SUSE Virtualization, Portworx by Everpure, Everpure FlashArray

Modern Virtualization with SUSE and Everpure

Integrating Portworx Enterprise and Everpure FlashArray Storage with SUSE Virtualization

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Date: 2026-03-31

Summary

In this getting started guide, learn how to integrate SUSE® Virtualization with Portworx Enterprise® by Everpure™ and an Everpure™ FlashArray™ to provide a flexible, enterprise platform that enables running both containers and virtual machines with unparalleled high availability, data protection, hybrid-cloud mobility, and multi-cluster support.

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1 Introduction

Organizations are modernizing their IT infrastructure to gain the benefits of cloud-native technologies, like containers and Kubernetes. Often, however, they still need to support legacy workloads in traditional, virtual machine infrastructure. This can lead to duplicate hardware infrastructure and siloed operations. What organizations need is an enterprise platform that unifies traditional and cloud-native infrastructure.

SUSE® Virtualization, built on a modern, Kubernetes stack, solves this challenge by enabling organizations to run both virtual machines and containerized applications on the same infrastructure platform. When combined with Portworx Enterprise® by Everpure™, enterprises can unlock advanced storage capabilities, ensuring seamless data management across diverse environments, enabling high availability and data protection, and supporting hybrid-cloud mobility and multi-cluster environments.

In this document, administrators and platform engineers learn how to deploy, configure, and validate a SUSE Virtualization environment with Portworx Enterprise and Everpure FlashArray storage, enabling them to deliver resilient, scalable, and efficient storage services for mission-critical workloads.

This integrated solution addresses a wide range of scenarios, including:

- Application Modernization: Seamlessly migrating or running legacy VM workloads and stateful cloud-native applications on the same infrastructure.
- Hybrid and Multi-Cloud Deployments: Enabling workload and data mobility across on-premises, public cloud, and edge locations.
- Business Continuity and Disaster Recovery: Providing cross-site failover and failback for both VMs and containers.
- Dev/Test and Self-Service Environments: Allowing developers to quickly provision persistent, production-grade storage for any workload type.
- Data-Intensive Workloads: Supporting databases, analytics, and AI/ML apps that require high availability and consistent performance.

1.1 Scope

This document provides instructions for installing Portworx Enterprise on a SUSE Virtualization cluster with an Everpure FlashArray. It details the necessary steps for configuring multipathing, deploying the Portworx Operator, defining the Portworx StorageCluster, and updating SUSE Virtualization to use this storage for backing VMs and containers.

1.2 Audience

This guide is intended for system administrators, platform engineers, DevOps engineers, and IT professionals responsible for designing, deploying, managing, and maintaining a modern infrastructure environment for container and virtual machine workloads. A basic understanding of Kubernetes and storage concepts is assumed.

2 Overview

By deploying SUSE Virtualization with Portworx Enterprise by Everpure, you gain robust Kubernetes data storage and data management capabilities. These include automated data operations, elastic scalability, and flexible deployment options across hybrid, multi-cloud, and on-premises environments. With the integrated Portworx Container Storage Interface (CSI), you can leverage Everpure FlashArray storage to deliver unified, high-performance block storage to back your mission-critical VMs and containers in SUSE Virtualization. This is illustrated in the diagram below.

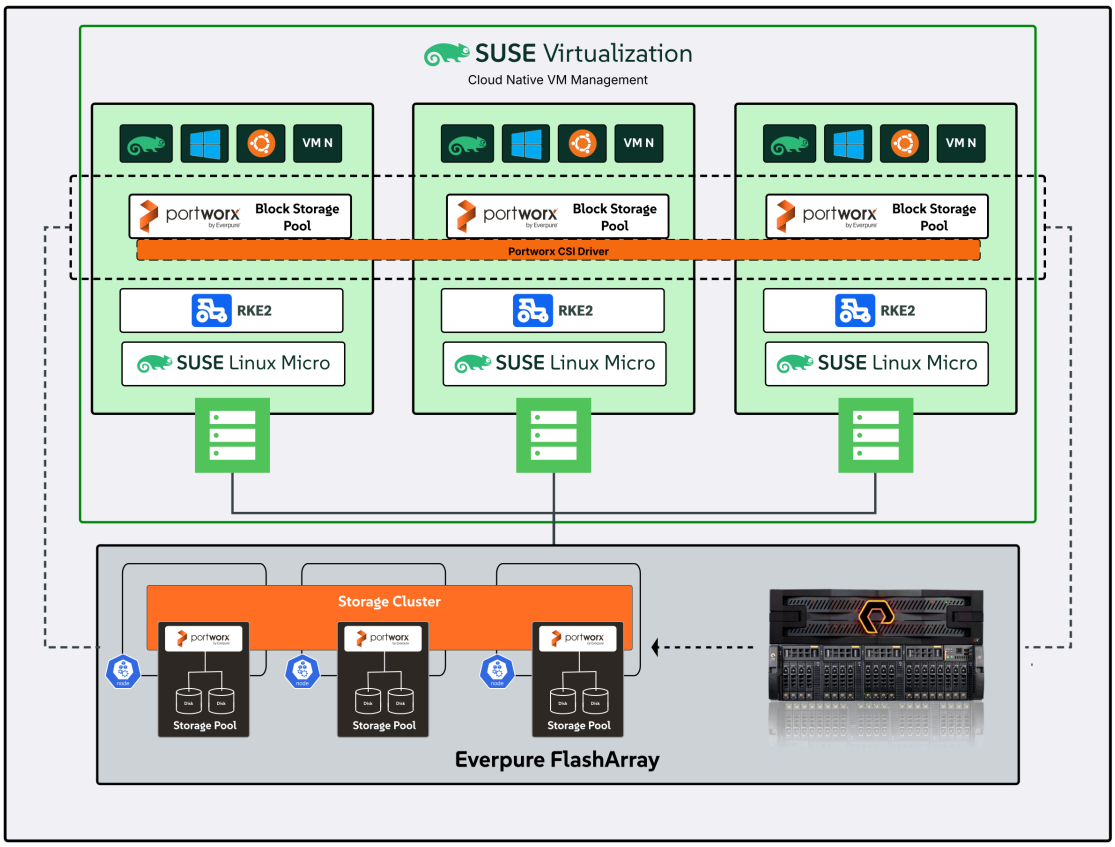

FIGURE 1: ARCHITECTURE DIAGRAM: SUSE VIRTUALIZATION WITH PORTWORX AND EVERPURE FLASHARRAY

Key components of this architecture are:

SUSE Virtualization

SUSE Virtualization (https://www.suse.com/products/rancher/virtualization/) (formerly Harvester) is a modern, open, and interoperable hyperconverged infrastructure (HCI) solution built on Kubernetes. SUSE Virtualization leverages other components (such as SUSE Linux Micro (https://www.suse.com/products/micro/) and RKE2 (https://documentation.suse.com/cloudnative/rke2/)) to deliver a secure, resilient, and scalable platform for managing virtual machine and container workloads. Access the SUSE Virtualization documentation (https://documentation.suse.com/cloudnative/virtualization/v1.6/en/introduction/overview.html) for detailed technical information, including Hardware and Network Requirements (https://documentation.suse.com/cloudnative/virtualization/v1.6/en/installation-setup/requirements.html) and installation guidance. This guide references SUSE Virtualization v1.6.0 and later.

Portworx Enterprise by Everpure

Portworx Enterprise (https://portworx.com/products/portworx-enterprise/) delivers elastic scalability, industry-leading availability, and self-service access to any storage infrastructure for the most widely used Kubernetes distribution. This fully-integrated storage solution offers automated capacity management, thin provisioning, and flexibility across hybrid, multi-cloud, and on-premises deployments. Portworx Enterprise installation, configuration, and updates are handled through the Portworx Operator. This guide references Portworx Enterprise (https://docs.portworx.com/portworx-enterprise) 3.5 or later and Portworx Operator 25.5.0 or later.

Everpure FlashArray

An Everpure FlashArray (https://www.purestorage.com/products/unified-block-file-storage.html) delivers high-performance, scalable, all-flash storage. Your FlashArray must be configured to meet the Portworx Enterprise environment prerequisites (https://docs.portworx.com/portworx-enterprise/platform/kubernetes/flasharray/before-you-begin#environment-prerequisites) and must be accessible from the SUSE Virtualization cluster nodes.

In the following pages, you will learn how to configure your SUSE Virtualization environment with Portworx Enterprise to leverage Everpure FlashArray for virtual machine storage. This includes:

- Preparing the SUSE Virtualization cluster nodes and the Everpure FlashArray
- Deploying the Portworx Operator to install and configure Portworx Enterprise
- Defining the Portworx StorageClass
- Creating a virtual machine with FlashArray-backed persistent storage

3 Preparing the environment

Before starting the installation, perform the following preparatory steps:

1. Enable multipath support on the SUSE Virtualization cluster nodes.

a. Create a Harvester CloudInit resource file to deploy the required node-level configuration with the following contents:

```
apiVersion: node.harvesterhci.io/v1beta1
kind: CloudInit
metadata:
  name: pure-multipath
spec:
  contents: |
    stages:
      network:
      - name: "Configure pure storage"
        files:
        - path: /etc/udev/rules.d/99-pure-storage.rules
          permissions: 0644
          content: |
            #ACTION=="change", SUBSYSTEM=="scsi",
 ENV{SDEV_UA}=="INQUIRY_DATA_HAS_CHANGED", TEST=="rescan", ATTR{rescan}="x"
            ACTION=="change", SUBSYSTEM=="scsi",
 ENV{SDEV_UA}=="CAPACITY_DATA_HAS_CHANGED", TEST=="rescan", ATTR{rescan}="x"
            #ACTION=="change", SUBSYSTEM=="scsi",
 ENV{SDEV_UA}=="THIN_PROVISIONING_SOFT_THRESHOLD_REACHED", TEST=="rescan",
 ATTR{rescan}="x"
            #ACTION=="change", SUBSYSTEM=="scsi",
 ENV{SDEV_UA}=="MODE_PARAMETERS_CHANGED", TEST=="rescan", ATTR{rescan}="x"
            ACTION=="change", SUBSYSTEM=="scsi",
 ENV{SDEV_UA}=="REPORTED_LUNS_DATA_HAS_CHANGED", RUN+="scan-scsi-target
 $env{DEVPATH}"
        - path: /etc/multipath.conf
          content: |
            defaults {
              user_friendly_names no
              enable_foreign "^$"
                    polling_interval    10
            }
            devices {
                device {
                    vendor                      "NVME"
                    product                     "Pure Storage FlashArray"
                    path_selector               "queue-length 0"
                    path_grouping_policy        group_by_prio
                    prio                        ana
                    failback                    immediate
                    fast_io_fail_tmo            10
                    user_friendly_names         no
                    no_path_retry               0
                    features                    0
```

```
                    dev_loss_tmo                60
                }
                device {
                    vendor                    "PURE"
                    product                   "FlashArray"
                    path_selector             "service-time 0"
                    hardware_handler          "1 alua"
                    path_grouping_policy      group_by_prio
                    prio                      alua
                    failback                  immediate
                    path_checker              tur
                    fast_io_fail_tmo          10
                    user_friendly_names       no
                    no_path_retry             0
                    features                  0
                    dev_loss_tmo              600
                }
            }
            blacklist_exceptions {
                    property "(SCSI_IDENT_|ID_WWN)"
            }
            blacklist {
                  devnode "^pxd[0-9]*"
                  devnode "^pxd*"
                  device {
                    vendor "VMware"
                    product "Virtual disk"
                  }
            }
          permissions: 0644
      - name: "Start multipathd service"
        systemctl:
          enable:
          - multipathd
          start:
          - multipathd
  filename: 99_multipathd.yaml
  matchSelector: {}
```

b. Apply the CloudInit resource to the SUSE Virtualization cluster.

```
kubectl apply -f pure-multipath.yaml
```

c. Restart the SUSE Virtualization cluster nodes.

1. Configure user access (https://docs.portworx.com/portworx-enterprise/platform/kubernetes/flasharray/install/install-flasharray/install-flasharray-cd-da#set-up-user-access-in-flasharray) in the Everpure FlashArray.

2. Create a Kubernetes secret (https://docs.portworx.com/portworx-enterprise/platform/kubernetes/flasharray/install/install-flasharray/fa-multi-tenancy#create-a-kubernetes-secret), named `px-pure-secret`, to securely store your FlashArray credentials.

d. Create a file, named `pure.json`, containing your FlashArray credentials.

e. Add the secret to your `portworx` namespace.

```
kubectl create secret generic px-pure-secret --namespace portworx --from-
file=pure.json
```

4 Generating the Portworx spec

The Portworx Operator is designed to efficiently manage the installation and upgrade workflow of all Portworx Enterprise components, but it must be configured for your environment. This is accomplished by generating a Portworx spec.

1. Log in to Portworx Central (https://central.portworx.com/).

2. Select *Portworx Enterprise → Generate Spec*.

3. Choose the *Portworx Version* and `Pure FlashArray` for *Platform*, then click *Customize*.

4. On the *Basic* tab:

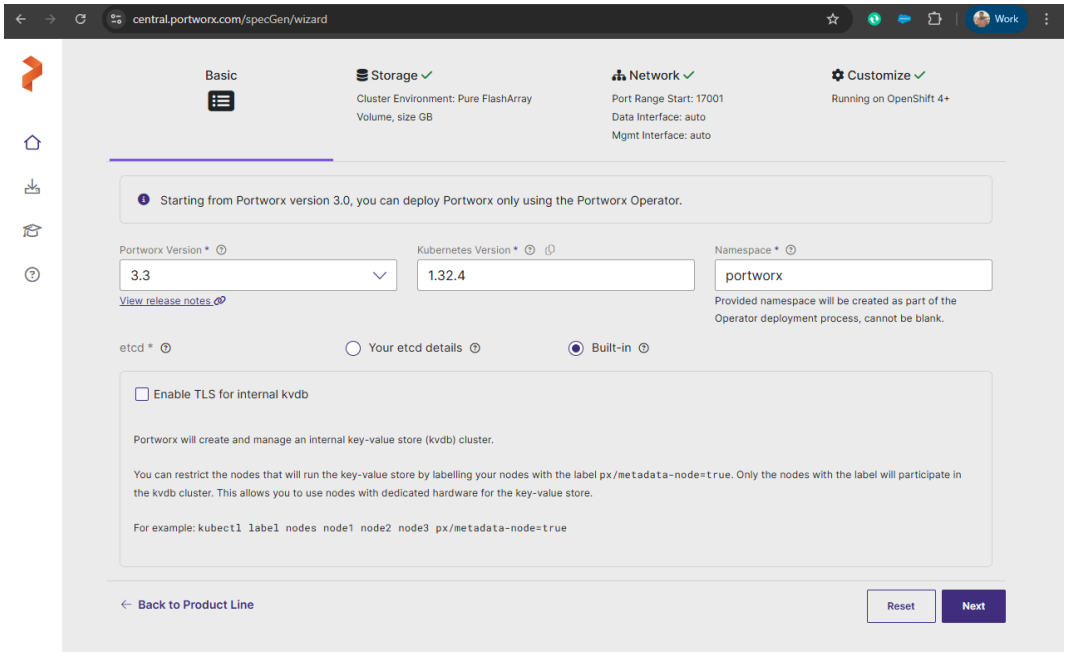

FIGURE 2: PORTWORX: GENERATE SPEC - BASIC

a. Validate or fill in values for each of the following fields:

   - *Portworx Version*
   - *Kubernetes Version*
   - *Namespace* (for example, `portworx`)

b. Select the `Built-in` option for *etcd*.

c. Click *Next*.

5. On the *Storage* tab, make the following choices:

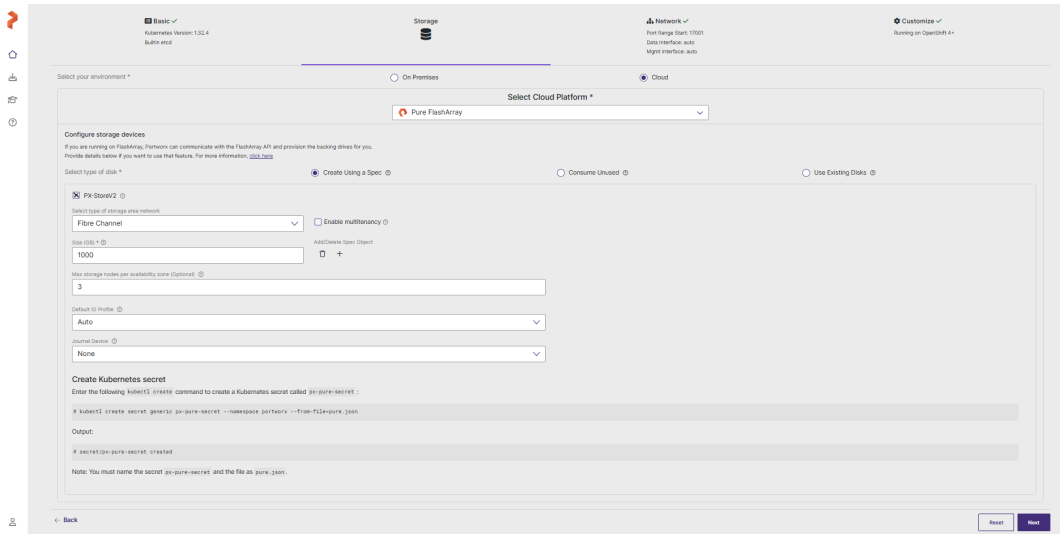

FIGURE 3: PORTWORX: GENERATE SPEC - STORAGE

a. Set *Select Cloud Platform* to `Pure FlashArray`.

b. Set *Select type of disk* to `Create Using a Spec`.

c. Enable *PX-StoreV2*.

d. Select `Fiber Channel` for *Type of storage area network*.

e. Enter the desired *Size* of the disk to be mapped to the SUSE Virtualization cluster.

f. Update the *Max storage nodes per availability zone* to `3` (for your 3-node cluster).

g. Click *Next*.

6. On the *Network* tab, configure the Portworx service port, then click *Next*.

Note

The default port is `9001`.

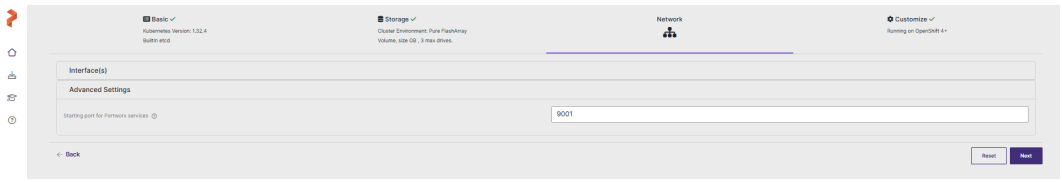

FIGURE 4: PORTWORX: GENERATE SPEC - NETWORK

7. On the *Customize* tab, select `Rancher Kubernetes Engine (RKE)` then click *Finish*.

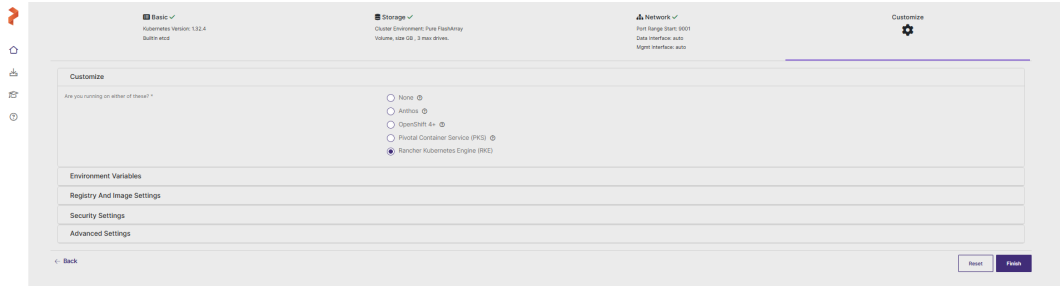

FIGURE 5: PORTWORX: GENERATE SPEC - CUSTOMIZE

8. The generator presents you with two Kubectl commands. The first is for deploying the Portworx Operator, and the second is for deploying the Portworx StorageCluster. Save these commands, as you will need them in the following section.

5 Deploying the Portworx Operator and Portworx StorageCluster

The Portworx Operator efficiently manages the installation and upgrade workflow of all Portworx Enterprise components. To deploy the Portworx Operator, you use the first of the Kubectl commands you generated in *Section 4, "Generating the Portworx spec"* as detailed below.

1. Log in to the SUSE Virtualization management node command line interface (CLI) with root access.

2. Run the first Kubectl command saved from the previous section to install the Portworx Operator.
   The command should be similar to:

```
kubectl apply -f 'https://install.portworx.com/3.3?
comp=pxoperator&kbver=1.3.0&ns=portworx'
```

You should see output like:

```
namespace/portworx created
serviceaccount/portworx-operator created
clusterrole.rbac.authorization.k8s.io/portworx-operator created
clusterrolebinding.rbac.authorization.k8s.io/portworx-operator created
deployment.apps/portworx-operator created
```

3. If you are using SUSE Virtualization v1.6.0 or later, add a Stork Snapshot StorageClass.

   a. Create the YAML file, `stork-snapshot-sc.yaml`, with the following contents:

   ```
   apiVersion: storage.k8s.io/v1
   kind: StorageClass
   metadata:
     name: stork-snapshot-sc
     annotations:
   cdi.harvesterhci.io/storageProfileVolumeModeAccessModes: '{"Block":
   ["ReadWriteOnce"]}'
   provisioner: stork-snapshot
   allowVolumeExpansion: true
   reclaimPolicy: Delete
   volumeBindingMode: Immediate
   ```

   b. Apply the YAML file to add the Stork Snapshot StorageClass.

   ```
   kubectl apply -f stork-snapshot-sc.yaml
   ```

   You should see this output:

   ```
   storageclass.storage.k8s.io/stork-snapshot-sc created
   ```

4. Execute the second of the Portworx spec Kubectl commands you generated in *Section 4, "Generating the Portworx spec"* to deploy the Portworx StorageCluster.
   The command should look something like:

   ```
   kubectl apply -f 'https://install.portworx.com/3.3?
   operator=true&mc=false&kbver=1.3.0&ns=portworx&b=true&iop=6&mz=3&s=%22size
   %3D1000%22&pureSanType=FC&ce=pure&dmthin=true&c=px-cluster-82af5d7d-f249-4f45-9e80-
   d1590e7bfce4&stork=true&csi=true&mon=true&tel=true&st=k8s&promop=true'
   ```

   If successful, the command generates output like:

   ```
   storagecluster.core.libopenstorage.org/px-cluster-82af5d7d-f249-4f45-9e80-
   d1590e7bfce4 created
   ```

6 Adding the Portworx StorageClass

1. Ensure you are still logged in to the SUSE Virtualization management CLI as root.
2. Create the YAML file, `portworx-storageclass.yaml`, with the following contents:

```
allowVolumeExpansion: true
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  annotations:
    storageclass.kubernetes.io/is-default-class: "true"
  name: data-disk-storage
parameters:
  cdi.kubevirt.io/storage.contentType: kubevirt
  nodiscard: "true"
  repl: "2"
provisioner: pxd.portworx.com
reclaimPolicy: Delete
volumeBindingMode: Immediate
```

3. Apply this YAML file to add the Portworx StorageClass.

```
kubectl apply -f portworx-storageclass.yaml
```

You should see:

```
storageclass.storage.k8s.io/data-disk-storage created
```

Tip

You may see a “request is invalid” error, such as:

```
The request is invalid: default StorageClass, 'harvester-longhorn', already exists.
Please reset it first before setting 'data-disk-storage' as default.
```

If this happens:

1. Unset the default `harvester-longhorn` StorageClass using the command:

```
kubectl patch storageclass harvester-longhorn -p '{"metadata": {"annotations":
{"storageclass.kubernetes.io/is-default-class":"false"}}}'
```

2. Re-apply the Portworx StorageClass.

```
kubectl apply -f portworx-storageclass.yaml
```

7 Updating the Portworx CSI driver configuration

1. Log in to the SUSE Virtualization UI.
2. Navigate to *Advanced* > *Settings*.
3. Locate `csi-driver-config`, click the three dots (for more options), then select *Edit Setting*.
4. Set the *Provisioner* to `pxd.portworx.com`.
5. Set the *Volume Snapshot Class Name* to `px-csi-snapclass`.
   This setting points to the name of the VolumeSnapshotClass used for creating volume snapshots or VM snapshots.

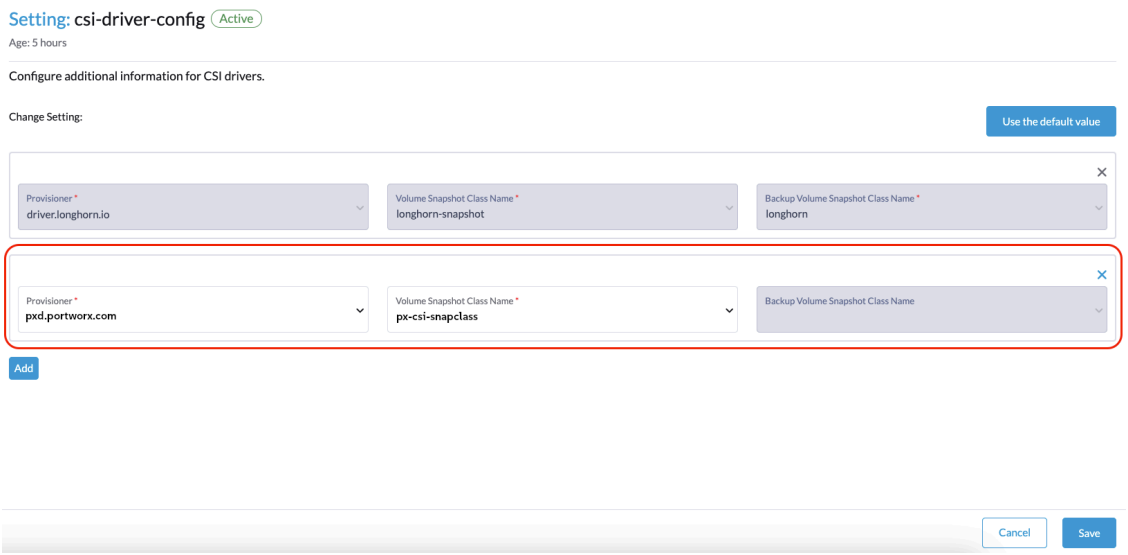

FIGURE 6: SUSE VIRTUALIZATION: CSI-DRIVER-CONFIG

8 Validating the integration

Ensure that Portworx Enterprise is correctly integrated with SUSE Virtualization by verifying that a virtual machine (VM) can be provisioned with storage backed by the FlashArray.

1. Create a new VM.
   For guidance, refer to the SUSE Virtualization: Create a Virtual Machine (https://documentation.suse.com/cloudnative/virtualization/v1.6/en/virtual-machines/create-vm.html) and be sure to select the StorageClass provisioned by Portworx (`data-disk-storage`) for your VM disk volume.

2. Verify that the VM was provisioned with Portworx storage in the SUSE Virtualization UI.

   a. Open *Virtual Machines*.

   b. Select your VM.

   c. Open *Volumes*.

   d. Confirm that the attached disk is using the `data-disk-storage` StorageClass.

3. You can also verify the VM's storage from the CLI.

   a. Log in to the SUSE Virtualization management CLI.

   b. List the PersistentVolumeClaims (PVCs) in the VM's namespace.

```
kubectl get pvc -n <namespace>
```

```
NAME          STATUS  VOLUME                                     CAPACITY
 ACCESS MODES  STORAGECLASS       AGE
vm1-rootdisk  Bound   pvc-8f3c8b2c-6e1e-4c6a-a83e-9d6c34ac3b21  40Gi      RWX
         data-disk-storage  2m
```

   c. Confirm that the STORAGECLASS column shows `data-disk-storage`.

   d. As an additional check, confirm that the volume is provisioned by `pxd.portworx.com`.

```
kubectl describe pv pvc-8f3c8b2c-6e1e-4c6a-a83e-9d6c34ac3b21
```

```
Name:                pvc-8f3c8b2c-6e1e-4c6a-a83e-9d6c34ac3b21
StorageClass:        data-disk-storage
Annotations:
pv.kubernetes.io/provisioned-by: pxd.portworx.com
Status: Bound
Reclaim Policy:      Delete
VolumeMode:          Block
Source:
    Type:            CSI (a Container Storage Interface (CSI) volume source)
```

```
    Driver:            pxd.portworx.com
    FSType:
    VolumeHandle:      424582431912071110
  ReadOnly:            false
  VolumeAttributes:    attached=ATTACH_STATE_EXTERNAL
                       error=
                       parent=
                       readonly=false
                       secure=false
                       shared=false
                       shared_mode=BLOCK
                       sharedv4=false
                       state=VOLUME_STATE_DETACHED
                       type=px-raw-volume
```

Upon successful completion of these checks, you have validated the integration of SUSE Virtualization with Portworx and the Everpure FlashArray.

9 Summary

SUSE and Everpure deliver the infrastructure platform modern enterprises seek. Integrating SUSE Virtualization with Portworx Enterprise by Everpure and an Everpure FlashArray provides a flexible, resilient, and scalable platform for running container and virtual machine workloads side-by-side. This unified landscape helps streamline operations and can lower both operational and capital costs.

This guide provides an overview of a reference architecture for the combined solution with detailed steps for implementation and validation.

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