HITACHI

Hitachi Vantara

Hitachi NAS CSI Driver for Red Hat OpenShift

User Guide

This document describes how to use the Hitachi NAS CSI driver on the Red Hat® OpenShift® platform

MK-25HNAS105-00
December 2025

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Preface

About this document

This document describes how to use the Hitachi NAS CSI driver on the Red Hat OpenShift platform, and is intended to provide additional information to that covered in the user guide.

Full details of the Hitachi NAS CSI driver, the configuration options and general troubleshooting are described in *Hitachi NAS CSI Driver User Guide MK-92HNAS091*, which is available from docs.hitachivantara.com, and should be referred to in addition to this document.

Note: All OpenShift screenshots shown in this document were captured on OpenShift 4.19 – some screens may vary depending on OpenShift version.

Document conventions

This document uses the following typographic convention:

Convention	Description
Bold	• Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example: **Click OK**. • Indicates emphasized words in list items.
Italic	Indicates a document title or emphasized words in text.
`Monospace`	Indicates text that is displayed on screen or entered by the user. Example: `pairdisplay -g oradb`

Intended audience

This document is intended for system administrators, Hitachi Vantara representatives, and authorized service providers who install, configure, and run the Hitachi NAS Container Storage Interface (CSI) driver for Kubernetes on the Red Hat OpenShift platform.

Readers of this document should be familiar with the following:

- Containerized environments and their basic functions
- The Red Hat OpenShift platform
- Hitachi NAS server platforms (Hitachi NAS platform, NAS module and VSP One File)

Accessing product documentation

Product user documentation is available on: https://docs.hitachivantara.com/. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting Help

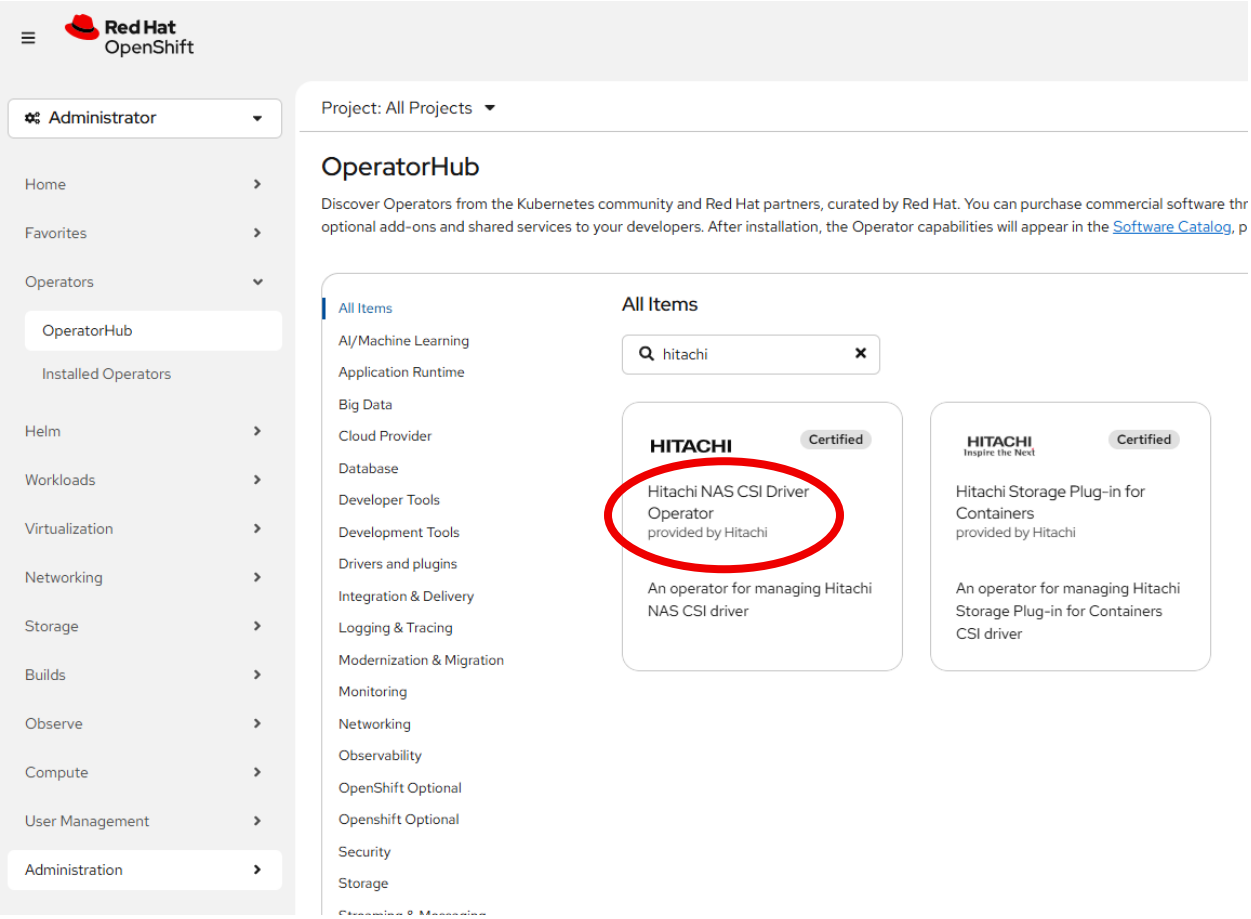
Hitachi Vantara Support Connect is the destination for technical support of products and solutions sold by Hitachi Vantara. To contact technical support, log on to Hitachi Vantara Support Connect for contact information: https://support.hitachivantara.com/en_us/contact-us.html.

Hitachi Vantara Community is a global online community for customers, partners, independent software vendors, employees, and prospects. It is the destination to get answers, discover insights, and make connections. **Join the conversation today!** Go to community.hitachivantara.com, register, and complete your profile.

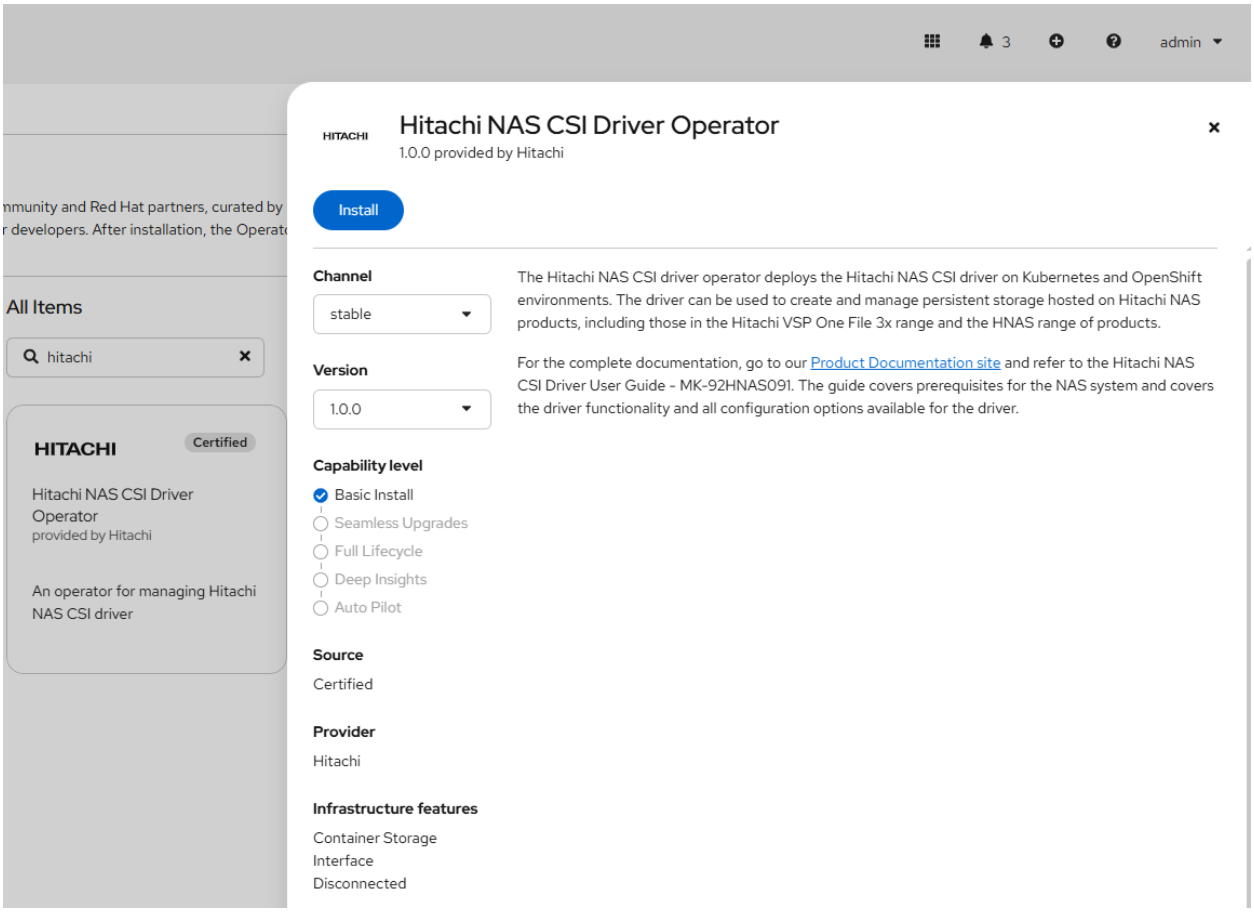
Chapter 1: Installing the Driver

The Hitachi NAS CSI driver can be installed from the Operator Hub within the Red Hat OpenShift UI, on versions that it has been certified for. A simple search for “hitachi” will determine if the Hitachi NAS CSI driver is available to install or not. There may be more than one Hitachi CSI driver available via the Operator Hub, so make sure to select the correct driver before attempting to install it.

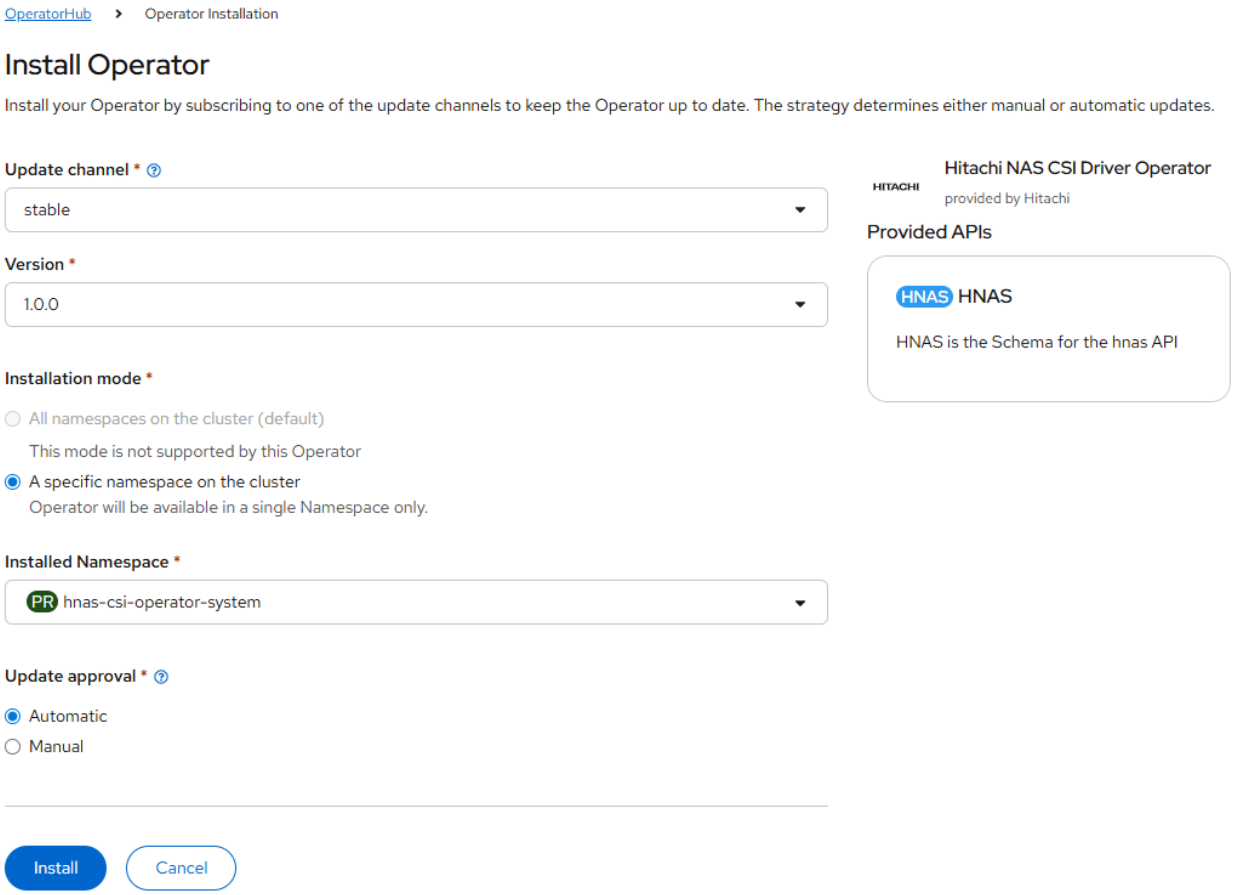
Note: Before installing the Hitachi NAS CSI driver from the Operator Hub, check that it has not already been installed using a different method. Refer to *Hitachi NAS CSI Driver User Guide MK-92HNAS091*, for details on how to check for an existing install, and how to uninstall it if already present.



Click on the correct tile within the UI and it will popup full details of the Operator which is used to install the Hitachi NAS CSI driver.

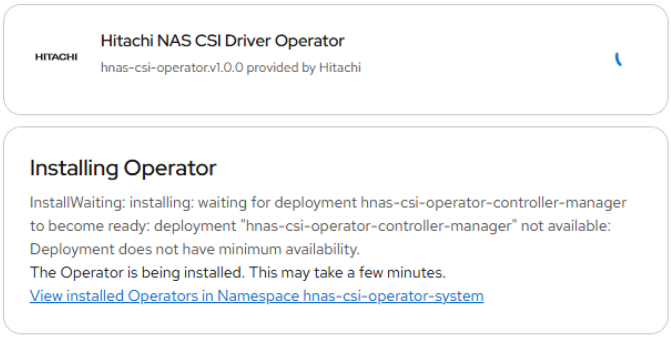


Click the **Install** button and enter the required details for the Operator:

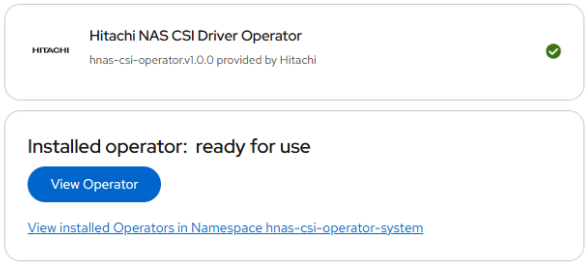


It is recommended to install the Operator into its own namespace, which can be created at this stage. The namespace `hnas-csi-operator-system` is used if the Operator is installed separately, so best practice would be to create a new namespace with that name, unless it is intended to install the Operator in a different namespace. The **Installed Namespace** drop down has an option to create a new namespace, which can be used to create the namespace as part of the install process. Accept the other default options, and press the **Install** button.

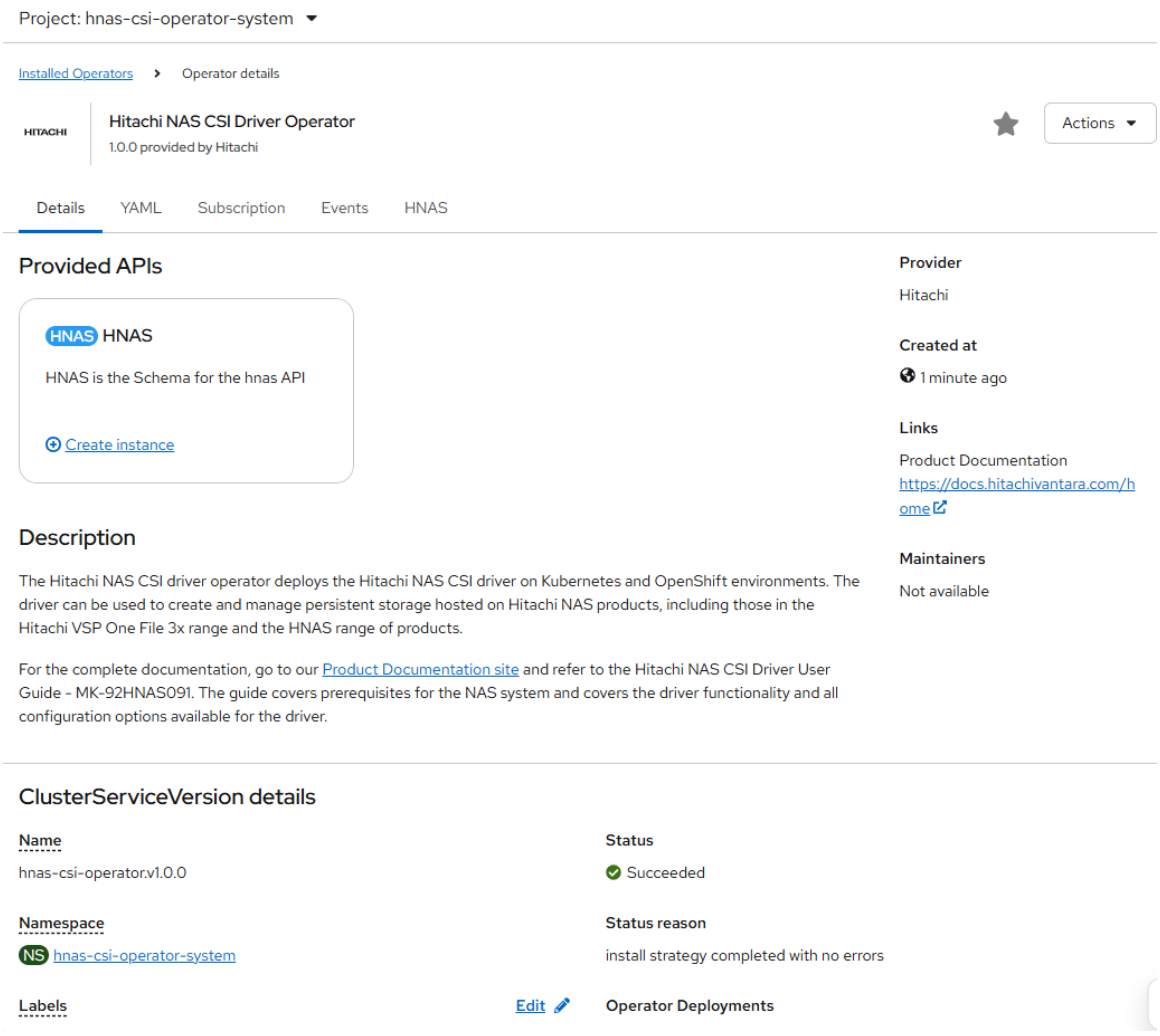
The Operator may take a short while to install:



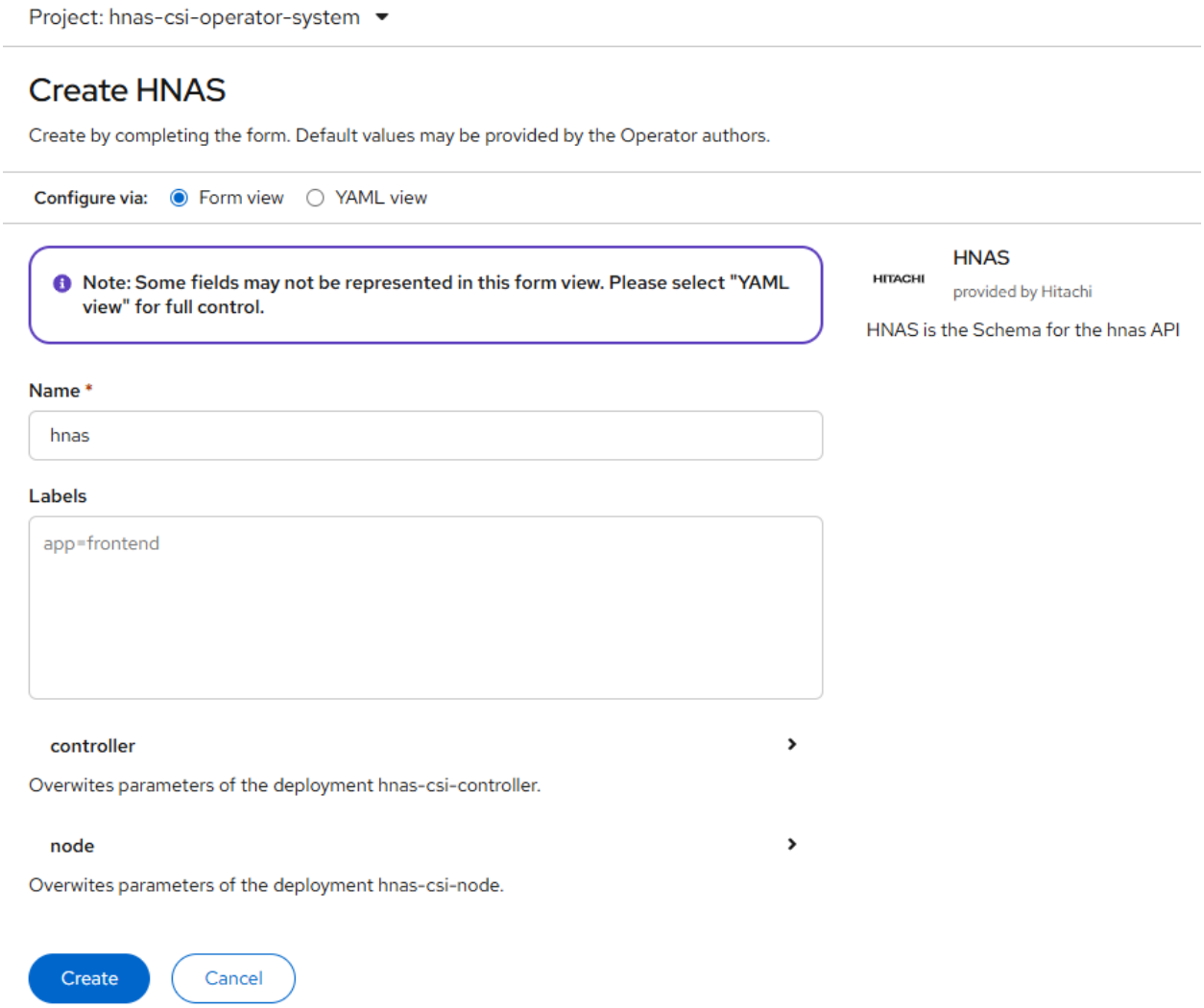
Once the Operator installation has completed, a new HNAS custom resource can be created which manages the Hitachi NAS CSI driver:



The **Hitachi NAS CSI Driver Operator** should now be shown in the **Installed Operators** section of the OpenShift UI, when viewing the appropriate namespace resources. Clicking the Operator link should display additional details:

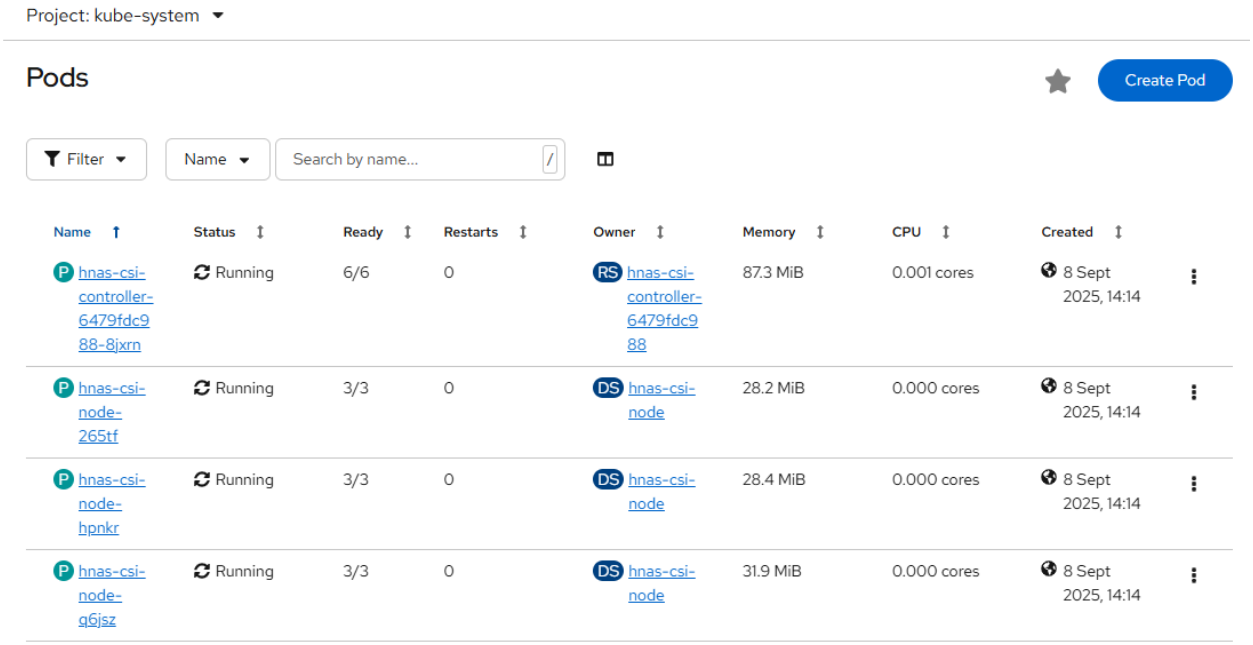


Select the **HNAS tab** and then select the **Create HNAS** option, which will display details about the new resource:



By selecting the default **Form view** options offered, it will deploy the Hitachi NAS CSI driver with all the driver configuration settings using their defaults. A new HNAS resource will be created that will be used to automatically manage the Hitachi NAS CSI driver. By deleting the HNAS resource, the CSI driver will be removed, and by changing the parameters from their defaults, the drivers settings can be adjusted, where necessary.

The Hitachi NAS CSI driver is installed into the **kube-system** namespace. Once installed and running, there should be one instance of the **hnas-csi-controller** pod and an instance of the **hnas-csi-node** pod on each of the OpenShift cluster nodes:



Chapter 2: Configuring the Driver

Before the driver can be used, it needs to be configured so that it can communicate with one or more Hitachi NAS systems.

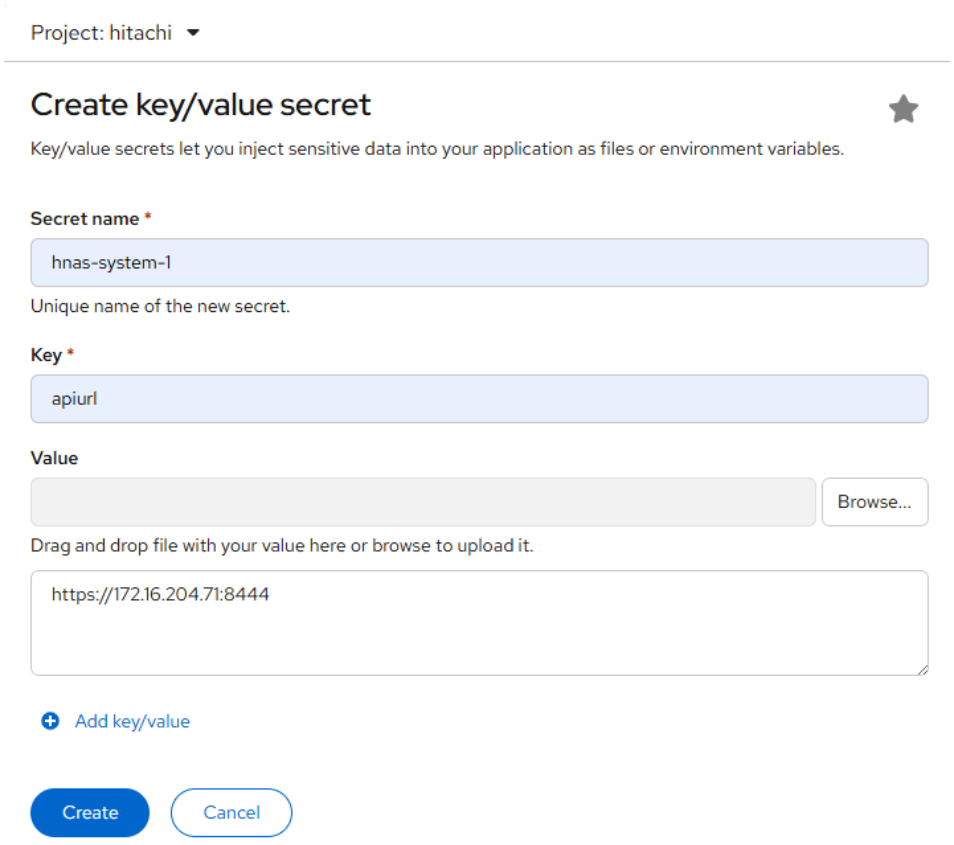
To allow communications to be established using the Hitachi NAS REST API, a set of Secret key/value pairs needs to be configured, which provide details on the API URL, version and a means of authenticating.

Setup Secrets

Create a new key/value secret. Select an appropriate namespace, and use a **Secret name** that is meaningful in relation to the Hitachi NAS system that it relates to.

Add Keys for **apiurl**, **apiversion** and **apikey** with their appropriate values. Alternatively **username** and **password** can be specified instead of the **apikey** value, but it is recommended to use an API key for authentication rather than a username/password combination. For a full description, and details of the parameters that can be used to configure the system secrets, refer to *Secret Settings* in *Hitachi NAS CSI Driver User Guide MK-92HNAS091*.

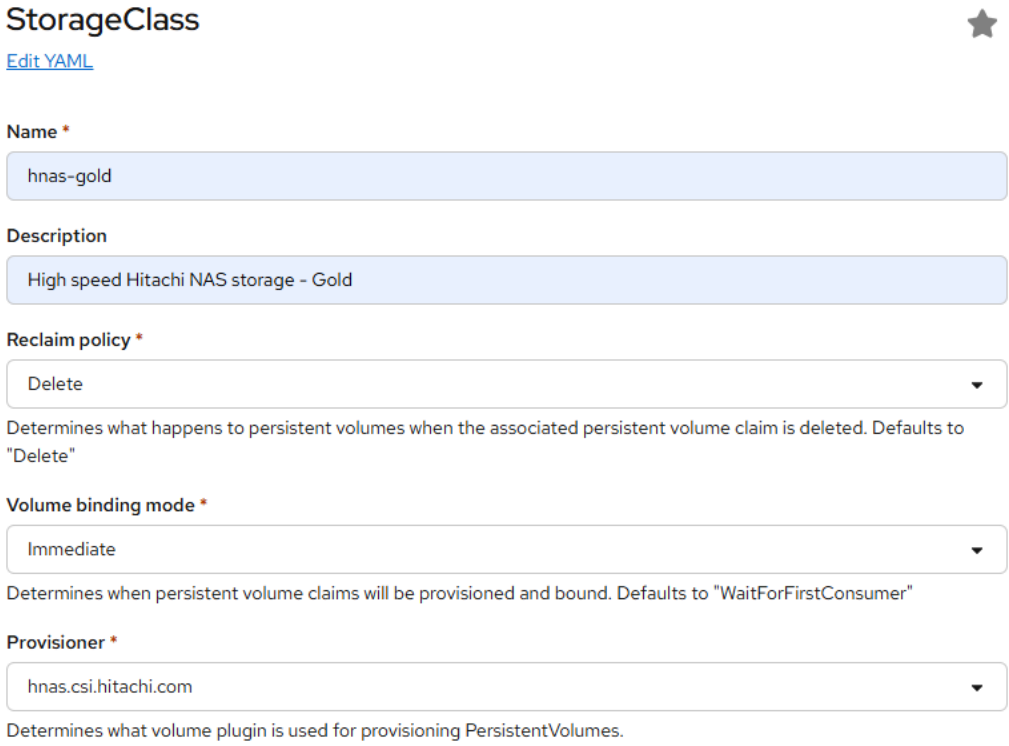
Click the Add key/value option to add each of the required values, and then once all have been added, click the **Create** button.



Setup StorageClass

Create a new StorageClass, using an appropriate **Name** and **Description** (optional), using the settings as shown below. The StorageClass is what determines where the volumes are stored on the Hitachi NAS system. More than one StorageClass can be created if there is a need to put volumes on different file systems.

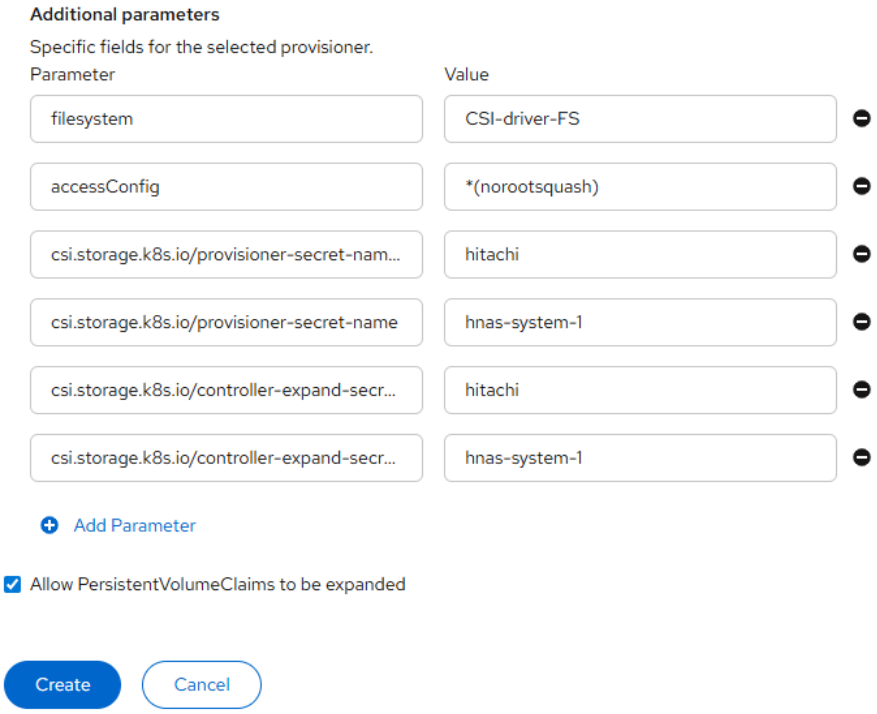
Select the appropriate **Reclaim policy** and **Volume binding mode**, and ensure the **Provisioner** is set to `hnas.csi.hitachi.com`.



Also add the following **Additional parameters** values, which are used to link the Hitachi NAS system to the new StorageClass and provide details on where it will store the files, and which credentials are to be used when communicating with it:

- **filesystem** – Name of the Hitachi NAS filesystem that will store the volumes
- **accessConfig** – NFS mount options that are used when OpenShift mounts the NFS export
- **csi.storage.k8s.io/provisioner-secret-namespace** – namespace where the secrets are stored
- **csi.storage.k8s.io/provisioner-secret-name** – name of the secrets
- **csi.storage.k8s.io/controller-expand-secret-namespace** – namespace where the secrets are stored
- **csi.storage.k8s.io/controller-expand-secret-name** – name of the secrets

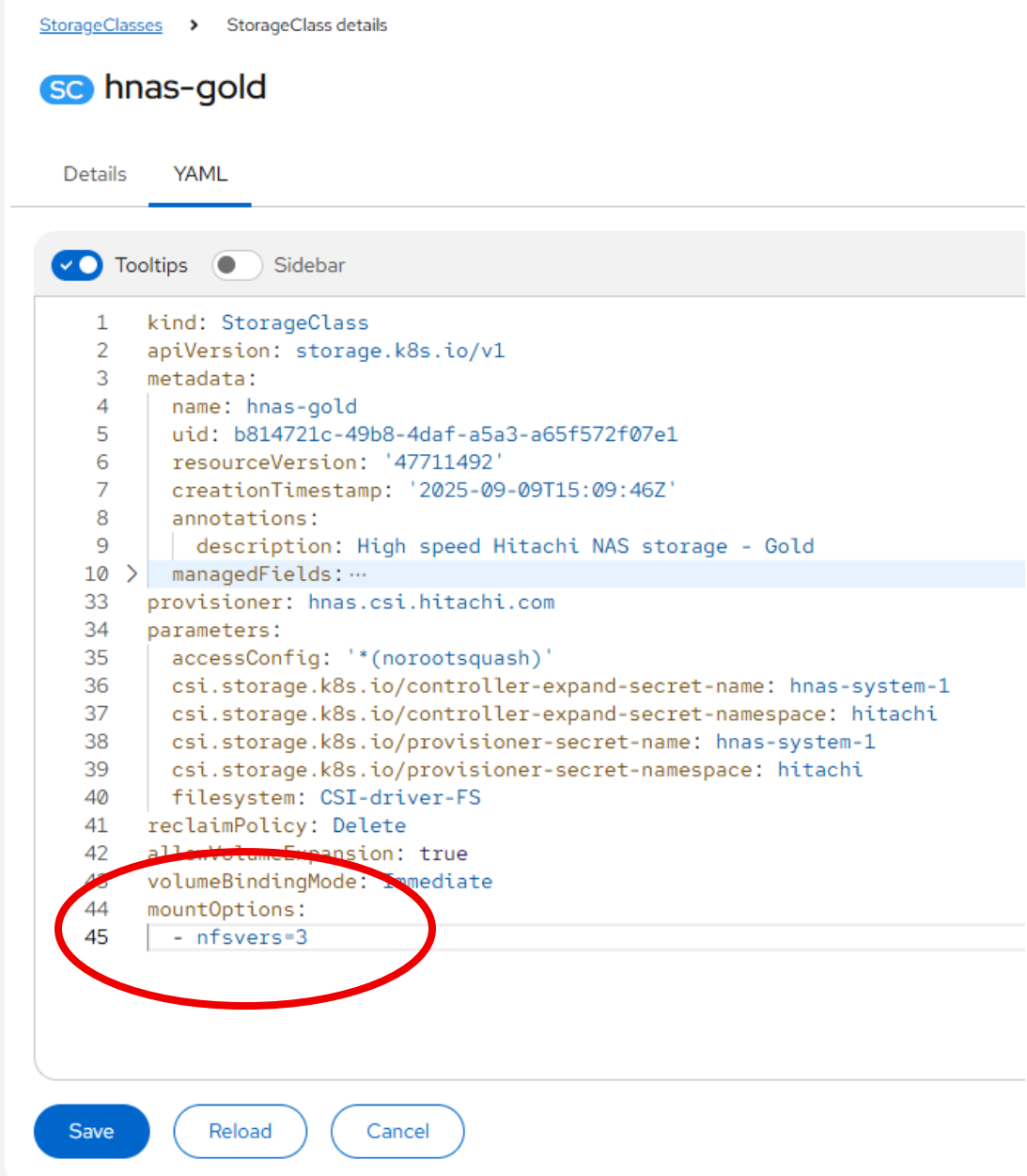
For a full description, and details of other parameters that can be configured for a storage class, refer to *StorageClass Settings* in *Hitachi NAS CSI Driver User Guide MK-92HNAS091*.



Once a StorageClass has been created, the Hitachi NAS CSI driver should be able to create volumes.

Note: By default, NFSv4 will be used to mount the volumes, but if NFSv3 is required instead, this will need to be added using the YAML editor, as it can't be added using the UI form. Some external documentation states that NFSv3 is not supported for use with Virtualization due to locking issues.

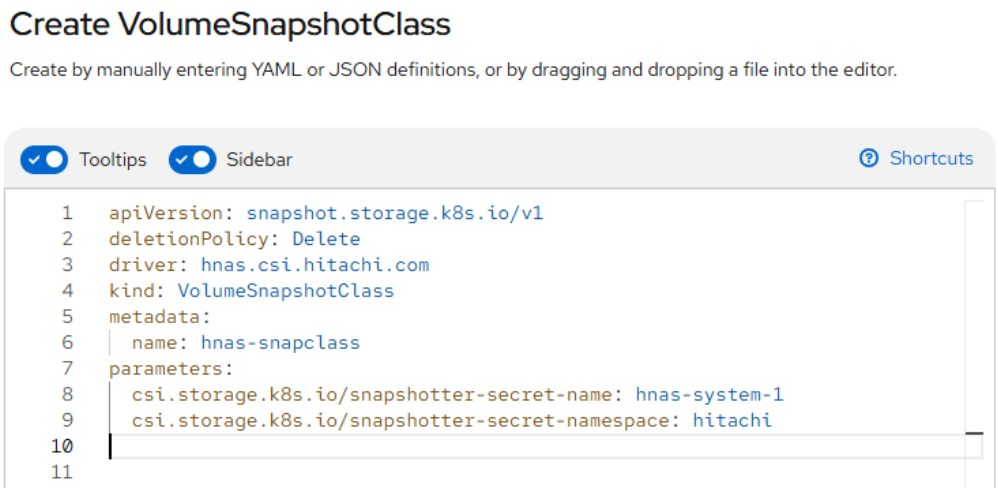
View the newly created StorageClass and then select the **YAML** tab, and add `mountOptions` to the YAML (as shown below) and click the **Save** button.



Setup VolumeSnapshotClass

There is no option to use a form to create a VolumeSnapshotClass, so the details need to be entered in YAML format, as below:

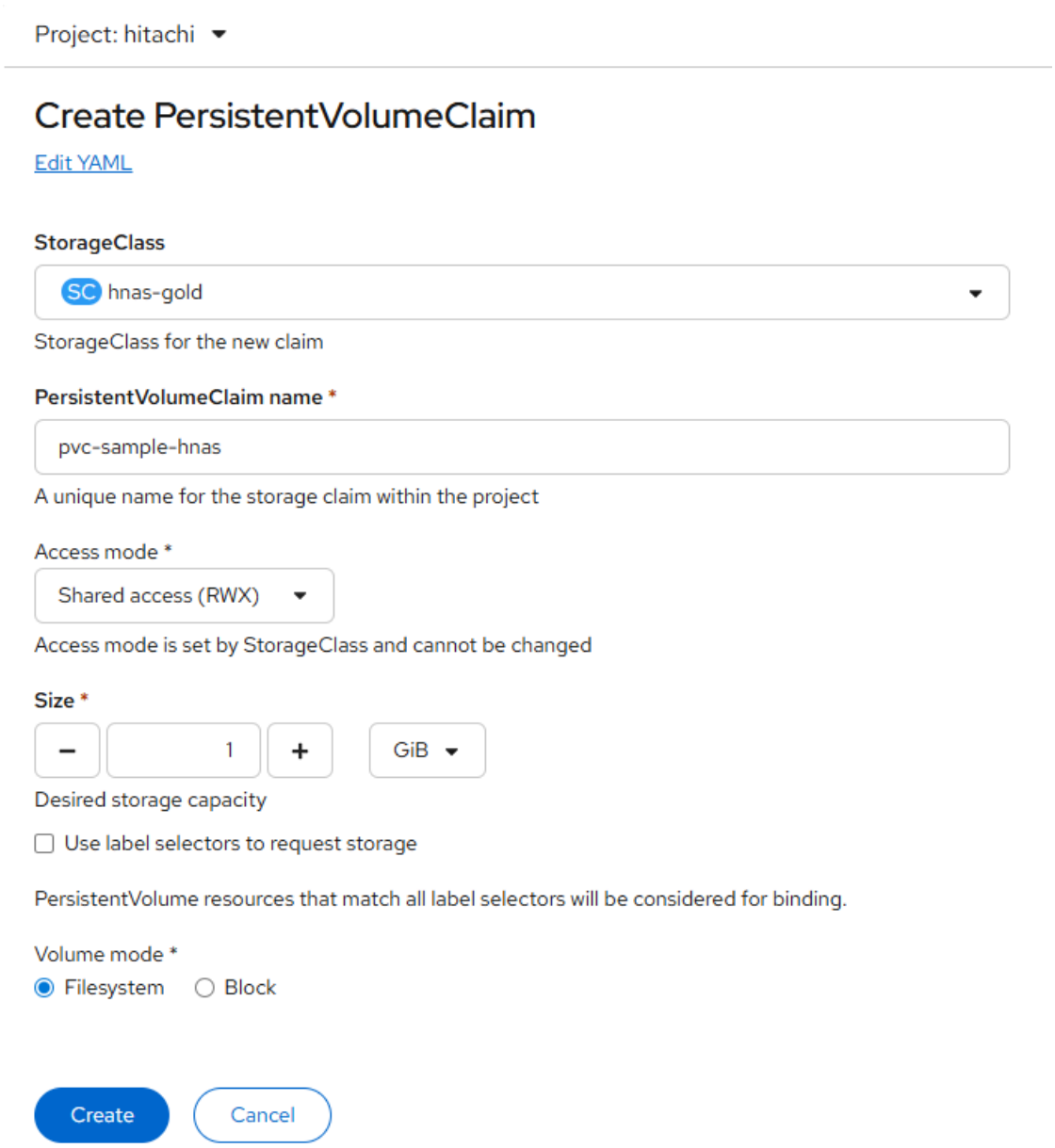
For a full description, and details of other parameters that can be configured for a volume snapshot class, refer to *VolumeSnapshotClass Settings* in *Hitachi NAS CSI Driver User Guide MK-92HNAS091*.



Chapter 3: Creating Volumes

Once the Hitachi NAS CSI driver has been configured, creating a PersistentVolumeClaim (PVC) is the same as with any other storage provider.

Select the appropriate **StorageClass**, enter a **PersistentVolumeClaim name**, choose the **Access mode** – `Shared access (RWX)` is supported by the driver, and provides the most flexibility. Ensure the **Volume mode** is set to **Filesystem**, as *Block* mode is not supported by the driver, and the operation will fail. Select an appropriate **Size** value (the specified size will be enforced using the virtual volume functionality on the Hitachi NAS system).

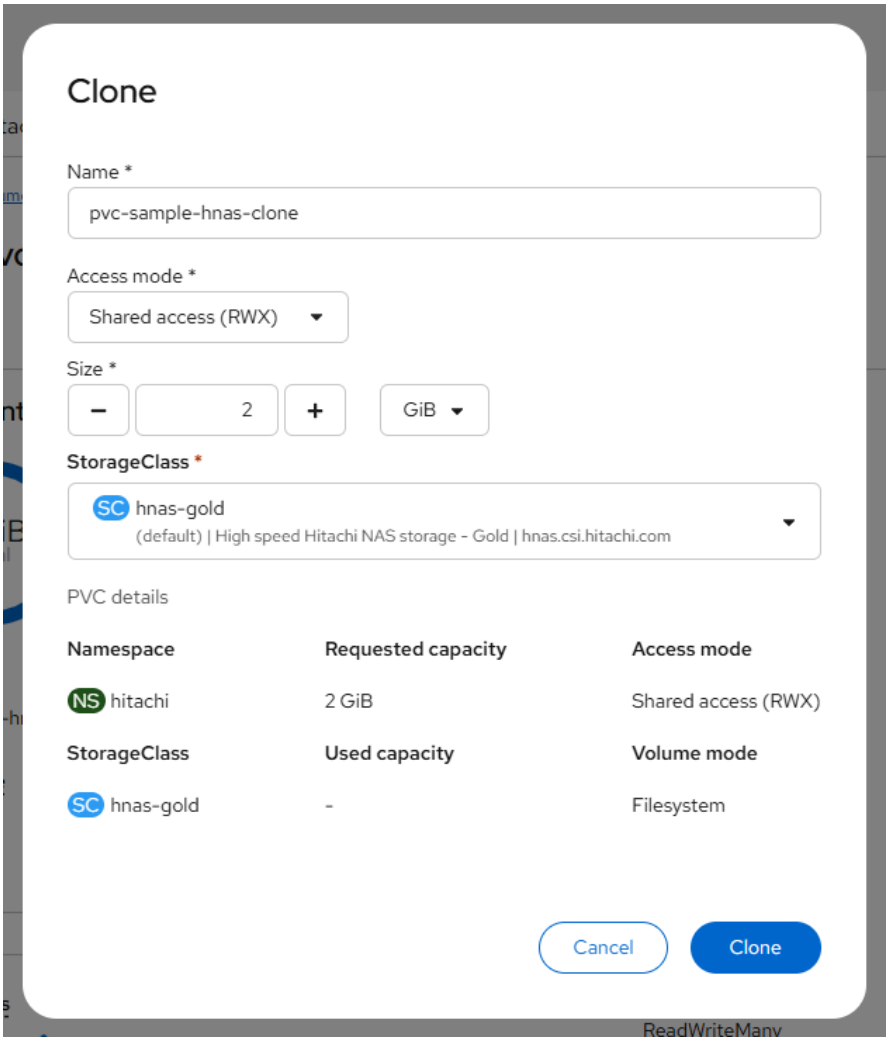


It's possible to expand the volume size once a PVC has been created, provided the StorageClass was configured to allow it (`allowVolumeExpansion: true`). Volumes can also be snapshotted or cloned, to create point in time copies.

Cloning a Volume

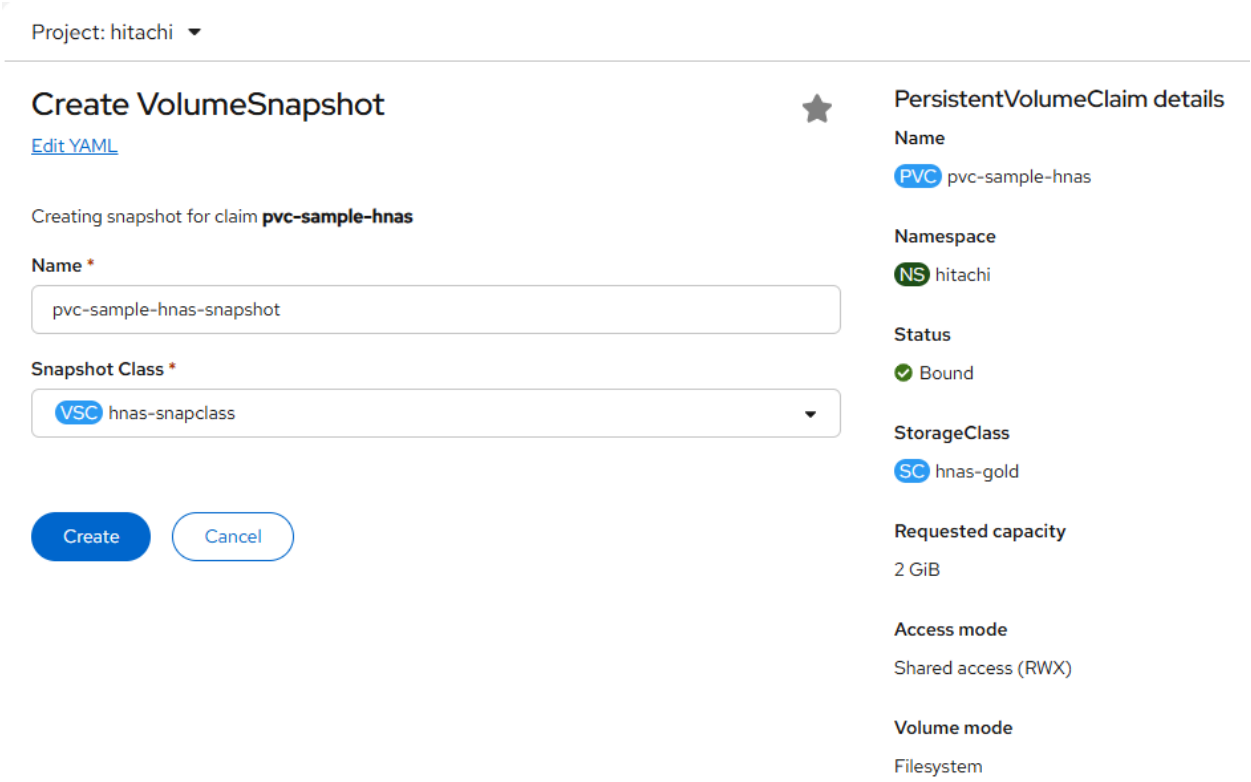
When attempting to clone a PVC created by the Hitachi NAS CSI driver, ensure that the **StorageClass** selected in the drop down list, matches the StorageClass of the source volume, otherwise the operation will fail.

The cloned volume can be created the same size as the source, or the **Size** can be increased as part of the clone operation.



Snapshotting a Volume

Snapshots can be taken of PVCs created using the Hitachi NAS CSI driver. Ensure that the appropriate **Snapshot Class** is used that corresponds with the Hitachi NAS system that hosts the filesystem containing the PVC.



Once a snapshot has been created, one or more PVCs can be created from it to create a new, writable, point in time copy of the data of the original source PVC.

Chapter 4: Virtualization

The Hitachi NAS CSI driver can be used to provide the storage for virtual machines, using the OpenShift Virtualization Operator.

Note: This document does not cover the process of ensuring the minimum requirements have been met, or of installing and configuring the Virtualization Operator. Please refer to the Red Hat documentation for details on how to do this.

Once the OpenShift Virtualization Operator is installed and configured, the following additional configuration needs to be made to ensure that the Hitachi NAS CSI driver can be used to host virtual machines.

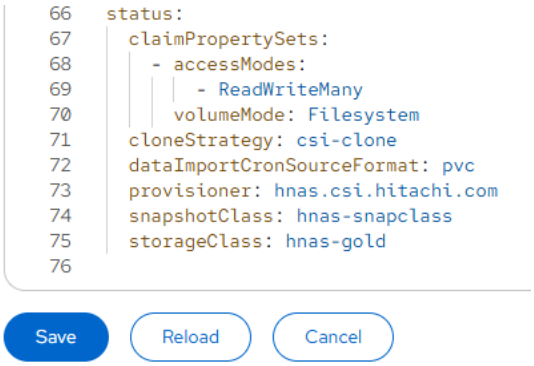
Ensure that the Hitachi NAS StorageClass that will be used to host the virtual machines and their templates is set to be the *default* storage class. The installation of the OpenShift Virtualization Operator will create a StorageProfile CustomResource for each StorageClass on the cluster. Each StorageProfile will contain details about the StorageClass and how it will be used by virtualization. It is necessary to check that all the relevant details are present, otherwise the creation of virtual machines may fail.

Find the StorageProfile CustomResource instance that has the same name as the Hitachi NAS StorageClass that was previously set as the default storage class, and check to see if it has the `claimPropertySets` and `cloneStrategy` (as show below) present in the status section of the **YAML** definition. If they are not present, add the following entries to the `spec` section of the **YAML** definition of the CustomResource. **Save** the changes and then **Reload** them. Once reloaded, the additional details should be added to the `status` section of the YAML file.

```
spec:
  claimPropertySets:
  - accessModes:
    - ReadWriteMany
      volumeMode: Filesystem
  cloneStrategy: csi-clone
```

The *cloneStrategy* is used to determine the best way to clone a VM image, and the *accessMode* is used when a new PVC is created during virtualization operations. The use of **ReadWriteMany** allows the virtual machines to be created so that they can support live migration between cluster nodes.

The `status` section of the StorageProfile should contain the following details, which link the storage class, snapshot class, CSI driver, and provide the best method to clone a virtual machine and what options to use when the PVCs are created that store the virtual machine data disks:

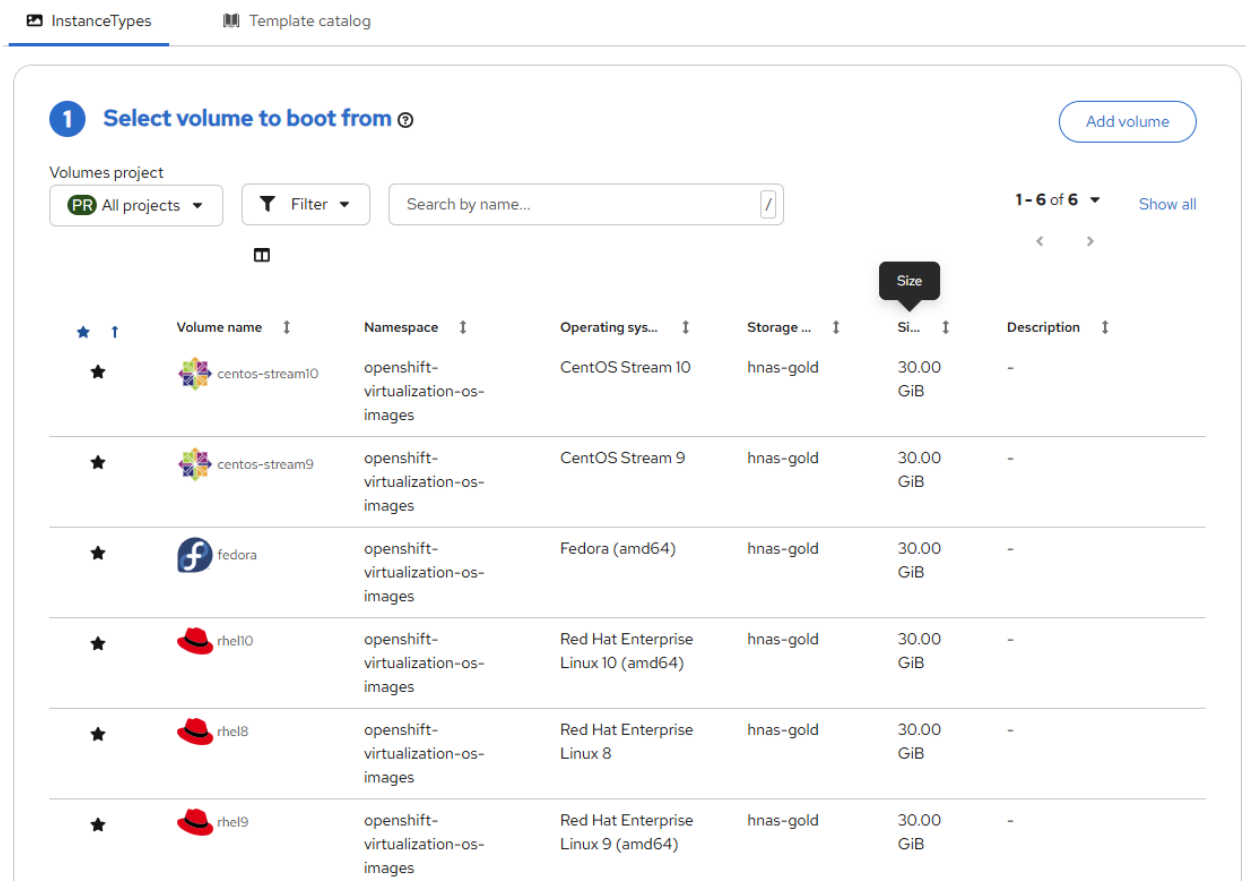


Once the StorageProfile is correctly configured, a few predefined virtual machine operating system images should be automatically created and the images downloaded. Each disk image is stored on an automatically created PVC. The population of all the PVCs may take a while to complete, as the images are downloaded from an external source. In addition to the images, there should be a range of templates, that specify different memory/CPU configurations associated with each disk image. The full list of templates should have information about which have associated images available locally and which don't.

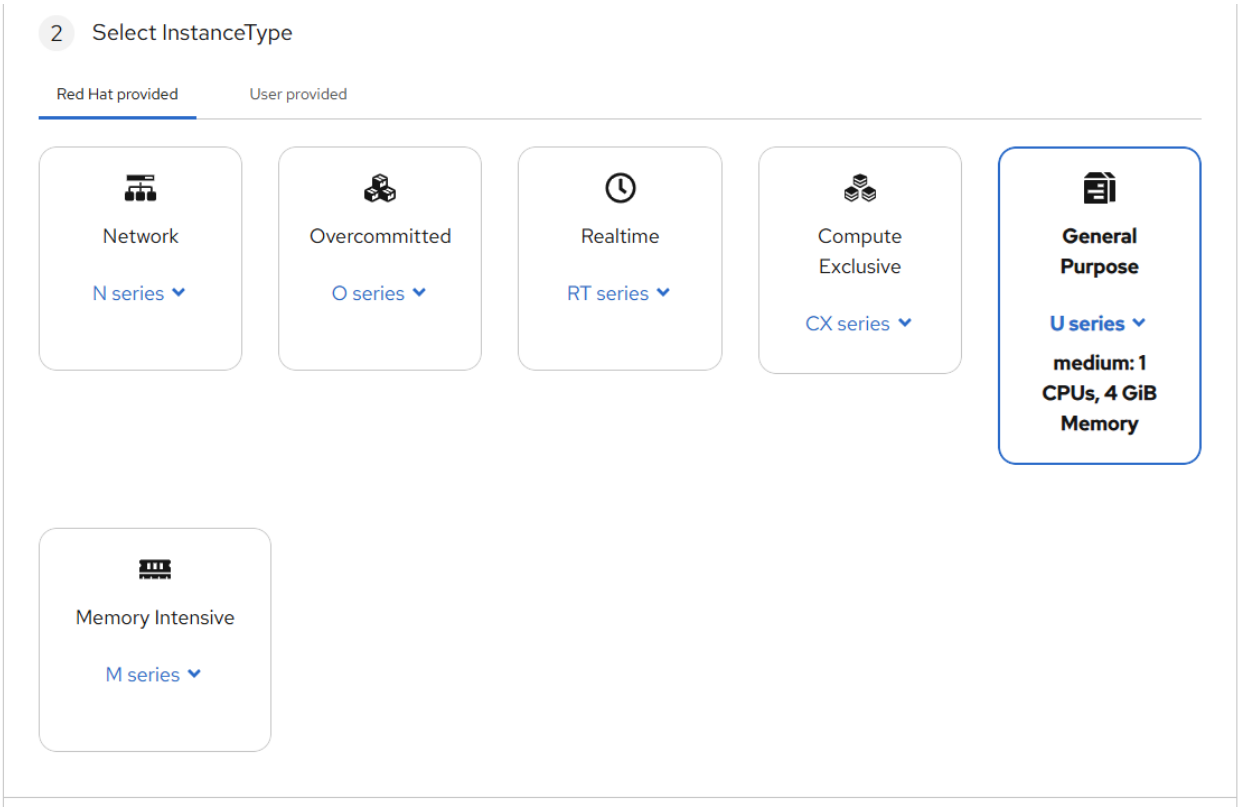
Creating a Virtual Machine

To create a virtual machine, select one of the available items from the **volume to boot from** list.

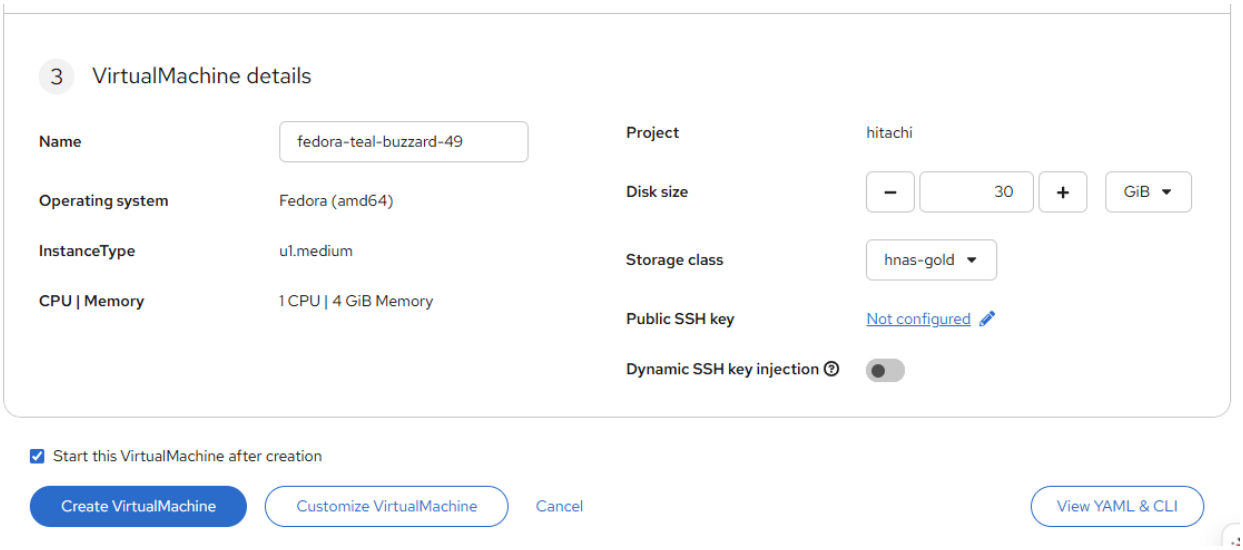
Note: Additional operating system boot disks can be added using the **Add volume** button. Details are not covered here, as the process should be the same irrespective of which storage provider is being used.



Select the required **InstanceType** option, either one of the **Red Hat provided** defaults or select **User provided** to enter specific details:



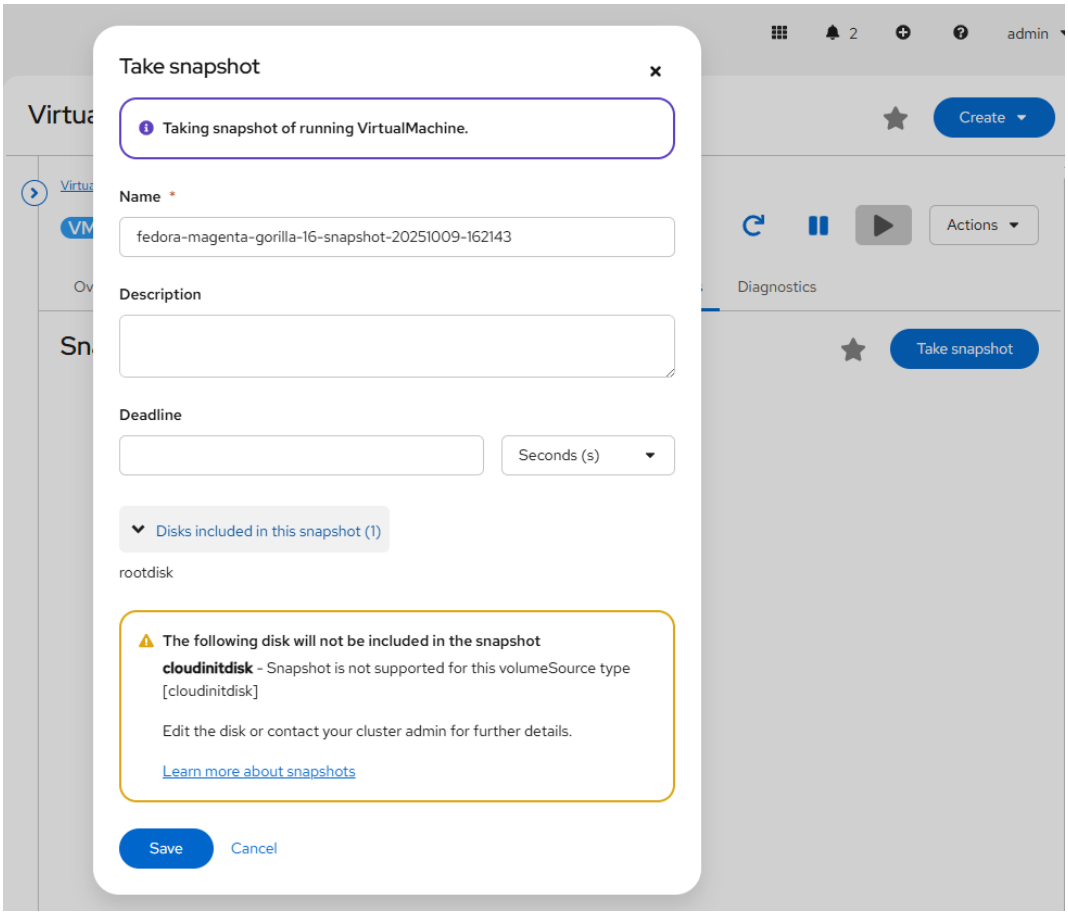
And finally, give the new virtual machine a unique N**ame**, select the **Disk size** and ensure that the **Storage class** is set to the Hitachi NAS storage class that was configured previously (it should be initially set to the *default* storage class). Once all the details are correct, press the **Create VirtualMachine** button. This should trigger a clone of the boot disk image from the PVC that it was downloaded to, to a newly created PVC. If the **Start this VirtualMachine after creation** check box was selected, the virtual machine should start booting once the PVC clone has completed.



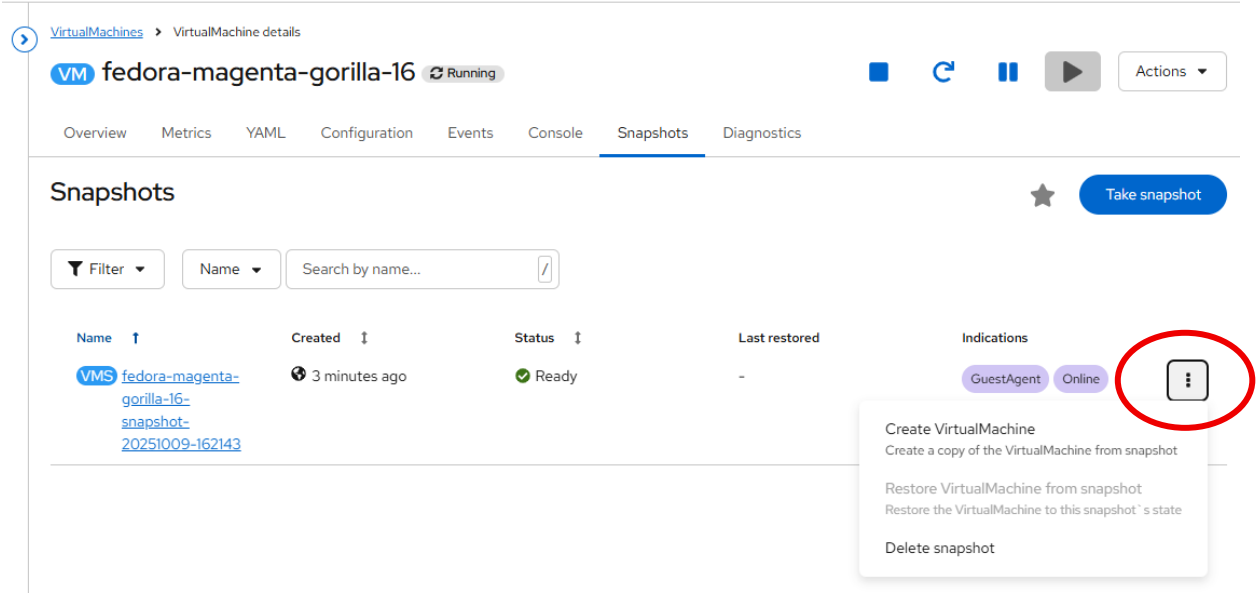
Taking a Snapshot of a Virtual Machine

To take a snapshot of the virtual machine, from within the **Snapshots** tab, press the **Take snapshot** button and either enter a new **Name**, or accept the offered name, which includes a time and date stamp. An optional **Description** can be associated with the snapshot if required, and press the **Save** button.

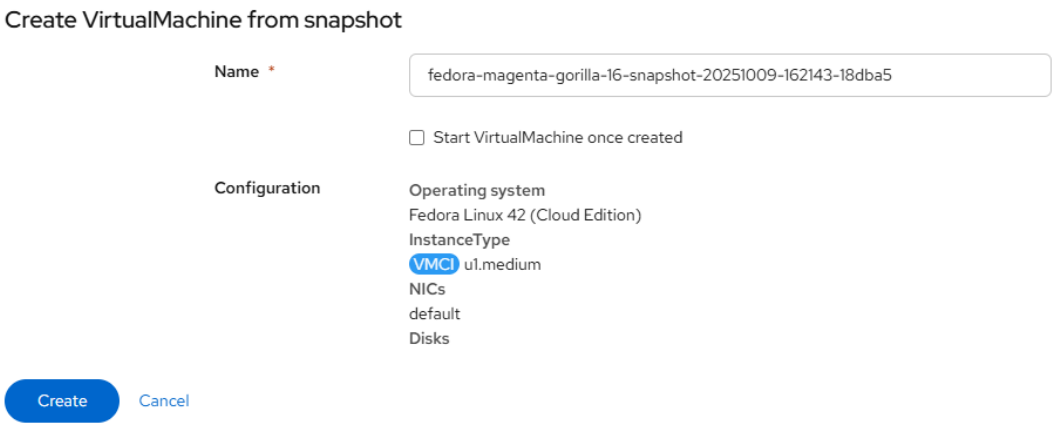
Note: Some disk types associated with a virtual machine may not support snapshots. Any disks stored on PVCs hosted on the Hitachi NAS should be included in the snapshots, other types may not be.



To create a new virtual machine from a snapshot, select the menu associated with the snapshot by clicking the 3 dots to the right of the snapshot entry, and select the **Create VirtualMachine** option. The same menu can also be used to delete a stored snapshot once it is no longer required.

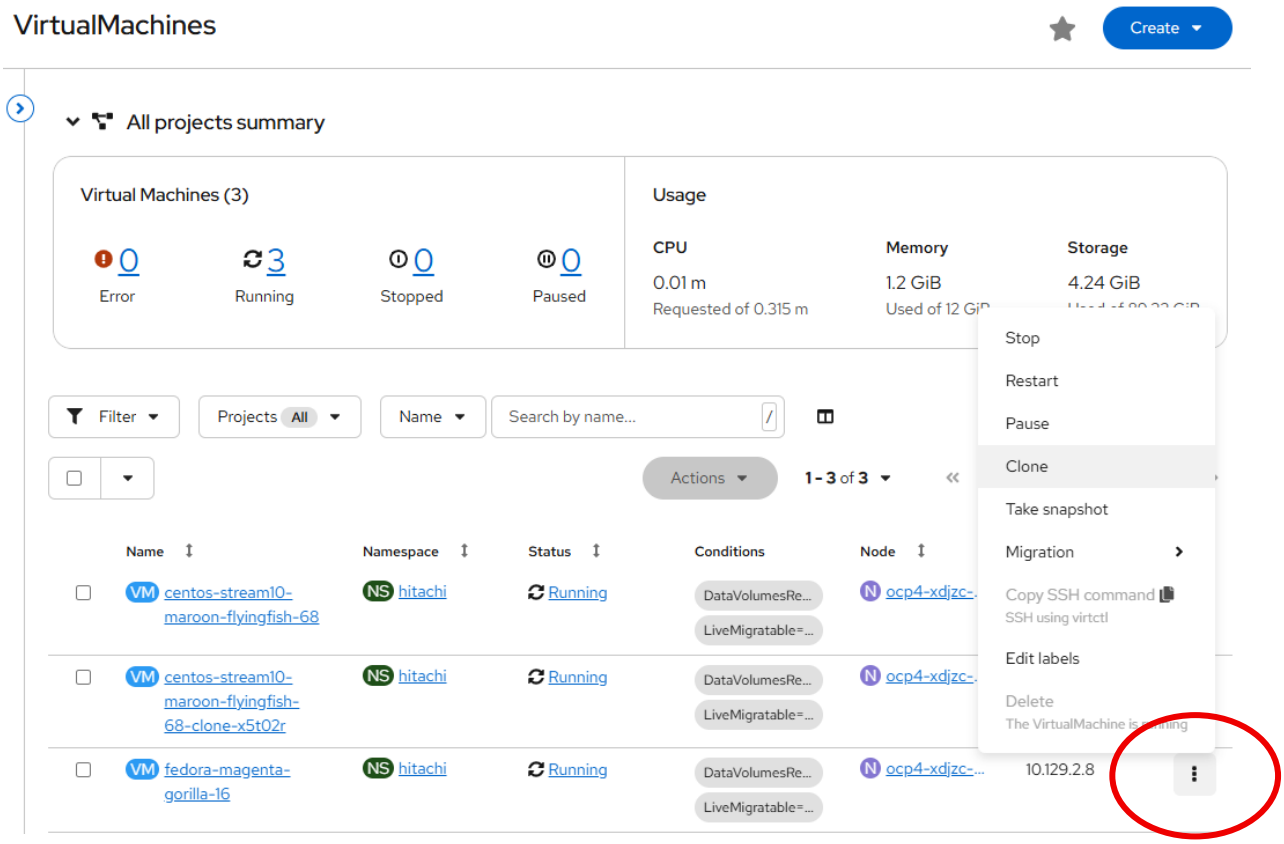


All that is required is to fill in a different **Name** for the new virtual machine, and press the **Create** button. This should be a fairly instantaneous operation and should be no different to creating a virtual machine from a snapshot using any other storage provider.

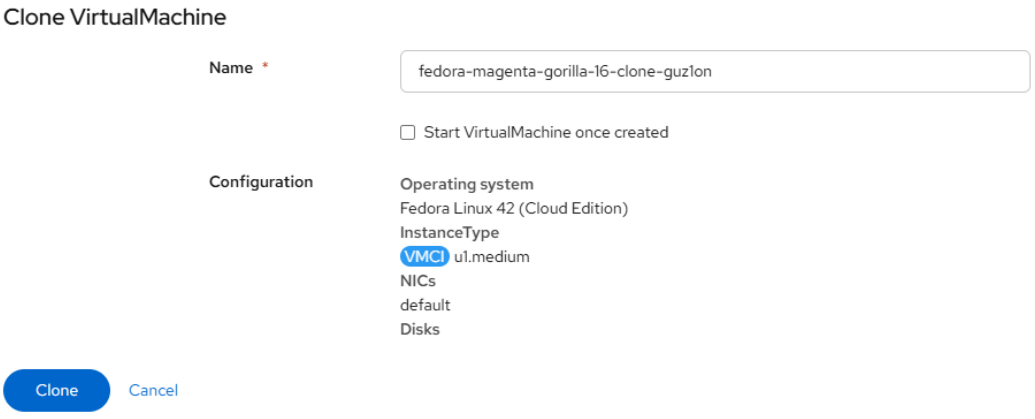


Cloning a Virtual Machine

To create a clone of the virtual machine, select the menu associated with the virtual machine by clicking the 3 dots to the right of the virtual machine entry, and select the **Clone** option.



All that is required is to fill in a different **Name** for the new virtual machine clone, and press the **Clone** button. This should be a fairly instantaneous operation and should be no different to cloning a virtual machine using any other storage provider.



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