

10_CVD: Deploy Portworx Operator on Red Hat OpenShift - for Vijay review

Deploy Persistent Storage on Red Hat OpenShift using Portworx from Pure Storage

For additional information on Portworx Enterprise from Pure Storage, see the following documentation:

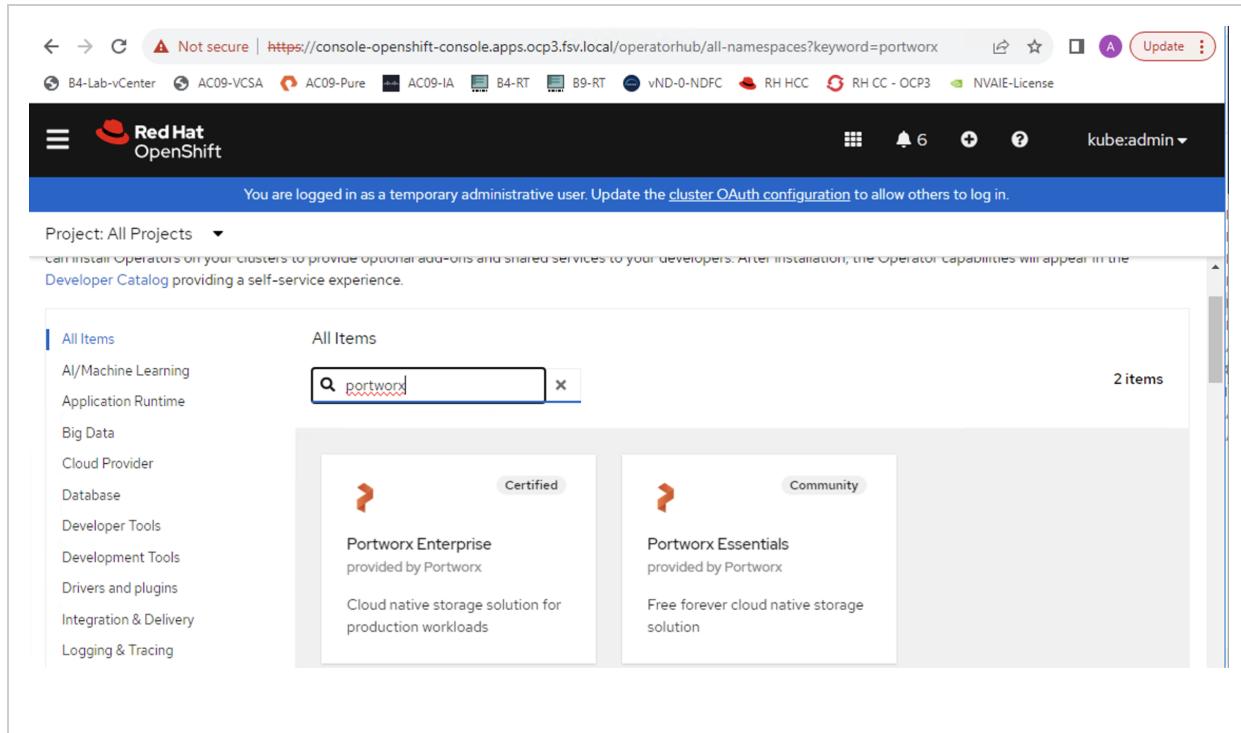
- <https://docs.portworx.com/portworx-enterprise/install-portworx/openshift/vsphere>
- <https://docs.portworx.com/portworx-enterprise/install-portworx/openshift/vsphere/openshift-vsphere-with-console-plugin>
- <https://portworx.com/blog/streamlining-openshift-management-exploring-openshift-dynamic-console-plugin-from-portworx-for-unified-management/>
- <https://portworx.com/blog/improving-productivity-with-single-pane-of-glass-openshift-storage-reporting/>

Prerequisites:

- OpenShift luster must be running OpenShift 4.12 or higher.
- You must have an OpenShift cluster deployed on infrastructure that meets the minimum requirements for Portworx - **see referenced links above.**
 - 3 nodes (8 cores, 8GB memory, 128G backing disk)
 - Secure boot must be disabled on underlying nodes
 - disabled by default on worker nodes deployed by OpenShift
 - ensure it is disable on underlying **vSphere hosts** used by Portworx
 - ~~Use supported disk types~~
 - Disable Storage DRS in VMware vSphere (if enabled)

Deploy Portworx Enterprise Operator from Operator Hub

- From the left navigation menu, navigate to **Operators > Operator Hub** and search for **Portworx Enterprise** from Pure Storage.



The screenshot shows the Red Hat OpenShift Operator Hub interface. At the top, there is a navigation bar with various cluster names like B4-Lab-vCenter, AC09-VCSA, AC09-Pure, AC09-IA, B4-RT, B9-RT, vND-0-NDFC, RH HCC, RH CC - OCP3, and NVAIE-License. On the right side of the header, there are icons for user profile, notifications (6), and other settings. The main title is "Red Hat OpenShift". Below the header, a message says "You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in." A sub-header "Project: All Projects" is followed by a note: "You can install Operators on your clusters to provide optional add-ons and shared services to your developers. After installation, the Operator capabilities will appear in the Developer Catalog providing a self-service experience." On the left, there is a sidebar with a "All Items" tab selected, showing a list of categories: AI/Machine Learning, Application Runtime, Big Data, Cloud Provider, Database, Developer Tools, Development Tools, Drivers and plugins, Integration & Delivery, and Logging & Tracing. A search bar at the top of the main content area contains the text "portworx". The search results show two items:

Category	Operator Name	Status	Description
Certified	Portworx Enterprise	provided by Portworx	Cloud native storage solution for production workloads
Community	Portworx Essentials	provided by Portworx	Free forever cloud native storage solution

- Select **Portworx Enterprise** and click **Install**.

The screenshot shows the Red Hat OpenShift OperatorHub interface. At the top, there's a navigation bar with icons for B4-Lab-vCenter, AC09-VCSA, AC09-Pure, AC09-IA, B4-RT, B9-RT, vND-0-NDFC, RH HCC, RH CC - OCP3, and NVAIE-License. On the right, there are user status indicators for 'kube:admin' and an 'Update' button. The main content area has a dark header with the Red Hat OpenShift logo. Below it, a message says 'You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.' A 'stable' radio button is selected. Under 'Installation mode *', there are two options: 'All namespaces on the cluster (default)' and 'A specific namespace on the cluster'. The second option is selected. In the 'Provided APIs' section, there are two boxes: 'SC Storage Cluster' (marked as required) which describes it as installing Portworx in the cluster, and 'SN Storage Node' which notes it's internally created by the operator. On the left, there's a 'Select Project' dropdown with 'Create Project' and 'PR default' listed. The 'PR default' project is highlighted.

4. Click on **Create Project** and specify **portworx** for the **Name**.

The screenshot shows the 'Create Project' dialog box overlying the previous interface. The dialog has a title 'Create Project' and a sub-instruction 'An OpenShift project is an alternative representation of a Kubernetes namespace.' It includes a 'Learn more about working with projects' link. The 'Name *' field contains 'portworx', and the 'Display name' field also contains 'portworx'. In the 'Description' field, the text 'portworx operator folder' is entered. At the bottom right of the dialog are 'Cancel' and 'Create' buttons. The background of the dialog is semi-transparent, allowing the underlying operator hub interface to be seen.

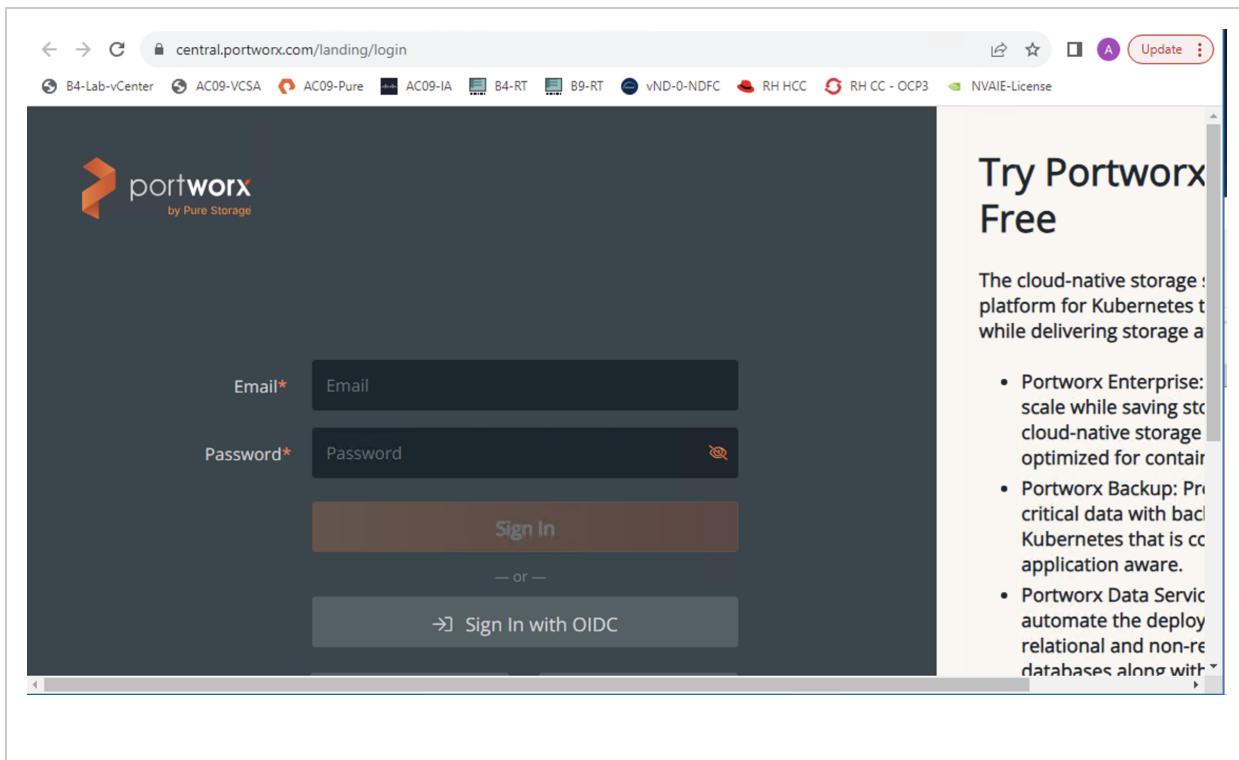
5. Click **Create**. After a few minutes you should see an output similar to this.

The screenshot shows the Red Hat OpenShift OperatorHub interface. At the top, there is a navigation bar with icons for various operators like B4-Lab-vCenter, AC09-VCSA, AC09-Pure, AC09-IA, B4-RT, B9-RT, vND-0-NDFC, RH HCC, RH CC - OCP3, and NVAIE-License. Below the navigation bar, the Red Hat OpenShift logo is visible. The user is logged in as 'kube:admin'. A blue banner at the top states: 'You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.' The main content area displays the 'Portworx Enterprise' operator card, which is version 23.7.0 provided by Portworx. A green checkmark icon indicates it is installed. Below the card, a message says: 'Installed operator: custom resource required. The Operator has installed successfully. Create the required custom resource to be able to use this Operator.' A 'StorageCluster' custom resource is listed as required, described as a 'Cloud native storage solution for production workloads'. There are two buttons at the bottom: 'Create StorageCluster' and 'View installed Operators in Namespace portworx'.

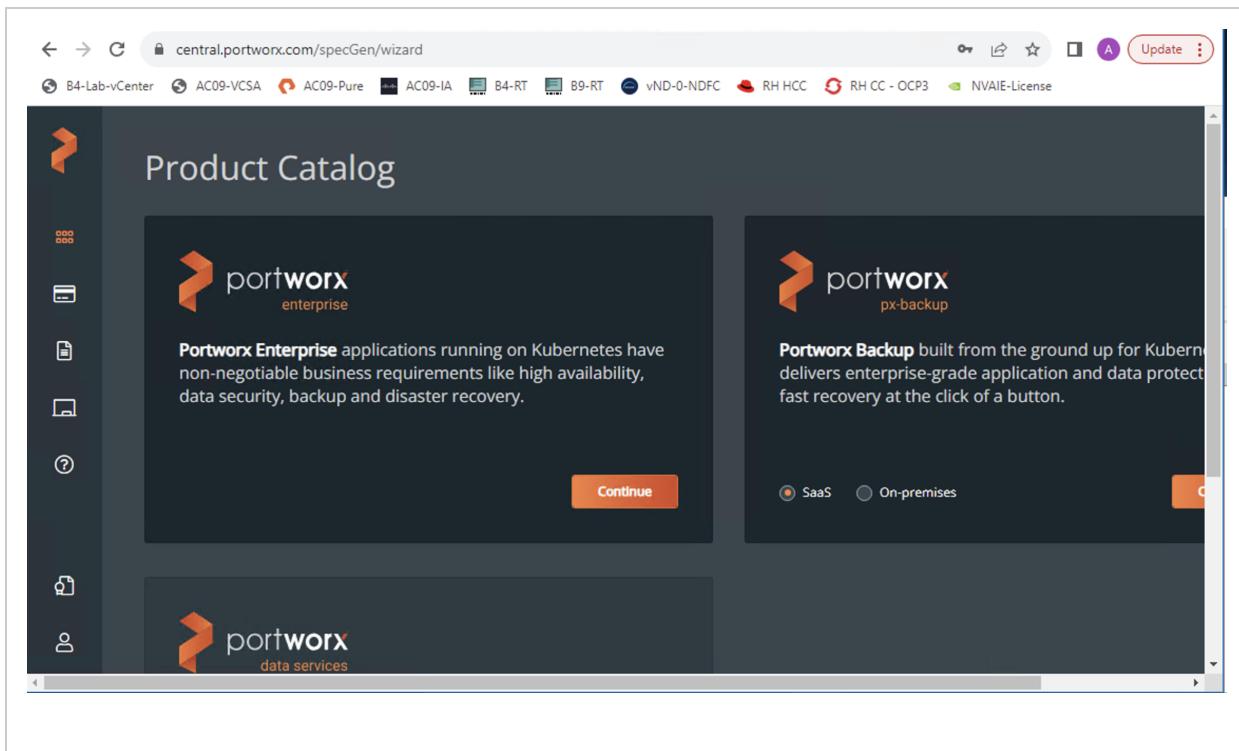
Generate StorageCluster spec from Portworx Central

To install Portworx with OpenShift, you must generate a StorageCluster spec that you will deploy in your cluster.

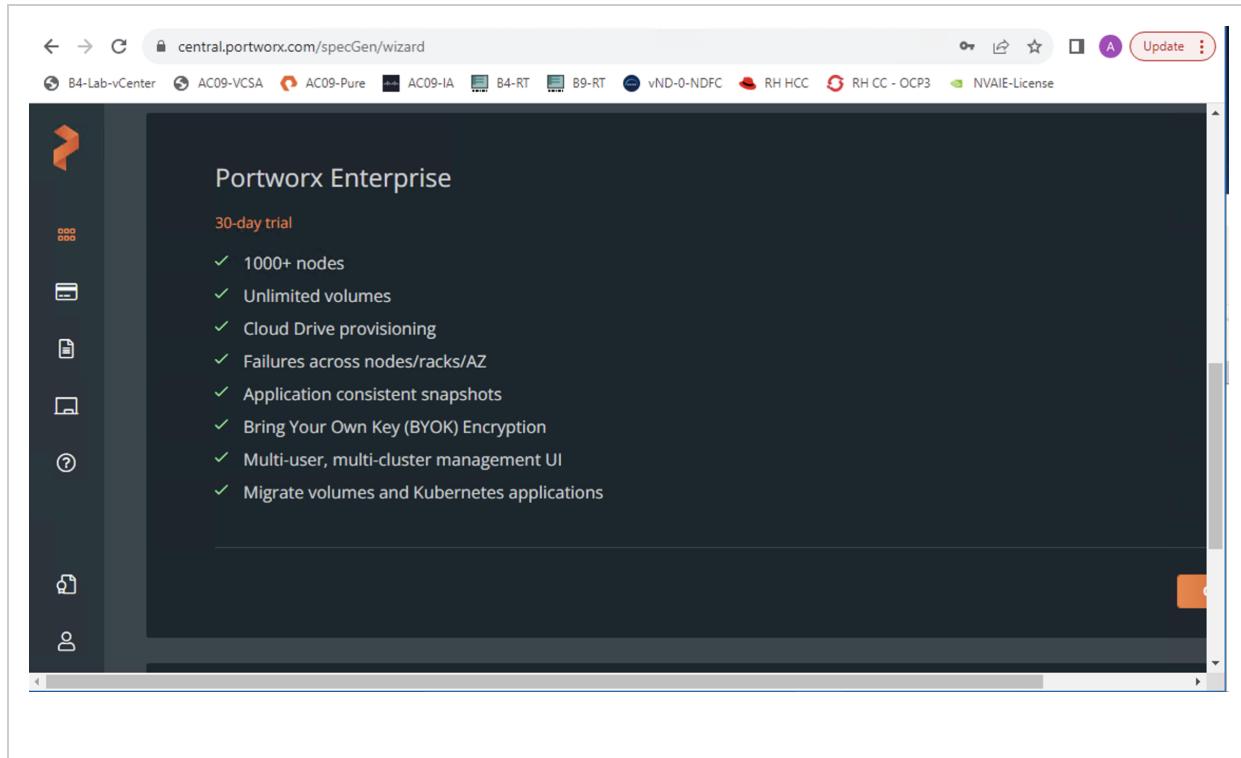
1. Navigate to cloud-based [Portworx Central](#) and log in, or create an account.



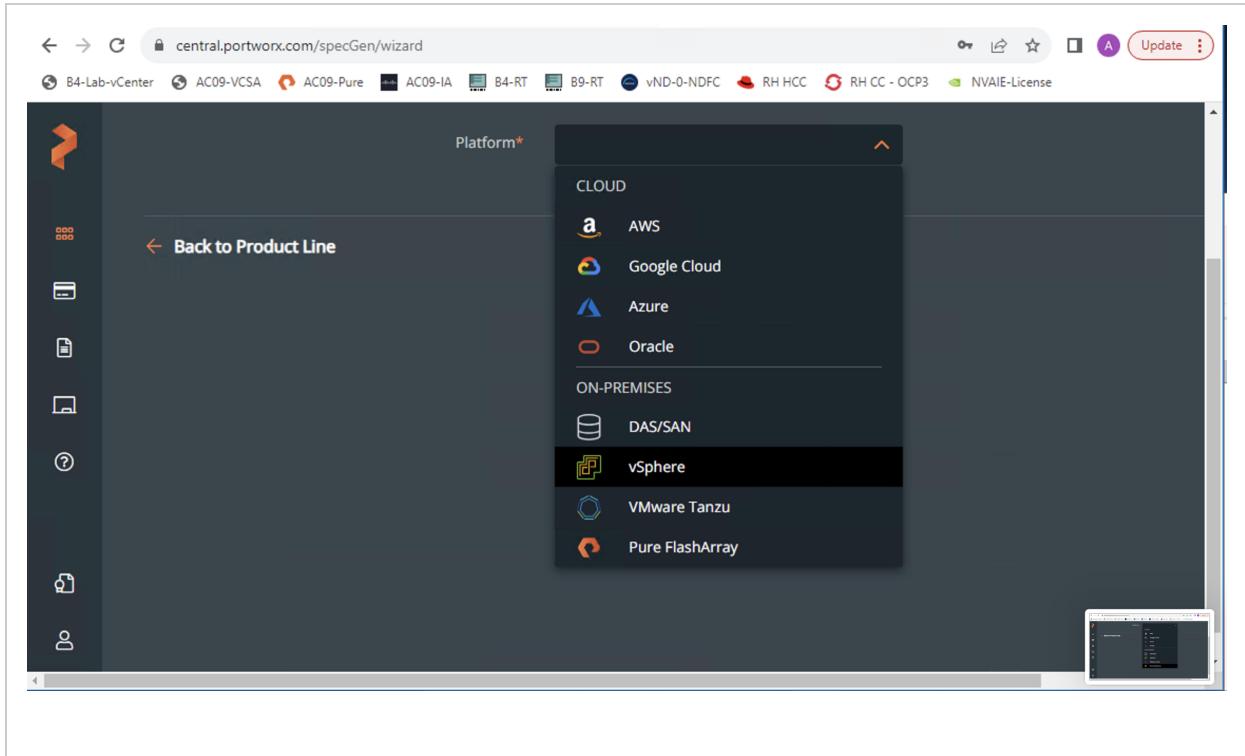
2. Select Portworx Enterprise from the Product Catalog page.



3. On the **Product Line** page, choose the specific license you intend to use, then click **Continue** to start the spec generator.



4. From the **Platform** drop-down, select **vSphere**.



5. In the Generate Spec window, select the **Portworx Version**. In the **vCenter endpoint** field, specify your **hostname** or the **IP address** of VMware vCenter. In the **vCenter datastore** prefix field, specify the **datastore name(s)** or **datastore cluster name(s)** for Portworx to use .

Note: To specify multiple datastore or datastore cluster names, you can specify a generic prefix common to the datastores. In the example below, datastore prefix of FSV-Infra enables access to FSV-Infra-Datastore-1, FSV-Infra-Datastore-2 etc.

The screenshot shows the central.portworx.com/specGen/wizard interface. The top navigation bar includes links for B4-Lab-vCenter, AC09-VCSA, AC09-Pure, AC09-IA, B4-RT, B9-RT, vND-0-NDFC, RH HCC, RH CC - OCP3, and NVAIE-License. On the right, there are icons for a profile, update, and more.

Step 1: Select Your Platform

- Portworx Version*: 3.0
- Platform*: vSphere
- vCenter Endpoint*: ac09-vcsa.fsv.local
- vCenter Datastore Prefix*: FSV-Infra

Portworx dynamically provisions and manages storage using vSphere's API. To modify this, click the "Customize" button in Step 3.

Step 2: Select Kubernetes Distribution

- Distribution Name*: OpenShift 4+

A sidebar on the left contains icons for a question mark, a gear, a file, a user, and a refresh symbol.

6. You can leave everything else as defaults.

central.portworx.com/specGen/wizard

B4-Lab-vCenter AC09-VCSA AC09-Pure AC09-IA B4-RT B9-RT vND-0-NDFC RH HCC RH CC - OCP3 NVAE-License

vCenter Datastore Prefix* **FSV-Infra-Datastore1**

Step 2: Select Kubernetes Distribution

Distribution Name* **OpenShift 4+**

Namespace* **portworx**

Step 3: Summary

K8s Version	1.25.0
Cluster Name Prefix	px-cluster
License Type	Enterprise
Platform	vSphere

Storage Size **150GB**

Volume Type **Lazy Zero Thick Provision Disks**

Disk Provision **Dynamic**

K8s Distribution **OpenShift 4+**

Portworx Operator **Enabled**

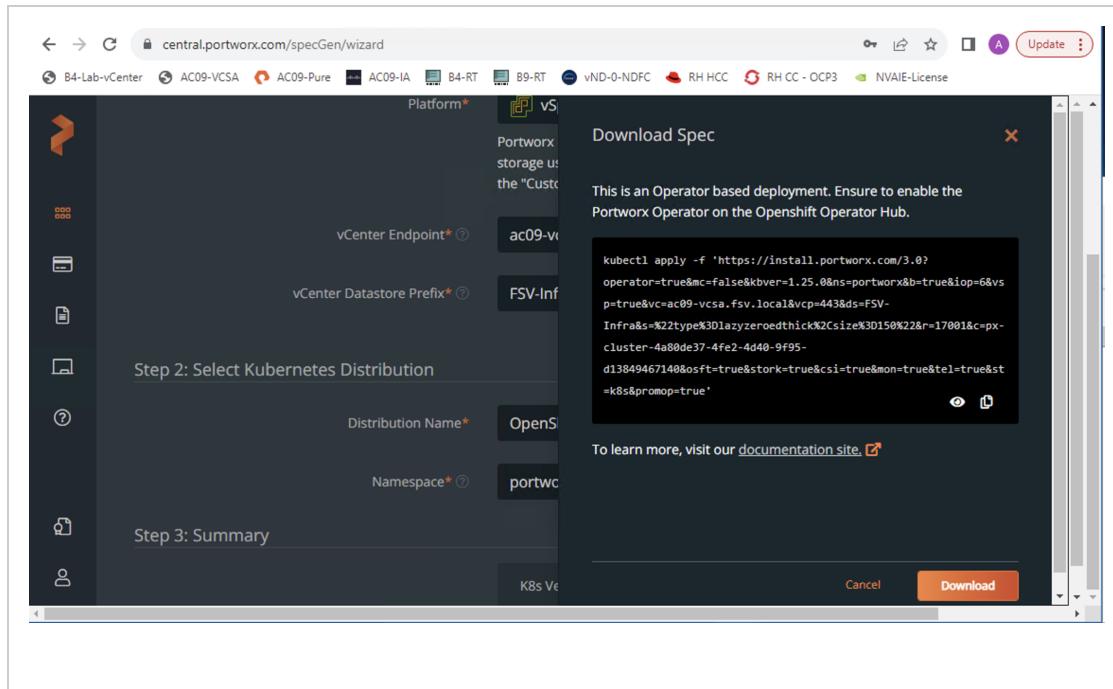
Portworx Version **3.0**

Namespace **portworx**

etcd **Internal**

vCenter Endpoint **ac09.vcsa.fsv.local**

7. Click **Save Spec** to generate the specs
8. Click on **Download.yaml** from the bottom right corner to download the spec to the OCP Installer workstation. Copy the **kubectl** command in the **Download spec** window to apply the spec from the CLI.



Create **Secret** object to enable secure access to VMware vCenter

1. Create a configuration file using your vCenter credentials as outlined below.

```
[administrator@FSV-AI-OCP-Installer INSTALL]$ vi px-vsphere-secret
```

```
apiVersion: v1
kind: Secret
metadata:
  name: px-vsphere-secret
  namespace: portworx
  type: Opaque
data:
  VSPHERE_USER: <your-vcenter-server-user>
  VSPHERE_PASSWORD: <your-vcenter-server-password>
```

```
apiVersion: v1
kind: Secret
metadata:
  name: px-vsphere-secret
  namespace: portworx
  type: Opaque
data:
  VSPHERE_USER: YWRtaW5pc3RyYXRvckB2c3BoZXJ1LmxvY2FsCg==
  VSPHERE_PASSWORD: SDFnaFYwbHQhCg==
```

2. From the OCP installer, you can verify that credentials are **available**.

```
echo '<vcenter-server-user>' | base64
echo '<vcenter-server-password>' | base64
```

```
[administrator@FSV-AI-OCP-Installer AIML]$ echo '<vcenter-server-user>' | base64
PHZjZW50ZXItc2VydmVyLXVzZXI+Cg==
[administrator@FSV-AI-OCP-Installer AIML]$ echo '<vcenter-server-password>' | base64
PHZjZW50ZXItc2VydmVyLBhc3N3b3JkPgo=
[administrator@FSV-AI-OCP-Installer AIML]$
```

3. Apply the configuration file to create the **Secret** for VMware vCenter

```
oc apply -f <your-spec-name>
```

```
[administrator@FSV-AI-OCP-Installer INSTALL]$ oc apply -f px-vsphere-secret
secret/px-vsphere-secret created
```

4. Alternatively, you can configure and deploy from OpenShift console as shown below.

Not secure | https://console-openshift-console.apps.ocp3.fsv.local/dashboards

B4-Lab-vCenter AC09-VCSA AC09-Pure AC09-IA B4-RT B9-RT vND-0-NDFC RH HCC RH CC - OCP3 NVAIE-License

Red Hat OpenShift

kube:admin

You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Administrator

- Home
- Operators
- Workloads
 - Pods
 - Deployments
 - DeploymentConfigs
 - StatefulSets
 - Secrets
 - ConfigMaps

Build with guided documentation

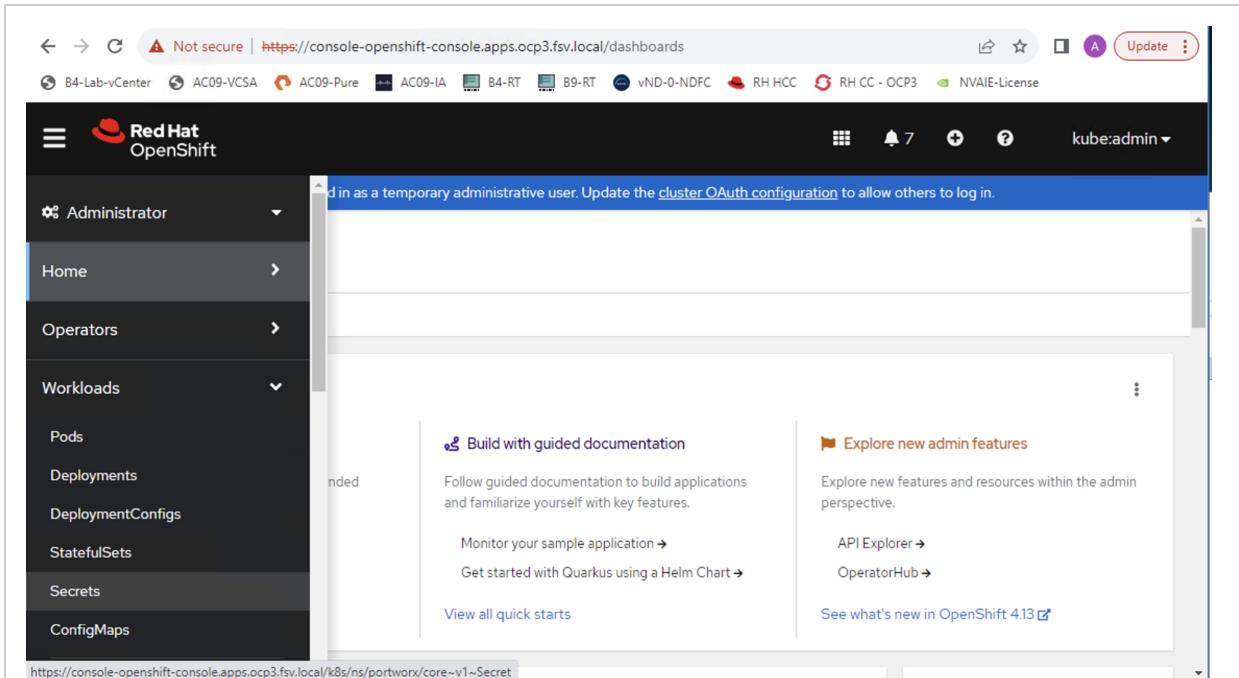
Follow guided documentation to build applications and familiarize yourself with key features.

Monitor your sample application →
Get started with Quarkus using a Helm Chart →
View all quick starts

Explore new admin features

Explore new features and resources within the admin perspective.

API Explorer →
OperatorHub →
See what's new in OpenShift 4.13 ↗



Not secure | https://console-openshift-console.apps.ocp3.fsv.local/k8s/ns/portworx/core~v1~Secret

B4-Lab-vCenter AC09-VCSA AC09-Pure AC09-IA B4-RT B9-RT vND-0-NDFC RH HCC RH CC - OCP3 NVAIE-License

Red Hat OpenShift

kube:admin

You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Project: portworx

Owner

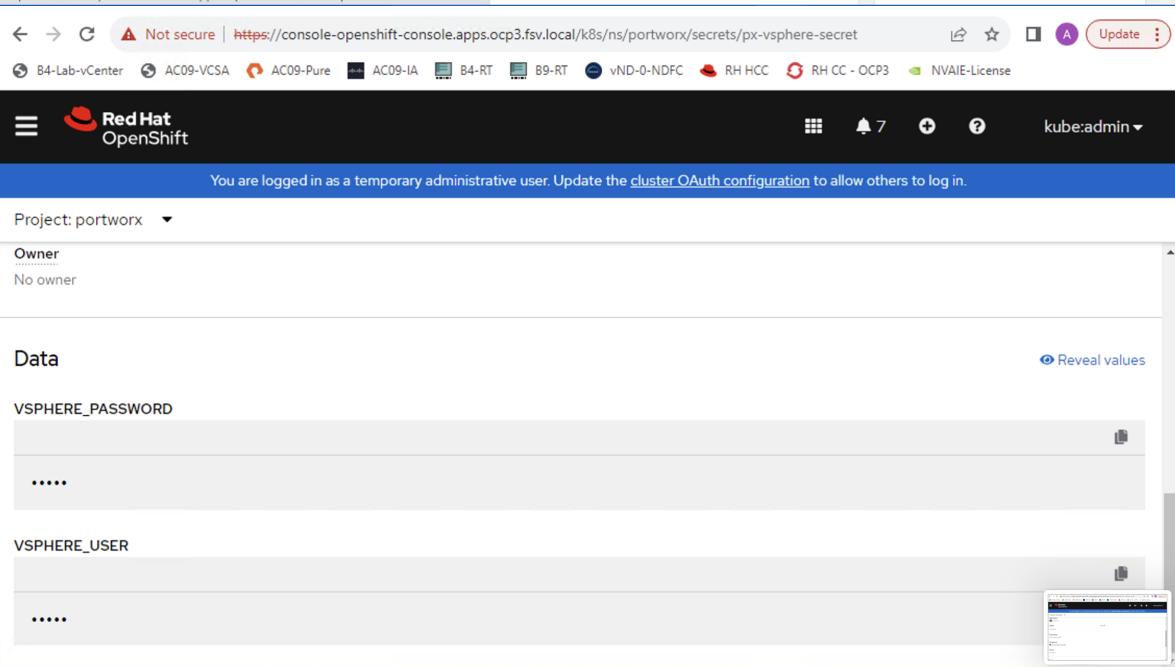
No owner

Data

VSPPHERE_PASSWORD

VSPPHERE_USER

Reveal values



Deploy Storage Class

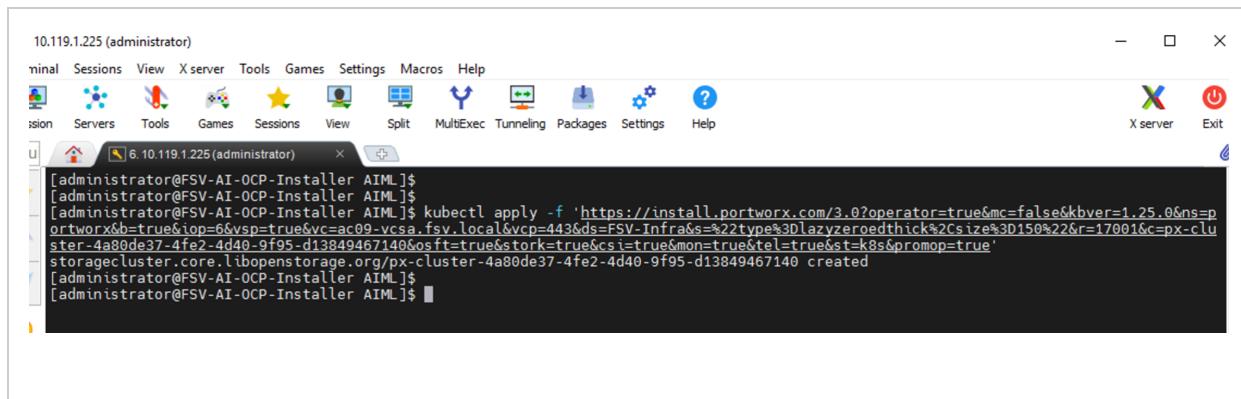
Storage Class is a custom resource that defines the Portworx cluster. Deploy the storage spec downloaded from Portworx Central to define the Portworx storage cluster.

Prerequisites:

- Disable Storage DRS
 - PX does not support the movement of VMDK files from the datastores on which they were created.
 - For **Runtime Settings**, clear the Enable I/O metric for SDRS recommendations option.
 - For **Advanced options**, clear the Keep VMDKs together by default options.
- Grant permissions to VMware vCenter by using the **secret** object created earlier for vCenter credentials
- Ensure ports 17001-17020 on worker nodes are reachable from the control plane node and other worker nodes.

Deployment Steps:

1. To deploy the spec from the OCP installer workstation, use the **kubectl** command saved from the **Download spec** window earlier to apply the spec to OCP cluster and portworx operator.



The screenshot shows a terminal window titled '10.119.1.225 (administrator)' running on a Linux desktop environment. The terminal command is:

```
[Administrator@FSV-AI-OCP-Installer AIML]$ kubectl apply -f 'https://install.portworx.com/3.0?operator=true&mc=false&kbver=1.25.0&ns=portworx&b=true&iop=6&vsp=true&vc=ac09-vcsa.fsv.local&vcp=443&ds=FSV-Infra&s=%22type%3Dlazzyzeroedthick%2Csize%3D150%22&r=17001&c=px-cluster-4a80de37-4fe2-4d40-9f95-d13849467140&osft=true&stork=true&csi=true&mon=true&tel=true&st=k8s&promop=true' storagecluster.core.libopenstorage.org/px-cluster-4a80de37-4fe2-4d40-9f95-d13849467140 created
```

2. Alternatively, you can also use the web UI to apply the spec. --> is this correct
Vijay???? Is deploying the storage class same as deploying storage spec as in the step above?

- Use a browser to navigate and login to Red Hat OpenShift's cluster console.

- From the left navigation menu, navigate to **Operators > Installed Operators** and select **Portworx Enterprise**.
- Click on **StorageCluster > Create Instance**. Paste the spec in.
- Verify that the StorageCluster goes to a **Running Status**.

The screenshot shows the Red Hat OpenShift web console interface. The top navigation bar includes links for various operators like AC09-VCSA, AC09-Pure, AC09-IA, B4-RT, B9-RT, vND-0-NDFC, RH HCC, RH CC - OCP3, and NVAIE-License. The user is logged in as 'kube:admin'. The main header says 'Red Hat OpenShift' and 'You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.' Below this, the 'Project: portworx' is selected. Under 'Installed Operators > Operator details Portworx Enterprise 23.7.0 provided by Portworx', there are tabs for Details, YAML, Subscription, Events, All instances, Storage Cluster (which is selected), and Storage Node. The 'StorageClusters' section lists one item: 'px-cluster-4a80de37-4fe2-4d40-9f95-d13849467140' (Kind: StorageCluster, Status: Phase: Running). A 'Create StorageCluster' button is visible on the right.

Verify Portworx Cluster status

- Once you have created the StorageCluster, you will see an update about a Web Console update.

The screenshot shows the Red Hat OpenShift web console interface. At the top, there's a navigation bar with various project icons and a dropdown for 'kube:admin'. Below the header, a banner indicates the user is logged in as a temporary administrative account. The main content area displays a 'Secrets' list, with one item selected: 'px-vsphere-secret' from the 'portworx' namespace. This secret is categorized as 'Opaque'. A modal window is overlaid on the page, alerting the user to a 'Web console update is available' and prompting them to refresh the browser. The bottom of the screen shows a 'Labels' section with no entries.

2. You can now see **Portworx** in the left navigation menu of OpenShift console.

The screenshot shows a web browser window for the Red Hat OpenShift Portworx dashboard. The URL is <https://console-openshift-console.apps.ocp3.fsv.local/portworx>. The page title is "Red Hat OpenShift". The left navigation menu includes "Storage", "Builds", "Observe", "Compute", "User Management", "Administration", "Portworx" (selected), and "Cluster". The "Cluster" sub-tab is selected. The main content area displays cluster details: UUID (9f95-d1384...), Operator Version (23.7.0), Monitoring Status (Enabled), and Stork Version (23.8.0). A blue banner at the top states: "You are currently logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in." To the right, there is an "Activity" log with several entries from 10:39AM, all showing "Readiness probe" errors. The log ends with "Last Updated: 10:40AM".

- Click the **Portworx** sub-tab in the left navigation menu to view the **Portworx** dashboard.
- Click the **Cluster** sub-tab in the left navigation menu to view the **Portworx** dashboard.

The screenshot shows a web browser window for the Red Hat OpenShift Portworx console at <https://console-openshift-console.apps.ocp3.fsv.local/portworx>. The user is logged in as 'kube:admin'. The interface displays 'Cluster Details' for the 'px-cluster-4a80de37-4fe2-4d40-9f95-d1384...' cluster, including Name (px-cluster-4a80de37-4fe2-4d40-9f95-d1384...), Version (3.0.3), Status (Initializing), Telemetry Status (Enabled), UUID (-), Operator Version (23.7.0), Monitoring Status (Enabled), and Stork Version (23.8.0). To the right, an 'Activity' log shows multiple entries from 10:39AM, all indicating 'Readiness probe ...' with a warning icon. A tooltip at the bottom right of the log area says 'Last Updated: 10:40AM'.

4. If Portworx has been installed correctly, the status will eventually change to **Running**. You can also see the information about the status of **Telemetry**, **Monitoring**, and **version** of Portworx and its components installed on your cluster.

The screenshot shows the Red Hat OpenShift Portworx interface. At the top, there's a navigation bar with various icons and a dropdown for 'kube:admin'. Below it is a banner stating, 'You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.' The main content area has a title 'Drives' and displays a table of storage nodes:

Name	Node	Capacity
/dev/sdb	ocp3-qg7j6-worker-0-fk429	8GiB / 150GiB
/dev/sdb	ocp3-qg7j6-worker-0-j7ps2	8GiB / 150GiB
/dev/sdb	ocp3-qg7j6-worker-0-fz8rw	8GiB / 150GiB

At the bottom right of the interface, it says 'Last Updated: 10:52AM'.

5. Navigate to the **Node Summary** section. If your cluster is running as intended, the status of all Portworx nodes should be online with a status of **ok**.

You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Name	IP	Status	PX Version	Used / Total Capacity
ocp3-qg7j6-worker-0-fk429	10.119.3.13	status ok	3.0.3.0-1f99161	8GiB / 150GiB
ocp3-qg7j6-worker-0-j7ps2	10.119.3.15	status ok	3.0.3.0-1f99161	8GiB / 150GiB
ocp3-qg7j6-worker-0-fz8rw	10.119.3.14	status ok	3.0.3.0-1f99161	8GiB / 150GiB

1 - 3 of 3 << < 1 of 1 > >> Last Updated: 10:52AM

Verify if all pods are running

To check the status of all pods in the **portworx** namespace,

1. From the left navigation pane of the OpenShift console, click on **Workloads > Pods**.
2. Select **portworx** from the **Project** drop-down list. If Portworx is installed correctly, then all pods should have a status of **Running**.

You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Name	IP	Status	PX Version	Used / Total Capacity
ocp3-qg7j6-worker-0-fk429	10.119.3.13	status ok	3.0.3.0-1f99161	8GiB / 150GiB
ocp3-qg7j6-worker-0-j7ps2	10.119.3.15	status ok	3.0.3.0-1f99161	8GiB / 150GiB
ocp3-qg7j6-worker-0-fz8rw	10.119.3.14	status ok	3.0.3.0-1f99161	8GiB / 150GiB

1 - 3 of 3 << < 1 of 1 > >>

Last Updated: 10:52AM

Create a Persistent Volume Claim

To create a Persistent Volume Claim (PVC), complete the following steps:

1. Create a configuration YAML file as shown below

```
[administrator@FSV-AI-OCP-Installer AIML]$ more OCP3/px-pvc1.yaml
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
  name: px-check-pvc
spec:
  storageClassName: px-csi-db
  accessModes:
  - ReadWriteOnce
  resources:
  requests:
    storage: 2Gi
[administrator@FSV-AI-OCP-Installer AIML]$
```

2. Apply the file to create the PVC.

```
[administrator@FSV-AI-OCP-Installer AIML]$ 
[administrator@FSV-AI-OCP-Installer AIML]$ oc apply -f OCP3/px-pvc1.yaml
persistentvolumeclaim/px-check-pvc created
[administrator@FSV-AI-OCP-Installer AIML]$
```

- From the left navigation pane of the OpenShift console, select **Portworx > Cluster**. Scroll down to the **Volumes** section under **Cluster details** to view the status of your newly created PVC.

Name	Namespace	PVC	Status	Attached Node	Replica	Capaci...
pvc-aa6f2f93-80a7-4091-8b00-e69c2b8bf2b3	portworx	px-check-pvc	UP	-	3	2GiB

- A **PVC status** of **Up** indicates that the PVC is successfully bound to a Persistent Volume and is available for use.

Make Portworx the default storage class

To make a storage class default, execute the following command from the OCP installer workstation:

```
oc patch storageclass standard -p '{"metadata": {"annotations": {"storageclass.kubernetes.io/is-default-class": "true"}}}'
```

```
[administrator@FSV-AI-OCP-Installer AIML]$ oc patch storageclass px-csi-db -p
'{"metadata": {"annotations": {"storageclass.kubernetes.io/is-default-class": "true"}}}'
storageclass.storage.k8s.io/px-csi-db patched
[administrator@FSV-AI-OCP-Installer AIML]$
[administrator@FSV-AI-OCP-Installer AIML]$
[administrator@FSV-AI-OCP-Installer AIML]$ oc get storageclass | grep default
px-csi-db (default) pxd.portworx.com Delete Immediate true 3h10m
thin-csi (default) csi.vsphere.vmware.com Delete WaitForFirstConsumer true 2d12h
[administrator@FSV-AI-OCP-Installer AIML]$
[administrator@FSV-AI-OCP-Installer AIML]$
[administrator@FSV-AI-OCP-Installer AIML]$ oc patch storageclass thin-csi -p
'{"metadata": {"annotations": {"storageclass.kubernetes.io/is-default-class": "false"}}}'
storageclass.storage.k8s.io/thin-csi patched
[administrator@FSV-AI-OCP-Installer AIML]$
[administrator@FSV-AI-OCP-Installer AIML]$
[administrator@FSV-AI-OCP-Installer AIML]$ oc get storageclass | grep default px-
csi-db (default) pxd.portworx.com Delete Immediate true 3h12m
[administrator@FSV-AI-OCP-Installer AIML]$
```