Certified Kubernetes Administrator

Kubernetes: Storage

Learning Objectives

By the end of this lesson, you will be able to:

- Create a volume with YAML, host path, empty dir, and NFS share
- Create a PersistentVolume with YAML
- Create PersistentVolumeClaims with YAML
- Create pod with PersistentVolumeClaims

Volumes

Introduction to Volumes

Volume is a directory on a disk or any container that outlives the other containers that run within the pod. Kubernetes volume abstraction solves the following problems:

1. In case of a container crash, Kubelet restarts but all the files are lost. Hence, the container then starts with a clean state.
2. When multiple containers are running together in a pod, it is often necessary to share the files between those containers.

Types of Volumes

Kubernetes supports the following types of volumes:	
➢ awsElasticBlockStore	➢ Flocker
➢ azureDisk	➢ gcePersistentDist
➢ azureFile	➢ gitRepo
➢ cephfs	➢ glusterfs
➢ cinder	➢ hostPath
➢ configMap	➢ iSCSI
➢ csi	➢ local
➢ downwardAPI	➢ nfs
➢ emptyDir	➢ persistentVolumeClaim
➢ fc (Fiber)	➢ secret
➢ flexVolume	➢ vsphereVolume

Creating a Volume with YAML

Problem Statement:

You are given a project to create a volume with YAML.

ASSISTED PRACTICE

Creating a Volume with Host Path

Problem Statement:

You are given a project to create a volume with host path (host drive).

ASSISTED PRACTICE

Creating a Volume with Empty Directory

Problem Statement:

You are given a project to create a volume with empty directory (auto-deletion).

ASSISTED PRACTICE

Creating a Volume with NFS Share

Problem Statement:

You are given a task to create a volume with NFS share.

ASSISTED PRACTICE

PersistentVolumes

PersistentVolumes

PersistentVolume is a subsystem that provides an API to the users and administrators and describes how the storage is provided and consumed.

Here are the two API resources:

- PersistentVolume
- PersistentVolumeClaims

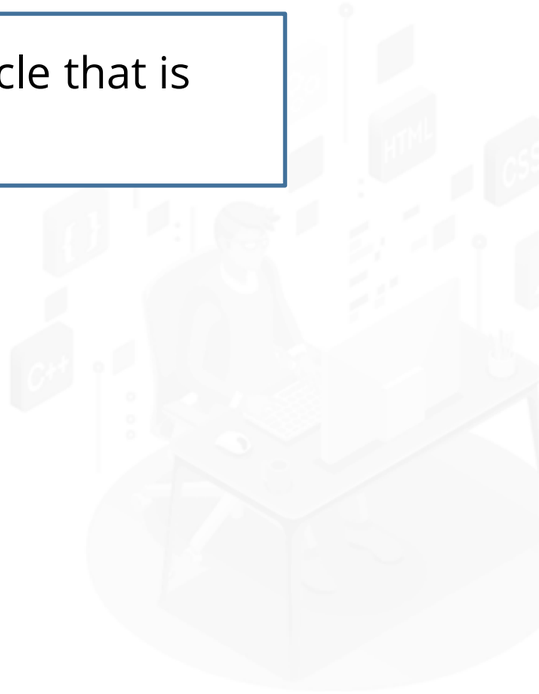
PersistentVolumes

It is a part of the storage in the cluster that is provisioned by an administrator or provisioned dynamically using storage classes.

Just like a node, PersistentVolume is also a resource in the cluster and has a lifecycle that is independent of any pod.

The types of PersistentVolumes are:

- AWSElastocBlockStore
- AzureFile
- AzureDisk
- CSI
- Flexvolume
- Flocker
- NFS
- iSCSI
- CephFS
- Cinder
- Glusterfs
- vSphereVolume
- StorageOS



Introduction to PersistentVolumes

Problem Statement:

You are given a project to demonstrate the use of PersistentVolumes.

ASSISTED PRACTICE

Creating PersistentVolumes with YAML

Problem Statement:

You are given a project to create PersistentVolumes with YAML.

ASSISTED PRACTICE

PersistentVolumeClaims

PersistentVolumeClaims

The characteristics of PersistentVolumeClaims are listed below:

- It is a request for storage by a user and is similar to pods.
- It consumes PersistentVolume resources similar to the pods that consume node resources.
- PersistentVolumeClaims can request specific size and access modes and allow the user to consume storage resources.

Introduction to PersistentVolume Claims

Problem Statement:

You are given a project to demonstrate the use of PersistentVolumeClaims.

ASSISTED PRACTICE

Creating PersistentVolume Claims with YAML

Problem Statement:

You are given a project to create PersistentVolumeClaims with YAML.

ASSISTED PRACTICE

Application Configuration

Creating Pods with Volumes

Problem Statement: You are given a project to create pods with volumes.

ASSISTED PRACTICE

Creating Pods with PersistentVolumeClaims

Problem Statement: You are given a project to create pods with PersistentVolumeClaims.

ASSISTED PRACTICE

Key Takeaways

You are now able to:

- Create a volume with YAML, host path, empty dir, and NFS share
- Create a PersistentVolume with YAML
- Create PersistentVolumeClaims with YAML
- Create pod with PersistentVolumeClaims

Knowledge Check

Knowledge Check

1

Which of the following is NOT a type of volume?

a. awsElasticBlockStore

b. local

c. hostPath

d. cis

Knowledge Check

1

Which of the following is NOT a type of volume?

a. awsElasticBlockStore

b. local

c. hostPath

d. cis

The correct answer is **d**

cis is not a type of volume.

Knowledge Check

2

Which of the following is a type of PersistentVolume?

a. vSphereVolume

b. fc

c. emptyDir

d. gitRepo

Knowledge Check 2

Which of the following is a type of PersistentVolume?

a. vSphereVolume

b. fc

c. emptyDir

d. gitRepo

The correct answer is **a**

vSphereVolume is a type of PersistentVolume.

Knowledge Check

3

Which of the following resources can request specific size and access modes and allow the user to consume storage resources?

a. PersistentVolumes

b. PersistentVolumeClaims

c. NFS Share

d. Host Drive

Knowledge Check

3

Which of the following resources can request specific size and access modes and allow the user to consume storage resources?

a. PersistentVolumes

b. PersistentVolumeClaims

c. NFS Share

d. Host Drive

The correct answer is **b**

PersistentVolumeClaims can request specific size and access modes and allow the user to consume storage resources.

Knowledge Check

4

Which of the following resources is present in a cluster and has a lifecycle independent of any pod?

a. PersistentVolumes

b. PersistentVolumeClaims

c. NFS Share

d. Host Drive

Knowledge Check

4

Which of the following resources is present in a cluster and has a lifecycle independent of any pod?

a. PersistentVolumes

b. PersistentVolumeClaims

c. NFS Share

d. Host Drive

The correct answer is **a**

PersistentVolumes is also a resource in the cluster and have a lifecycle independent of any pod.

Knowledge Check

5

Which of the following is NOT a characteristic of PersistentVolumeClaims?

a. It is a part of storage in the cluster

b. It consumes PersistentVolume resources

c. It allows the user to consume storage resources

d. All of the above

Knowledge Check

5

Which of the following is NOT a characteristic of PersistentVolumeClaims?

a. It is a part of storage in the cluster

b. It consumes PersistentVolume resources

c. It allows the user to consume storage resources

d. All of the above

The correct answer is **d**

PersistentVolumes is a part of storage in the cluster, it is provisioned by an administrator, and has a lifecycle independent of any pod.

Problem Statement: How to deploy a highly scalable WordPress site and a huge MySQL database using Kubernetes when you have to use the normal system to run these applications in real-time production?

Objective: Use PersistentVolumes and PersistentVolumeClaims to store large volume of data taking Wordpress and MYSQL as examples of real-time applications.

LESSON-END PROJECT