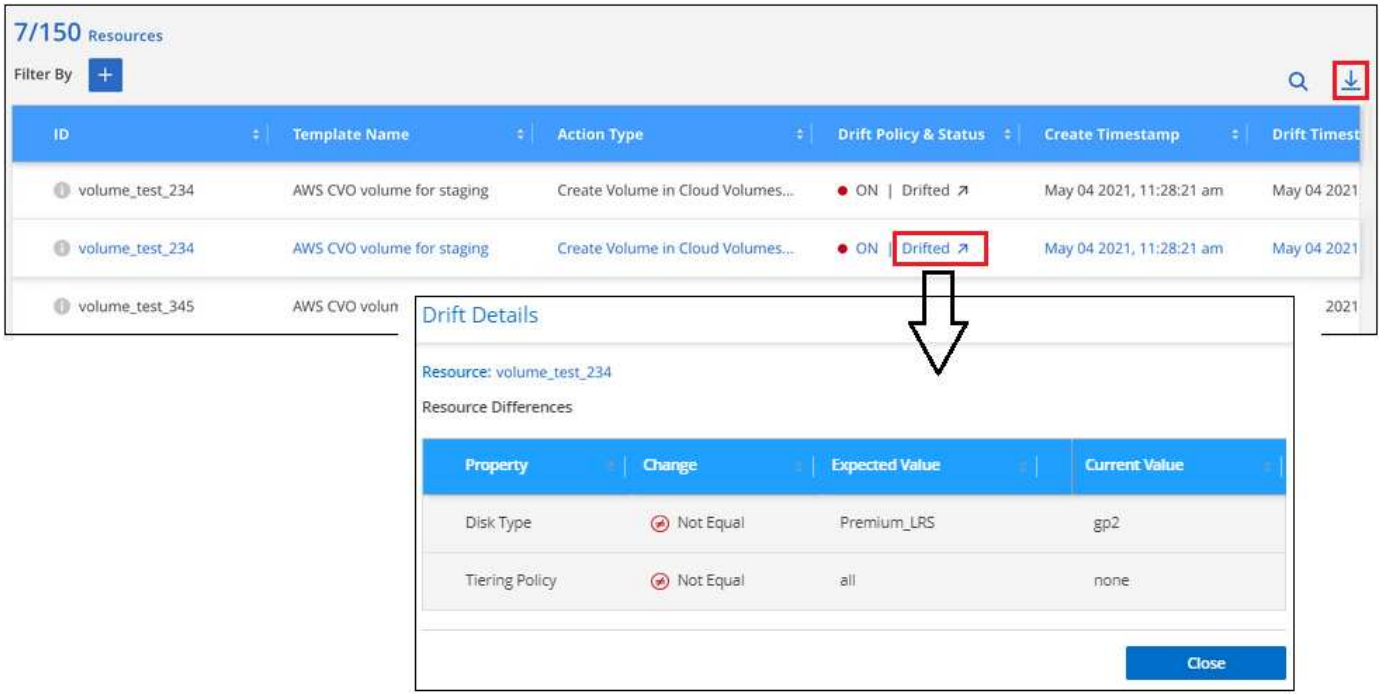

You can run drift checking on a single template from the Templates Dashboard:




## 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.

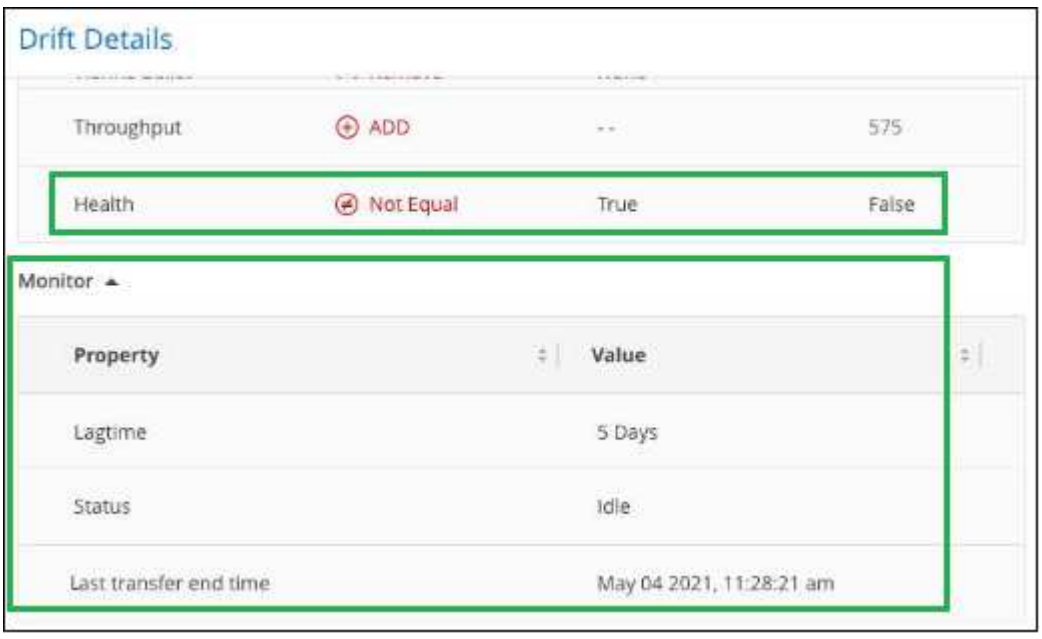



To view a drift report for resources that have been created from your templates, click to download a .CSV file. The drift report reflects what is currently filtered on the page - it does not show all resources unless you haven't applied any filters on the page.

### 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 or modify 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, or on existing 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 a 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:

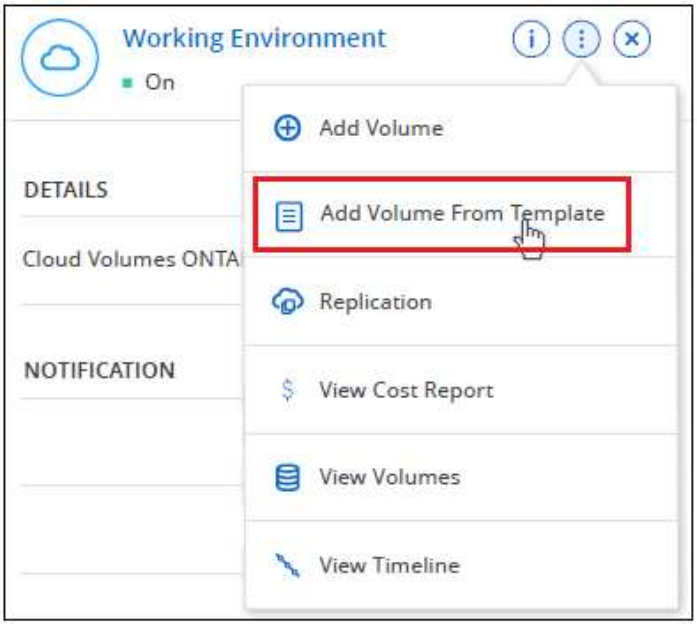
- How to provision Cloud Volumes ONTAP volumes
- How to provision Azure NetApp Files volumes
- How to provision on-premises ONTAP volumes

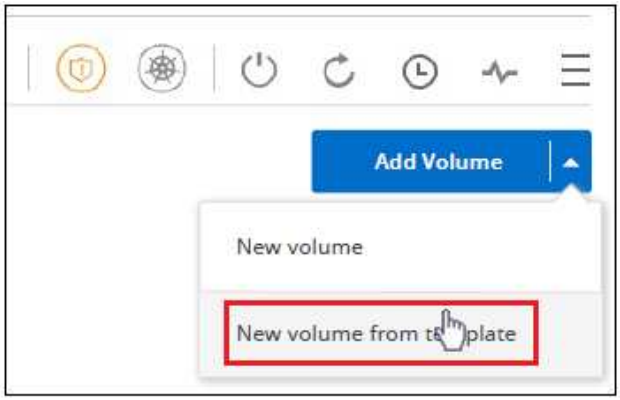
### Run a volume template from the working environment

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

#### Steps

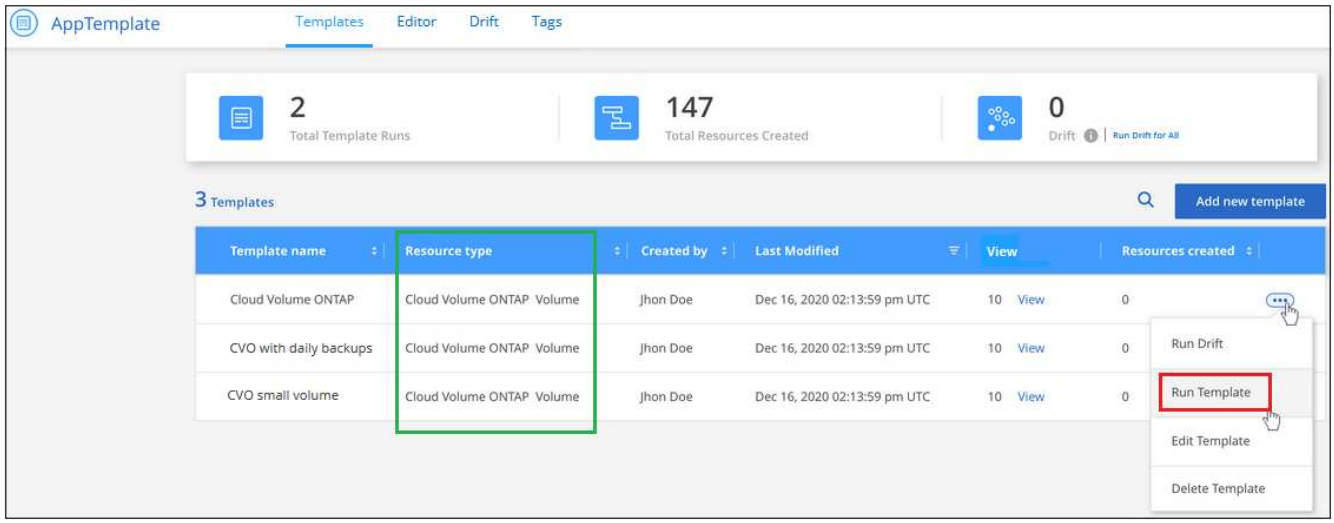
1. From the *Working Environment* page or from the *Volume Details* page, click **Add Volume From Template**.



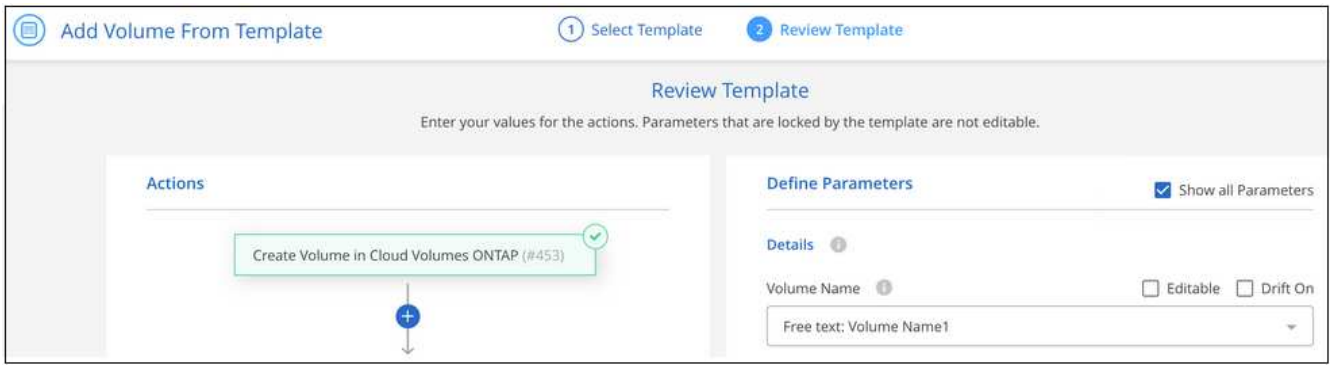

   The *Templates Dashboard* is displayed and it lists only those templates that are applicable to the selected working environment — for example, it only shows Cloud Volumes ONTAP templates.

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

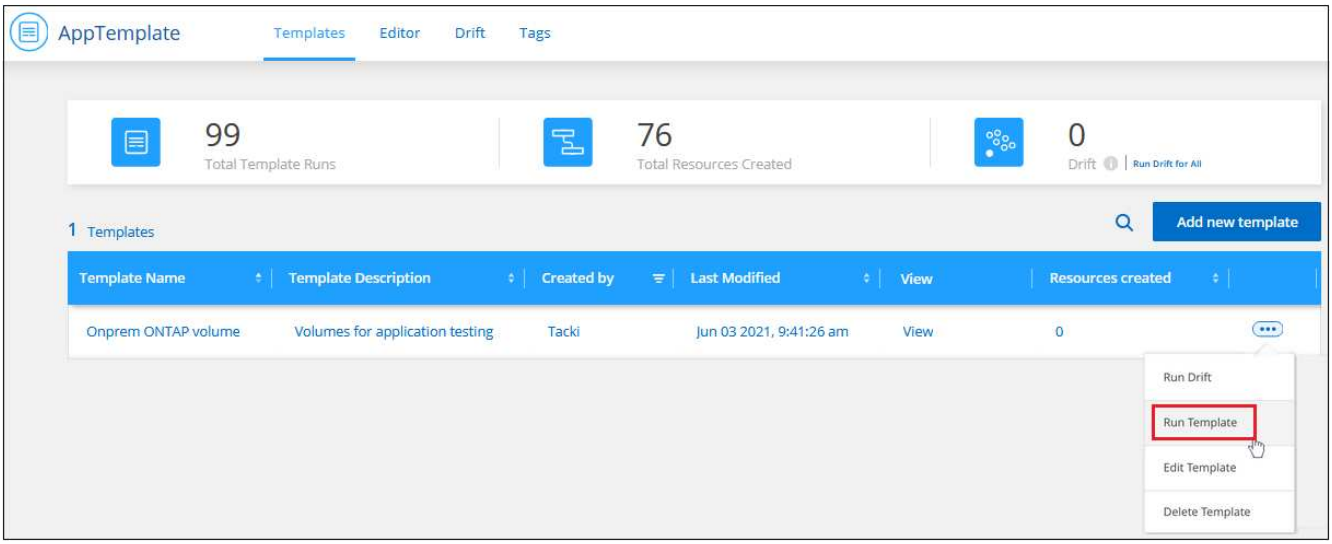
You can add a volume to an existing working environment from the *Templates Dashboard*.

#### Steps

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

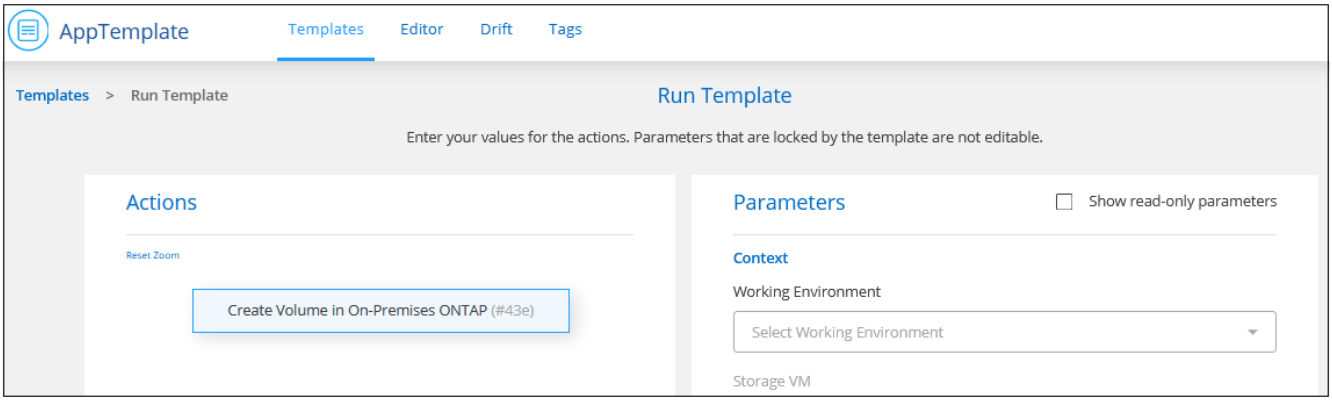
   The *Templates Dashboard* is displayed.

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.

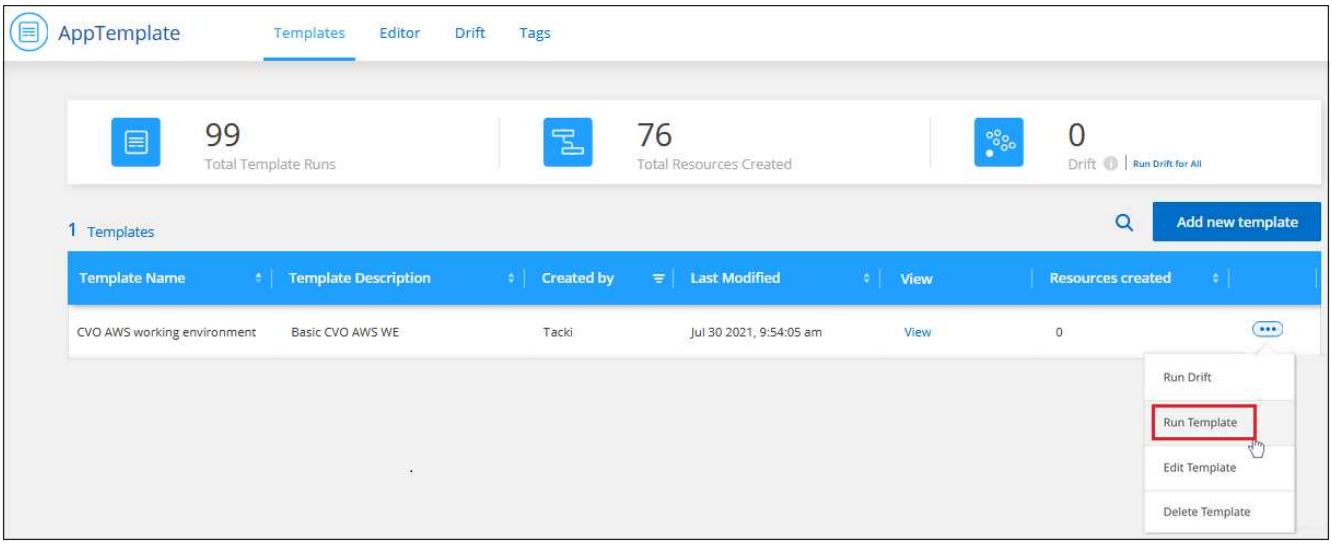
If you have any questions about the details required to create the working environment, see Launching Cloud Volumes ONTAP in AWS.

### Steps

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

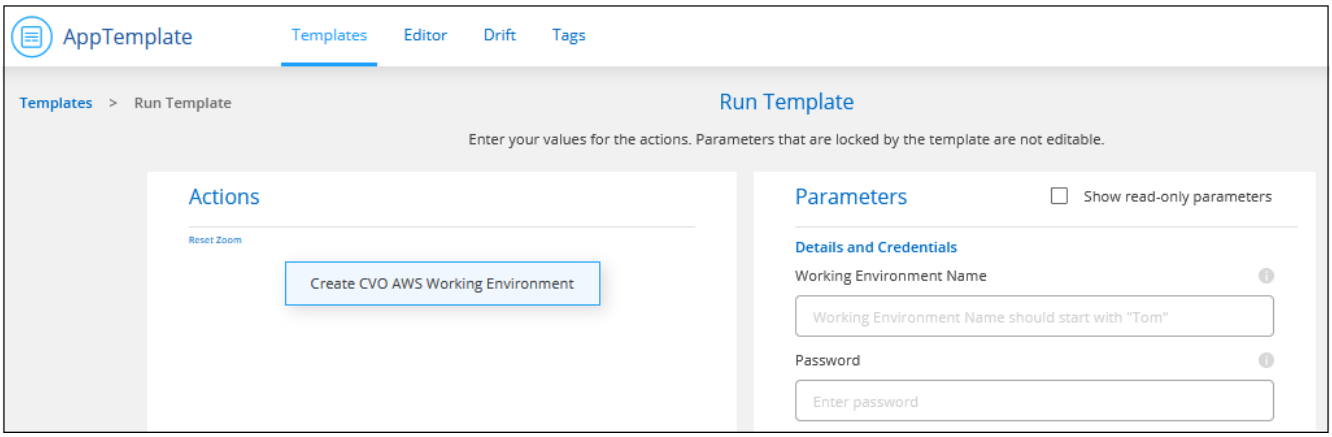
   The *Templates Dashboard* is displayed.

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 working environment and the first volume and click **Run Template**.




## Select and run a template that finds existing resources

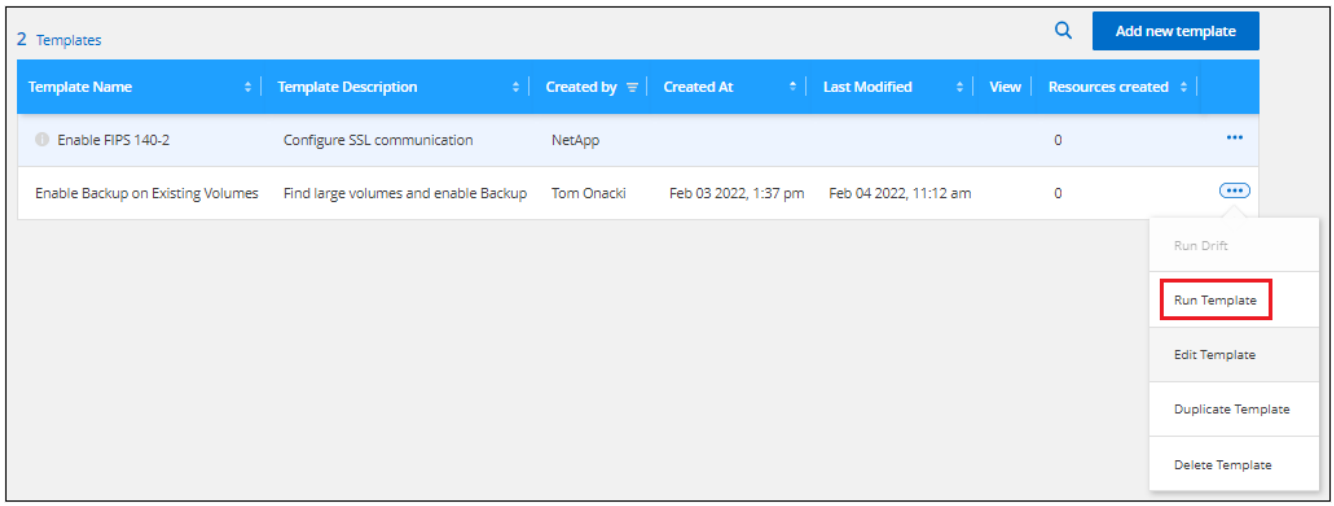
You can run a template that finds certain resources (for example, volumes), and then enables a cloud service on those resources (for example, Cloud Backup), if your company has created a template using this functionality. When running the template, you can make some minor adjustments so that you apply the cloud service only to the appropriate resources.

### Steps

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

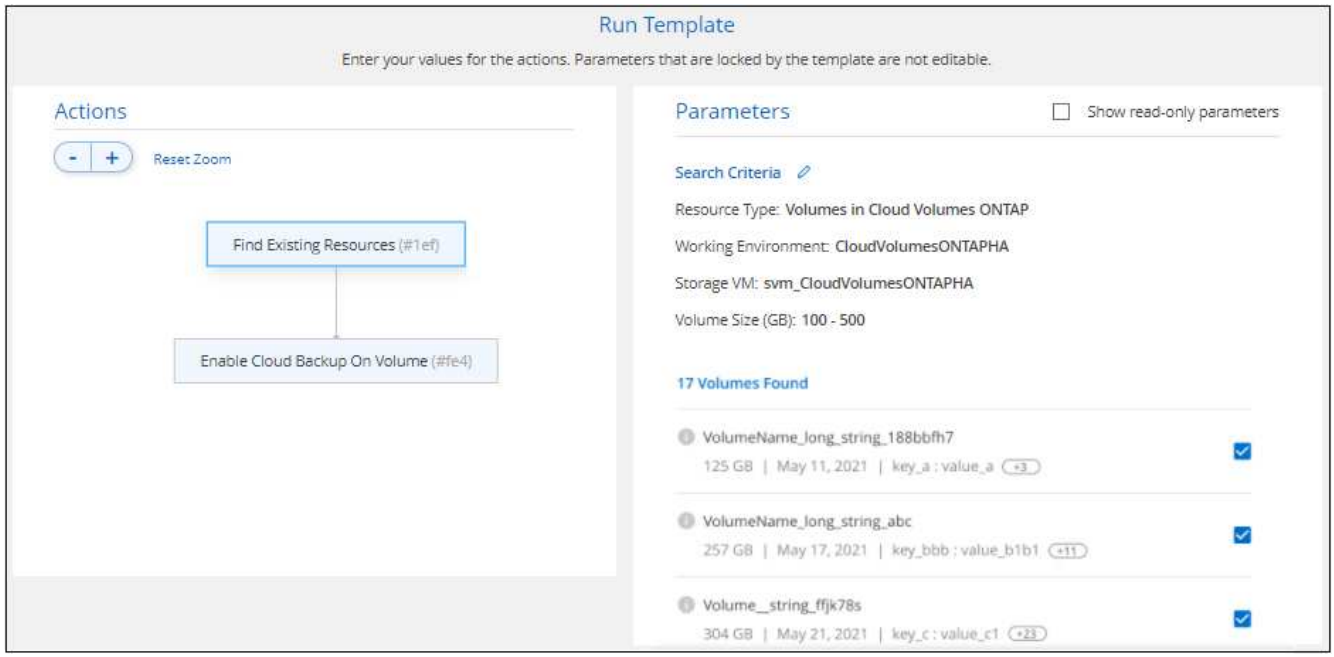
   The *Templates Dashboard* is displayed.

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




The *Run Template* page appears and immediately runs the search that was defined in the template to find the volumes that match the criteria.

3. View the list of returned volumes in the *Volume Results* area.




4. If the results are what you expected, select the checkbox for each volume that you want to have Cloud Backup enabled using the criteria from the *Enable Cloud Backup on Volume* part of the template and click **Run Template**.

   If the results are not what you expected, click  next to *Search Criteria* and refine the search further.

**Results**

The template will run and it will enable Cloud Backup on each volume that you checked from the search criteria.

Any error will be called out in the *Running your Template* page, and you can resolve the issues if needed.