



Protect VMs using third-party tools

NetApp virtualization solutions

NetApp
January 15, 2026

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Protect VMs using third-party tools

Learn about data protection for VMs in Red Hat OpenShift Virtualization using OpenShift API for Data Protection (OADP)

OpenShift API for Data Protection (OADP) with Velero provides backup, restore, and disaster recovery capabilities for VMs in OpenShift Virtualization. Use Trident CSI snapshots to back up persistent volumes and VM metadata to NetApp ONTAP S3 or StorageGRID S3. OADP integrates with Velero APIs and CSI storage drivers to manage data protection operations for containerized VMs.

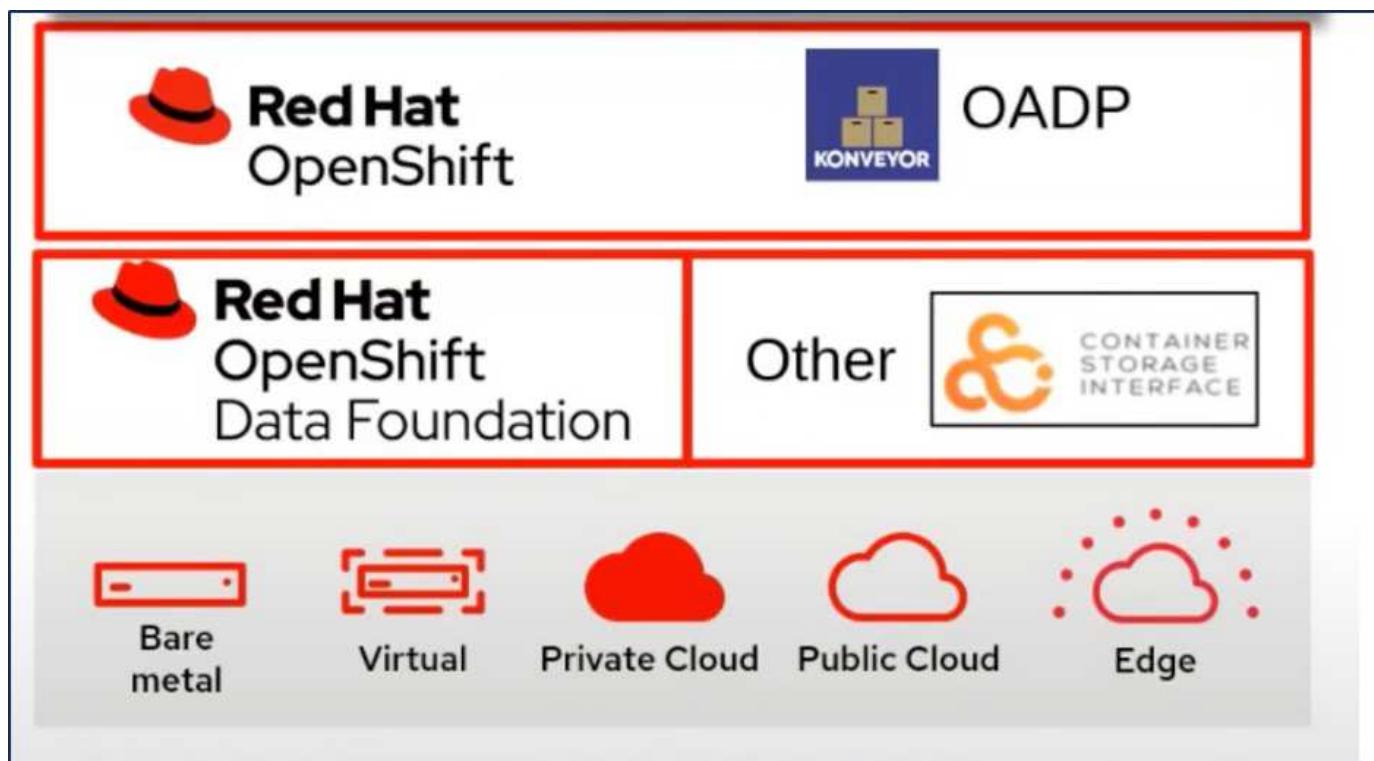
Virtual machines in the OpenShift Virtualization environment are containerized applications that run in the worker nodes of your OpenShift Container platform. It is important to protect the VM metadata as well as the persistent disks of the VMs, so that when they are lost or corrupted, you can recover them.

The persistent disks of the OpenShift Virtualization VMs can be backed by ONTAP storage integrated to the OpenShift Cluster using [Trident CSI](#). In this section we use [OpenShift API for Data Protection \(OADP\)](#) to perform backup of VMs including its data volumes to

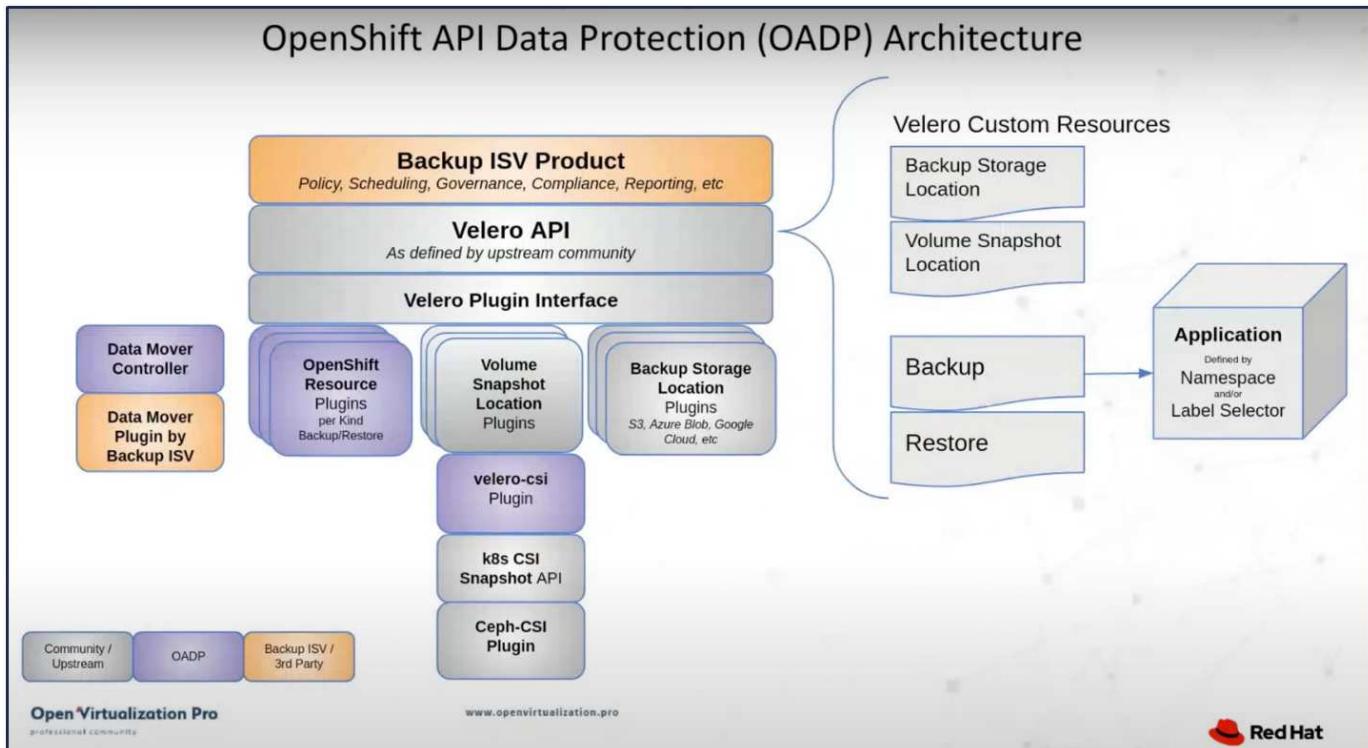
- ONTAP Object Storage
- StorageGrid

We then restore from the backup when needed.

OADP enables backup, restore, and disaster recovery of applications on an OpenShift cluster. Data that can be protected with OADP include Kubernetes resource objects, persistent volumes, and internal images.



Red Hat OpenShift has leveraged the solutions developed by the OpenSource communities for data protection. [Velero](#) is an open-source tool to safely backup and restore, perform disaster recovery, and migrate Kubernetes cluster resources and persistent volumes. To use Velero easily, OpenShift has developed the OADP operator and the Velero plugin to integrate with the CSI storage drivers. The core of the OADP APIs that are exposed are based on the Velero APIs. After installing the OADP operator and configuring it, the backup/restore operations that can be performed are based on the operations exposed by the Velero API.



OADP 1.3 is available from the operator hub of OpenShift cluster 4.12 and later. It has a built-in Data Mover that can move CSI volume snapshots to a remote object store. This provides portability and durability by moving snapshots to an object storage location during backup. The snapshots are then available for restoration after disasters.

The following are the versions of the various components used for the examples in this section

- OpenShift Cluster 4.14
- OpenShift Virtualization installed via OperatorOpenShift Virtualization Operator provided by Red Hat
- OADP Operator 1.13 provided by Red Hat
- Velero CLI 1.13 for Linux
- Trident 24.02
- ONTAP 9.12

Trident CSI

OpenShift API for Data Protection (OADP) Velero

Install the Red Hat OpenShift API for Data Protection (OADP) operator

Install the OpenShift API for Data Protection (OADP) Operator to enable backup and restore capabilities for VMs in OpenShift Virtualization. This procedure includes deploying the OADP Operator from the OpenShift Operator Hub, configuring Velero to use NetApp ONTAP S3 or StorageGRID as the backup target, and setting up the necessary secrets and backup locations.

Prerequisites

- A Red Hat OpenShift cluster (later than version 4.12) installed on bare-metal infrastructure with RHCOS worker nodes
- A NetApp ONTAP cluster integrated with the cluster using Trident
- A Trident backend configured with an SVM on ONTAP cluster
- A StorageClass configured on the OpenShift cluster with Trident as the provisioner
- Trident Snapshot class created on the cluster
- Cluster-admin access to Red Hat OpenShift cluster
- Admin access to NetApp ONTAP cluster
- OpenShift Virtualization operator installed and configured
- VMs deployed in a Namespace on OpenShift Virtualization
- An admin workstation with tridentctl and oc tools installed and added to \$PATH

 If you want to take a backup of a VM when it is in the Running state, then you must install the QEMU guest agent on that virtual machine. If you install the VM using an existing template, then QEMU agent is installed automatically. QEMU allows the guest agent to quiesce in-flight data in the guest OS during the snapshot process, and avoid possible data corruption. If you do not have QEMU installed, you can stop the virtual machine before taking a backup.

Steps to install OADP Operator

1. Go to the Operator Hub of the cluster and select Red Hat OADP operator. In the Install page, use all the default selections and click install. On the next page, again use all the defaults and click Install. The OADP operator will be installed in the namespace openshift-adp.

Home >

Operators >

OperatorHub

Installed Operators

Workloads >

Virtualization >

Networking >

Storage >

Builds >

Observe >

OperatorHub

All Items

All Items

AI/Machine Learning

Application Runtime

Big Data

Cloud Provider

Database

Developer Tools

Development Tools

Drivers and plugins

Integration & Delivery

Logging & Tracing

Modernization & Migration

Monitoring

Search: OADP

 Red Hat

OADP Operator
provided by Red Hat

OADP (OpenShift API for Data Protection) operator sets up and installs Data Protection...

 Community

OADP Operator
provided by Red Hat

OADP (OpenShift API for Data Protection) operator sets up and installs Velero on the OpenShift...

 **OADP Operator**

1.3.0 provided by Red Hat

Install

Channel
stable-1.3

Version
1.3.0

Capability level

- Basic Install
- Seamless Upgrades
- Full Lifecycle
- Deep Insights
- Auto Pilot

Source
Red Hat

Provider
Red Hat

Infrastructure features
Disconnected

[Activate Windows](#)

Installed Operators

Installed Operators are represented by ClusterServiceVersions within this Namespace. For more information, see the [Understanding Operators documentation](#) or Operator and ClusterServiceVersion using the [Operator SDK](#).

Name	Namespace	Managed Namespaces	Status
OpenShift Virtualization 4.14.4 provided by Red Hat	 openshift-cnv	 openshift-cnv	 Succeeded Up to date
OADP Operator 1.3.0 provided by Red Hat	 openshift-adp	 openshift-adp	 Succeeded Up to date
Package Server 0.0.1-snapshot provided by	 openshift-operator-lifecycle-manager	 openshift-operator-lifecycle-manager	 Succeeded

Prerequisites for Velero configuration with Ontap S3 details

After the installation of the operator succeeds, configure the instance of Velero.

Velero can be configured to use S3 compatible Object Storage. Configure ONTAP S3 using the procedures shown in the [Object Storage Management section of ONTAP documentation](#). You will need the following information from your ONTAP S3 configuration to integrate with Velero.

- A Logical Interface (LIF) that can be used to access S3
- User credentials to access S3 that includes the access key and the secret access key
- A bucket name in S3 for backups with access permissions for the user
- For secure access to the Object storage, TLS certificate should be installed on the Object Storage server.

Prerequisites for Velero configuration with StorageGrid S3 details

Velero can be configured to use S3 compatible Object Storage. You can configure StorageGrid S3 using the procedures shown in the [StorageGrid documentation](#). You will need the following information from your StorageGrid S3 configuration to integrate with Velero.

- The endpoint that can be used to access S3
- User credentials to access S3 that includes the access key and the secret access key
- A bucket name in S3 for backups with access permissions for the user
- For secure access to the Object storage, TLS certificate should be installed on the Object Storage server.

Steps to configure Velero

- First, create a secret for an ONTAP S3 user credential or StorageGrid Tenant user credentials. This will be used to configure Velero later. You can create a secret from the CLI or from the web console. To create a secret from the web console, select Secrets, then click on Key/Value Secret. Provide the values for the credential name, key and the value as shown. Be sure to use the Access Key Id and Secret Access Key of your S3 user. Name the secret appropriately. In the sample below, a secret with ONTAP S3 user credentials named ontap-s3-credentials is created.

Installed Operators

Workloads

Pods

Deployments

DeploymentConfigs

StatefulSets

Secrets

ConfigMaps

Project: openshift-adp

Secrets

Filter Name Search by name... Size

Name	Type	S...	Created
builder-dockercfg-7g8ww	kubernetes.io/dockercfg	1	Apr 11, 2024, 10:52 AM
builder-token-rrn4s	kubernetes.io/service-account-token	4	Apr 11, 2024, 10:52 AM

Create

Key/value secret

Image pull secret

Source secret

Webhook secret

From YAML

Project: openshift-adp

Edit key/value secret

Key/value secrets let you inject sensitive data into your application as files or environment variables.

Secret name *

ontap-s3-credentials

Unique name of the new secret.

Key *

cloud

Value

Drag and drop file with your value here or browse to upload it.

[default]

aws_access_key_id= [REDACTED]

aws_secret_access_key= [REDACTED]

+ Add key/value

Save Cancel

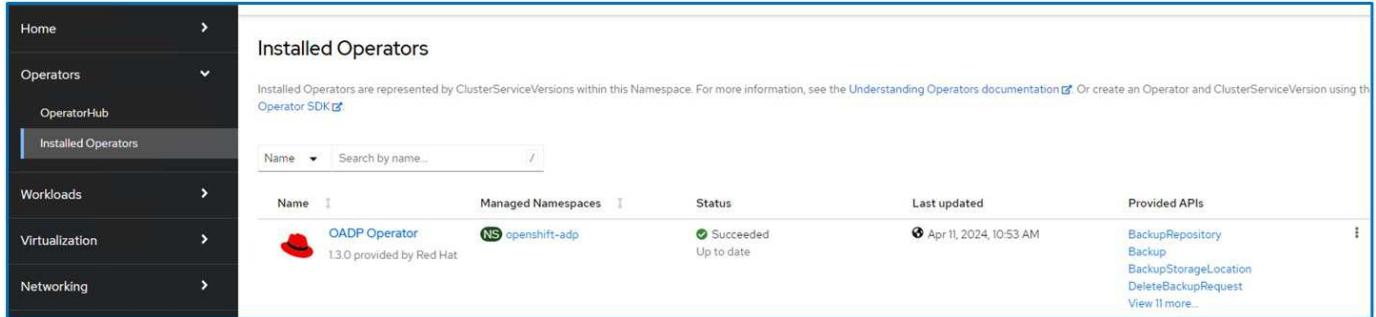
To create a secret named sg-s3-credentials from the CLI you can use the following command.

```
# oc create secret generic sg-s3-credentials --namespace openshift-adp --from-file  
cloud=cloud-credentials.txt
```

Where credentials.txt file contains the Access Key Id and the Secret Access Key of the S3 user in the following format:

```
[default]  
aws_access_key_id=< Access Key ID of S3 user>  
aws_secret_access_key=<Secret Access key of S3 user>
```

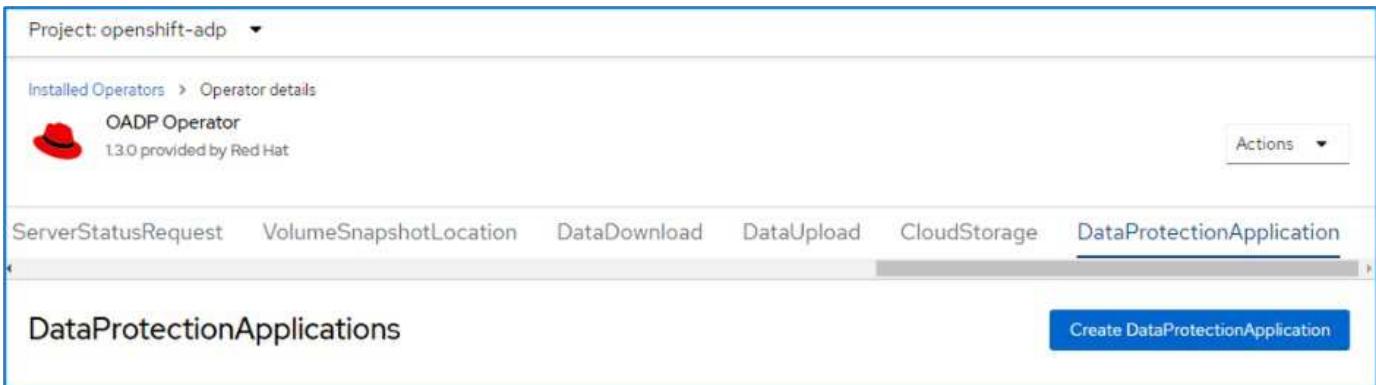
- Next, to configure Velero, select Installed Operators from the menu item under Operators, click on OADP operator, and then select the DataProtectionApplication tab.



The screenshot shows the 'Installed Operators' page in the OperatorHub. The 'OADP Operator' is listed with the following details:

Name	Managed Namespaces	Status	Last updated	Provided APIs
OADP Operator	NS openshift-adp	✓ Succeeded Up to date	Apr 11, 2024, 10:53 AM	BackupRepository Backup BackupStorageLocation DeleteBackupRequest View 11 more...

Click on Create DataProtectionApplication. In the form view, provide a name for the DataProtection Application or use the default name.



The screenshot shows the 'Operator details' page for the OADP Operator. The 'DataProtectionApplication' tab is selected. A 'Create DataProtectionApplication' button is visible at the bottom right.

Now go to the YAML view and replace the spec information as shown in the yaml file examples below.

Sample yaml file for configuring Velero with ONTAP S3 as the backupLocation

```

spec:
  backupLocations:
    - velero:
        config:
          insecureSkipTLSVerify: 'false' ->use this for https
          communication with ONTAP S3
          profile: default
          region: us-east-1
          s3ForcePathStyle: 'True' ->This allows use of IP in s3URL
          s3Url: 'https://10.xx.xx.xx' ->LIF to access S3. Ensure TLS
          certificate for S3 is configured
        credential:
          key: cloud
          name: ontap-s3-credentials ->previously created secret
        default: true
        objectStorage:
          bucket: velero ->Your bucket name previously created in S3 for
          backups
          prefix: demobackup ->The folder that will be created in the
          bucket
          provider: aws
        configuration:
          nodeAgent:
            enable: true
            uploaderType: kopia
            #default Data Mover uses Kopia to move snapshots to Object Storage
        velero:
          defaultPlugins:
            - csi ->Add this plugin
            - openshift
            - aws
            - kubevirt ->Add this plugin

```

Sample yaml file for configuring Velero with StorageGrid S3 as the backupLocation and snapshotLocation

```

spec:
  backupLocations:
    - velero:
        config:
          insecureSkipTLSVerify: 'true'
          profile: default
          region: us-east-1 ->region of your StorageGrid system
          s3ForcePathStyle: 'True'
          s3Url: 'https://172.21.254.25:10443' ->the IP used to access S3
        credential:
          key: cloud
          name: sg-s3-credentials ->secret created earlier
        default: true
        objectStorage:
          bucket: velero
          prefix: demobackup
          provider: aws
      configuration:
        nodeAgent:
          enable: true
          uploaderType: kopia
      velero:
        defaultPlugins:
          - csi
          - openshift
          - aws
          - kubevirt

```

The spec section in the yaml file should be configured appropriately for the following parameters similar to the example above

backupLocations

ONTAP S3 or StorageGrid S3 (with its credentials and other information as shown in the yaml) is configured as the default BackupLocation for velero.

snapshotLocations

If you use Container Storage Interface (CSI) snapshots, you do not need to specify a snapshot location because you will create a VolumeSnapshotClass CR to register the CSI driver. In our example, you use Trident CSI and you have previously created VolumeSnapshotClass CR using the Trident CSI driver.

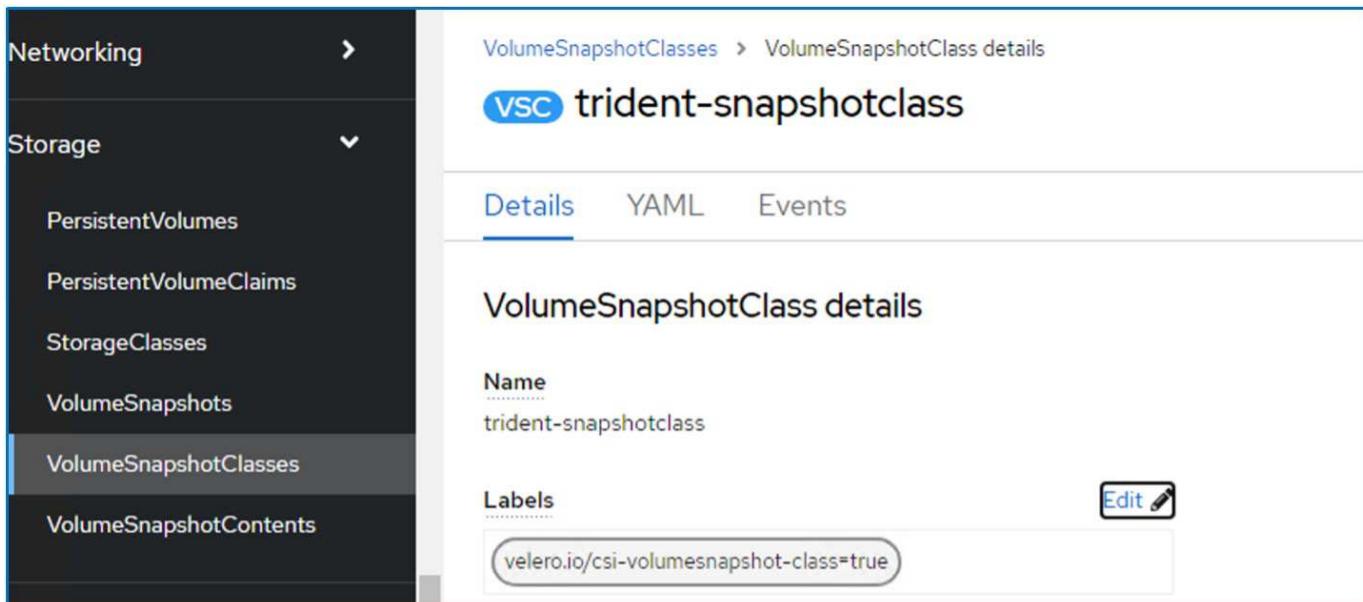
Enable CSI plugin

Add csi to the defaultPlugins for Velero to back up persistent volumes with CSI snapshots.

The Velero CSI plugins, to backup CSI backed PVCs, will choose the VolumeSnapshotClass in the cluster that has **velero.io/csi-volumesnapshot-class** label set on it. For this

- You must have the trident VolumeSnapshotClass created.
- Edit the label of the trident-snapshotclass and set it to

`velero.io/csi-volumesnapshot-class=true` as shown below.



Networking >

Storage ▾

- PersistentVolumes
- PersistentVolumeClaims
- StorageClasses
- VolumeSnapshots
- VolumeSnapshotClasses**
- VolumeSnapshotContents

VolumeSnapshotClasses > VolumeSnapshotClass details

vsc trident-snapshotclass

[Details](#) [YAML](#) [Events](#)

VolumeSnapshotClass details

Name trident-snapshotclass

Labels [Edit](#)

velero.io/csi-volumesnapshot-class=true

Ensure that the snapshots can persist even if the VolumeSnapshot objects are deleted. This can be done by setting the **deletionPolicy** to Retain. If not, deleting a namespace will completely lose all PVCs ever backed up in it.

```
apiVersion: snapshot.storage.k8s.io/v1
kind: VolumeSnapshotClass
metadata:
  name: trident-snapshotclass
  driver: csi.trident.netapp.io
  deletionPolicy: Retain
```

 **trident-snapshotclass**
[Details](#) [YAML](#) [Events](#)

VolumeSnapshotClass details

Name

trident-snapshotclass

Labels
[Edit](#) 

velero.io/csi-volumesnapshot-class=true

Annotations
[1 annotation](#) 
Driver

csi.trident.netapp.io

Deletion policy

Retain

Ensure that the DataProtectionApplication is created and is in condition:Reconciled.



OADP Operator

1.3.0 provided by Red Hat

[Actions](#) 
[ServerStatusRequest](#) [VolumeSnapshotLocation](#) [DataDownload](#) [DataUpload](#) [CloudStorage](#) [DataProtectionApplication](#)

DataProtectionApplications

[Create DataProtectionApplication](#)
[Name](#)  [Search by name...](#) 

Name	Kind	Status	Labels	
 velero-demo	DataProtectionApplication	Condition: Reconciled	No labels	

The OADP operator will create a corresponding BackupStorageLocation. This will be used when creating a backup.

Create on-demand backup for VMs in Red Hat OpenShift Virtualization using Velero

Back up VMs in OpenShift Virtualization using Velero and NetApp ONTAP S3 or StorageGRID. This procedure includes creating Backup Custom Resources (CRs) for on-demand backups and Schedule CRs for scheduled backups. Each backup captures VM metadata and persistent volumes, storing them in the specified object storage location for recovery or compliance purposes.

Steps to create a backup of a VM

To create an on-demand backup of the entire VM (VM metadata and VM disks), click on the **Backup** tab. This creates a Backup Custom Resource (CR). A sample yaml is provided to create the Backup CR. Using this yaml, the VM and its disks in the specified namespace will be backed up. Additional parameters can be set as shown in the [documentation](#).

A snapshot of the persistent volumes backing the disks will be created by the CSI. A backup of the VM along with the snapshot of its disks are created and stored in the backup location specified in the yaml. The backup will remain in the system for 30 days as specified in the ttl.

```

apiVersion: velero.io/v1
kind: Backup
metadata:
  name: backup1
  namespace: openshift-adp
spec:
  includedNamespaces:
  - virtual-machines-demo
  snapshotVolumes: true
  storageLocation: velero-demo-1 -->this is the backupStorageLocation
  previously created
                                         when Velero is configured.
  ttl: 720h0m0s

```

Once the backup completes, its Phase will show as completed.

Name	Kind	Status	Labels
backup1	Backup	Phase: ✓ Completed	velero.io/storage-location=velero-demo-1

You can inspect the backup in the Object storage with the help of an S3 browser application. The path of the backup shows in the configured bucket with the prefix name (velero/demobackup). You can see the contents of the backup includes the volume snapshots, logs, and other metadata of the virtual machine.



In StorageGrid, you can also use the S3 console that is available from the Tenant Manager to view the backup objects.

Path: / demobackup/ backups/ backup1/				
Name	Size	Type	Last Modified	Storage Class
..				
backup1.tar.gz	230.36 KB	GZ File	4/15/2024 10:26:29 PM	STANDARD
velero-backup.json	3.35 KB	JSON File	4/15/2024 10:26:29 PM	STANDARD
backup1-resource-list.json.gz	1.12 KB	GZ File	4/15/2024 10:26:29 PM	STANDARD
backup1-itemoperations.json.gz	600 bytes	GZ File	4/15/2024 10:26:28 PM	STANDARD
backup1-volumesnapshots.json.gz	29 bytes	GZ File	4/15/2024 10:26:28 PM	STANDARD
backup1-podvolumebackups.json.gz	29 bytes	GZ File	4/15/2024 10:26:28 PM	STANDARD
backup1-results.gz	49 bytes	GZ File	4/15/2024 10:26:28 PM	STANDARD
backup1-csi-volumesnapshotclasses.json.gz	426 bytes	GZ File	4/15/2024 10:26:28 PM	STANDARD
backup1-csi-volumesnapshotcontents.json.gz	1.43 KB	GZ File	4/15/2024 10:26:28 PM	STANDARD
backup1-csi-volumesnapshots.json.gz	1.34 KB	GZ File	4/15/2024 10:26:28 PM	STANDARD
backup1-logs.gz	13.49 KB	GZ File	4/15/2024 10:26:28 PM	STANDARD

Creating scheduled backups for VMs in OpenShift Virtualization

To create backups on a schedule, you need to create a Schedule CR.

The schedule is simply a Cron expression allowing you to specify the time at which you want to create the backup. A sample yaml to create a Schedule CR.

```
apiVersion: velero.io/v1
kind: Schedule
metadata:
  name: <schedule>
  namespace: openshift-adp
spec:
  schedule: 0 7 * * *
  template:
    hooks: {}
    includedNamespaces:
    - <namespace>
    storageLocation: velero-demo-1
    defaultVolumesToFsBackup: true
    ttl: 720h0m0s
```

The Cron expression 0 7 * * * means a backup will be created at 7:00 every day.

The namespaces to be included in the backup and the storage location for the backup are also specified. So instead of a Backup CR, Schedule CR is used to create a backup at the specified time and frequency.

Once the schedule is created, it will be Enabled.

Project: openshift-adp ▾

Installed Operators > Operator details



OADP Operator

1.3.0 provided by Red Hat

storageLocation DeleteBackupRequest DownloadRequest PodVolumeBackup PodVolumeRestore Restore Schedules

Schedules

Name	Kind	Status	Labels
Schedule1	Schedule	Phase: Enabled	No labels

Backups will be created according to this schedule, and can be viewed from the Backup tab.

Project: openshift-adp ▾

Installed Operators > Operator details

OADP Operator
1.3.0 provided by Red Hat

Events All instances BackupRepository Backup BackupStorageLocation DeleteBackupRequest DownloadRequest

Backups

Create Backup

Name	Kind	Status	Labels
Schedule1-20240416140507	Backup	Phase: InProgress	velero.io/schedule-name=schedule1 velero.io/storage-location=velero-demo-1

Restore a VM from backup in Red Hat OpenShift Virtualization using Velero

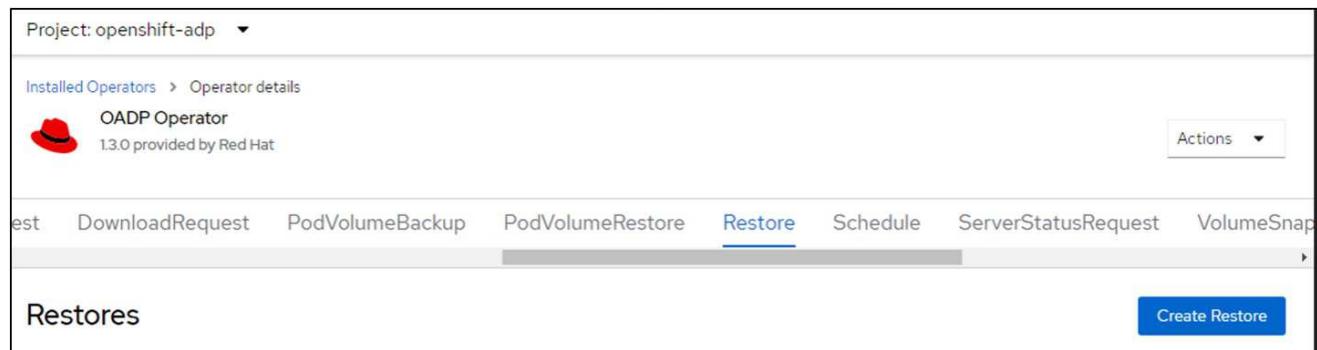
Restore VMs in OpenShift Virtualization using Velero and the OpenShift API for Data Protection (OADP). This procedure includes creating a Restore Custom Resource (CR) to recover VMs and their persistent volumes from backups, with options to restore to the original namespace, a different namespace, or using an alternative storage class.

Prerequisites

To restore from a backup, let us assume that the namespace where the virtual machine existed got accidentally deleted.

Restore to the same namespace

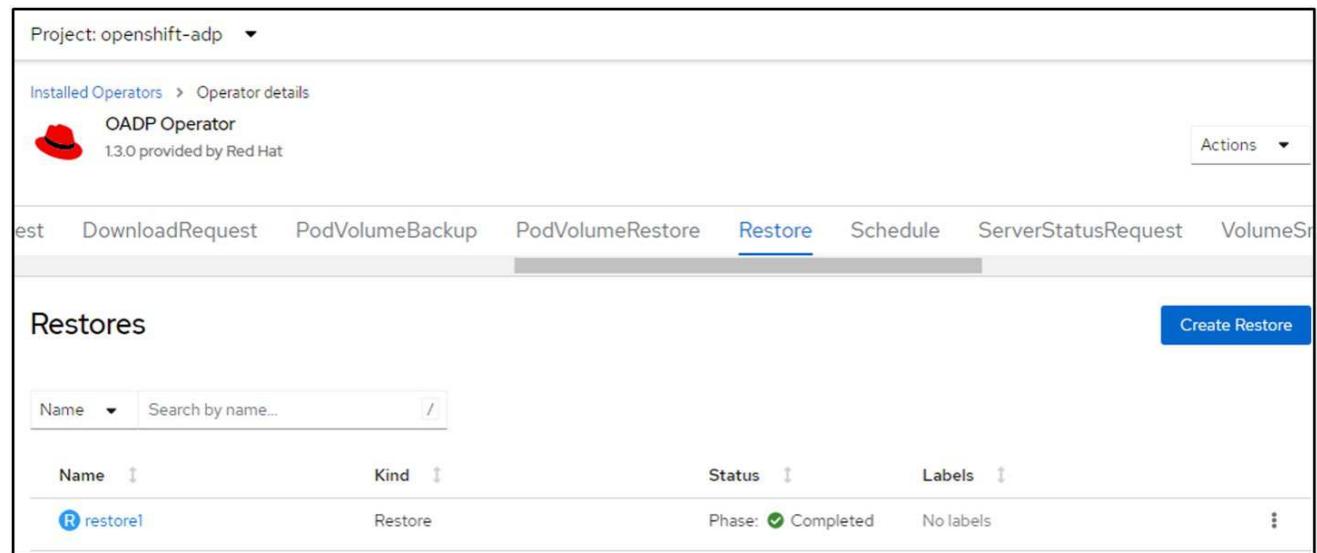
To restore from the backup that we just created, we need to create a Restore Custom Resource (CR). We need to provide it a name, provide the name of the backup that we want to restore from and set the restorePVs to true. Additional parameters can be set as shown in the [documentation](#). Click on Create button.



The screenshot shows the 'Installed Operators' section for the 'OADP Operator'. The 'Restore' tab is selected. A 'Create Restore' button is visible at the bottom right. The interface is part of the OpenShift web console.

```
apiVersion: velero.io/v1
kind: Restore
metadata:
  name: restore1
  namespace: openshift-adp
spec:
  backupName: backup1
  restorePVs: true
```

When the phase shows completed, you can see that the virtual machines have been restored to the state when the snapshot was taken. (If the backup was created when the VM was running, restoring the VM from the backup will start the restored VM and bring it to a running state). The VM is restored to the same namespace.



The screenshot shows the 'Installed Operators' section for the 'OADP Operator'. The 'Restore' tab is selected. A table lists the restored resources, including 'restore1' which is completed. The interface is part of the OpenShift web console.

Name	Kind	Status	Labels
restore1	Restore	Phase: ✓ Completed	No labels

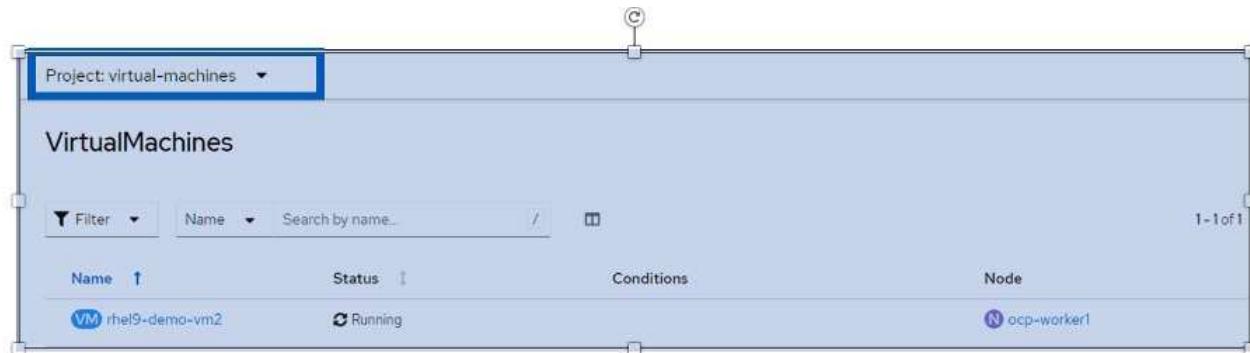
Restore to a different namespace

To restore the VM to a different namespace, you can provide a `namespaceMapping` in the yaml definition of the Restore CR.

The following sample yaml file creates a Restore CR to restore a VM and its disks in the `virtual-machines-demo` namespace when the backup was taken to the `virtual-machines` namespace.

```
apiVersion: velero.io/v1
kind: Restore
metadata:
  name: restore-to-different-ns
  namespace: openshift-adp
spec:
  backupName: backup
  restorePVs: true
  includedNamespaces:
  - virtual-machines-demo
  namespaceMapping:
    virtual-machines-demo: virtual-machines
```

When the phase shows completed, you can see that the virtual machines have been restored to the state when the snapshot was taken. (If the backup was created when the VM was running, restoring the VM from the backup will start the restored VM and bring it to a running state). The VM is restored to a different namespace as specified in the yaml.

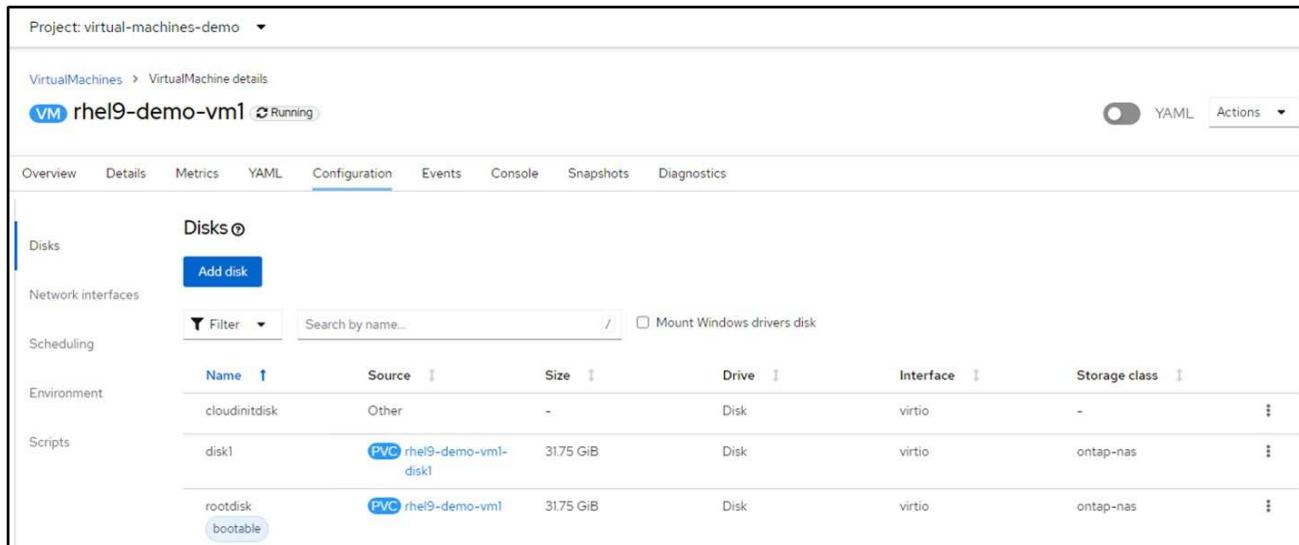


Name	Status	Conditions	Node
VM rhe19-demo-vm2	Running		ocp-worker1

Restore to a different storage class

Velero provides a generic ability to modify the resources during restore by specifying json patches. The json patches are applied to the resources before they are restored. The json patches are specified in a configmap and the configmap is referenced in the restore command. This feature enables you to restore using different storage class.

In the example below, the virtual machine, during creation uses `ontap-nas` as the storage class for its disks. A backup of the virtual machine named `backup1` is created.



Project: virtual-machines-demo

VirtualMachines > VirtualMachine details

VM rhel9-demo-vm1 (Running)

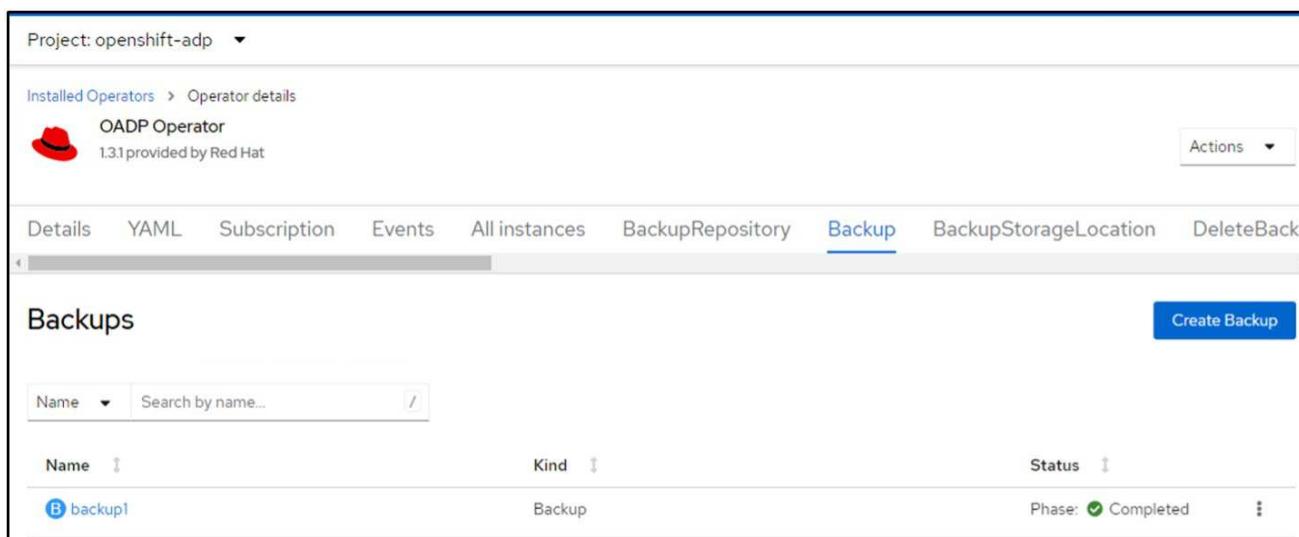
Overview Details Metrics YAML Configuration Events Console Snapshots Diagnostics

Disks

Add disk

Search by name... / Mount Windows drivers disk

Name	Source	Size	Drive	Interface	Storage class
cloudinitdisk	Other	-	Disk	virtio	-
disk1	PVC/rhel9-demo-vm1-disk1	31.75 GiB	Disk	virtio	ontap-nas
rootdisk	PVC/rhel9-demo-vm1	31.75 GiB	Disk	virtio	ontap-nas



Project: openshift-adp

Installed Operators > Operator details

OADP Operator
1.3.1 provided by Red Hat

Actions

Details YAML Subscription Events All instances BackupRepository Backup BackupStorageLocation DeleteBackup

Backups

Create Backup

Name Search by name... /

Name	Kind	Status
B backup1	Backup	Phase: Completed

Simulate a loss of the VM by deleting the VM.

To restore the VM using a different storage class, for example, `ontap-nas-eco` storage class, you need to do the following two steps:

Step 1

Create a config map (console) in the `openshift-adp` namespace as follows:

Fill in the details as shown in the screenshot:

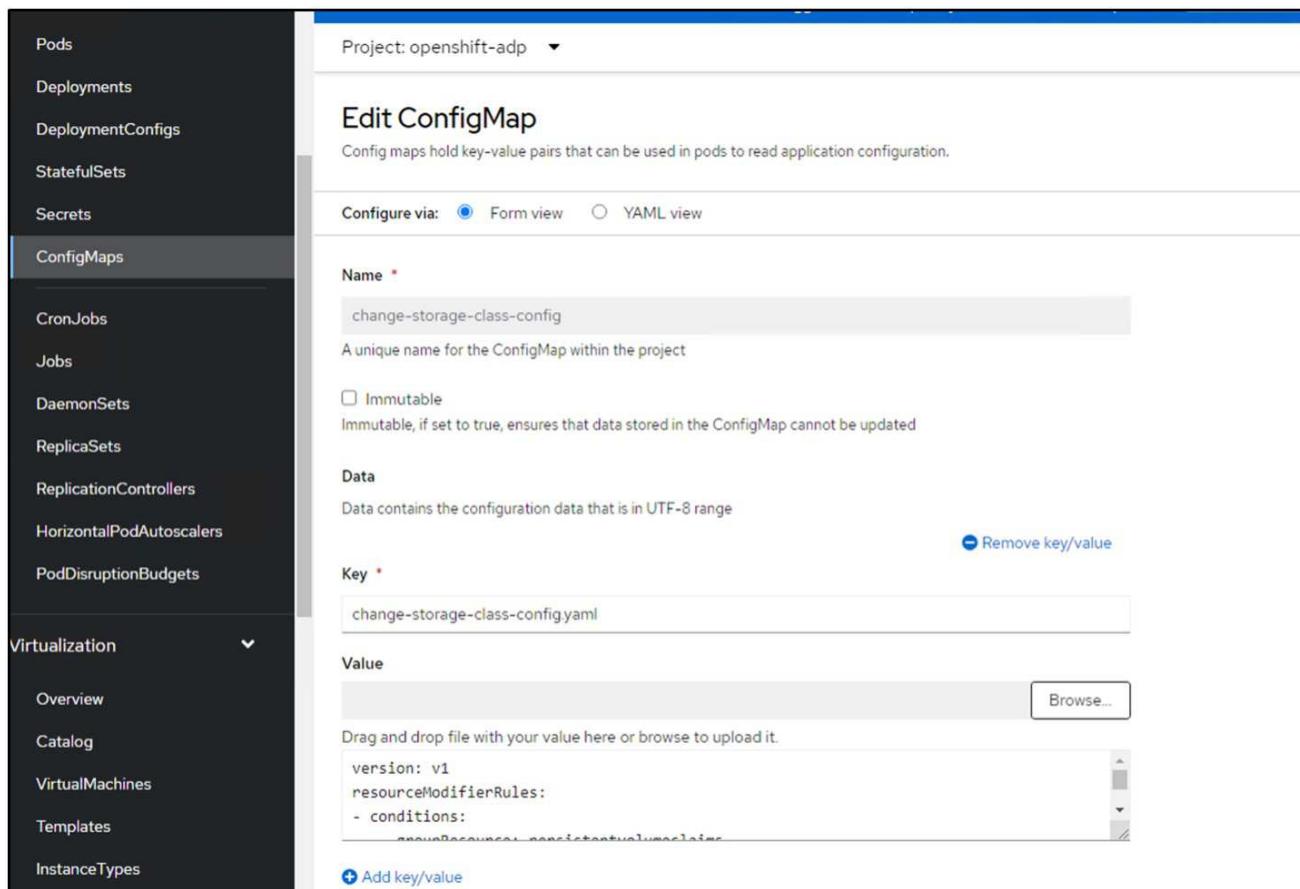
Select namespace : `openshift-adp`

Name: change-storage-class-config (can be any name)

Key: change-storage-class-config.yaml:

Value:

```
version: v1
resourceModifierRules:
- conditions:
  groupResource: persistentvolumeclaims
  resourceNameRegex: "^.rhel.*"
  namespaces:
  - virtual-machines-demo
patches:
- operation: replace
  path: "/spec/storageClassName"
  value: "ontap-nas-eco"
```



Pods

Deployments

DeploymentConfigs

StatefulSets

Secrets

ConfigMaps

CronJobs

Jobs

DaemonSets

ReplicaSets

ReplicationControllers

HorizontalPodAutoscalers

PodDisruptionBudgets

Virtualization

Overview

Catalog

VirtualMachines

Templates

InstanceTypes

Project: openshift-adp

Edit ConfigMap

Config maps hold key-value pairs that can be used in pods to read application configuration.

Configure via: Form view YAML view

Name *

change-storage-class-config

A unique name for the ConfigMap within the project

Immutable
Immutable, if set to true, ensures that data stored in the ConfigMap cannot be updated

Data

Data contains the configuration data that is in UTF-8 range

[Remove key/value](#)

Key *

change-storage-class-config.yaml

Value

Drag and drop file with your value here or browse to upload it.

```
version: v1
resourceModifierRules:
- conditions:
  groupResource: persistentvolumeclaims
  resourceNameRegex: "^.rhel.*"
  namespaces:
  - virtual-machines-demo
patches:
- operation: replace
  path: "/spec/storageClassName"
  value: "ontap-nas-eco"
```

[Browse...](#)

[+ Add key/value](#)

The resulting config map object should look like this (CLI):

```

# kubectl describe cm/change-storage-class-config -n openshift-adp
Name:          change-storage-class-config
Namespace:     openshift-adp
Labels:        velero.io/change-storage-class=RestoreItemAction
               velero.io/plugin-config=
Annotations:   <none>

Data
====

change-storage-class-config.yaml:
-----
version: v1
resourceModifierRules:
- conditions:
  groupResource: persistentvolumeclaims
  resourceNameRegex: "^.rhel.*"
  namespaces:
  - virtual-machines-demo
  patches:
  - operation: replace
    path: "/spec/storageClassName"
    value: "ontap-nas-eco"

BinaryData
====

Events:  <none>

```

This config map will apply the resource modifier rule when the restore is created. A patch will be applied to replace the storage class name to ontap-nas-eco for all persistent volume claims starting with rhel.

Step 2

To restore the VM use the following command from the Velero CLI:

```
#velero restore create restore1 --from-backup backup1 --resource
-modifier-configmap change-storage-class-config -n openshift-adp
```

The VM is restored in the same namespace with the disks created using the storage class ontap-nas-eco.

Delete a backup CR or restore CR in Red Hat OpenShift Virtualization using Velero

Delete backup and restore resources for VMs in OpenShift Virtualization using Velero. Use the OpenShift CLI to delete backups while retaining object storage data, or the Velero CLI to delete both the Backup Custom Resource (CR) and associated storage data.

Deleting a backup

You can delete a Backup CR without deleting the Object Storage data by using the OC CLI tool.

```
oc delete backup <backup_CR_name> -n <velero_namespace>
```

If you want to delete the Backup CR and delete the associated object storage data, you can do so by using the Velero CLI tool.

Download the CLI as given in the instructions in the [Velero documentation](#).

Execute the following delete command using the Velero CLI

```
velero backup delete <backup_CR_name> -n <velero_namespace>
```

Deleting a Restore

You can delete the Restore CR using the Velero CLI

```
velero restore delete restore --namespace openshift-adp
```

You can use oc command as well as the UI to delete the restore CR

```
oc delete backup <backup_CR_name> -n <velero_namespace>
```

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