



扫码添加小助手，发送“CKA”加群



CloudNativeLives

Kubernetes管理员实训

K8S存储管理实训

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大 纲

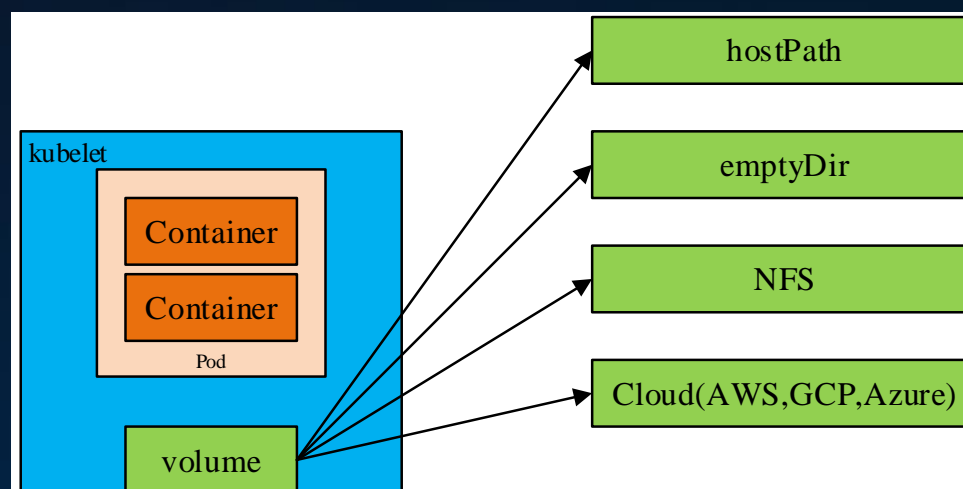
- 为何需要存储卷？
- 普通存储卷
- 应用中使用普通卷
- 持久化存储卷（PV）
- 持久化存储卷申明（PVC）
- 应用中使用持久化卷

为何需要存储卷？

容器部署过程中一般有以下三种数据：

- 启动时需要的初始数据，可以是配置文件
- 启动过程中产生的临时数据，该临时数据需要多个容器间共享
- 启动过程中产生的持久化数据

以上三种数据都不希望在容器重启时就消失，存储卷由此而来，它可以根据不同场景提供不同类型的存储能力。



普通存储卷(volume)



存储没有单独资源对象，与Pod的生命周期一起

```
apiVersion: v1
kind: Pod
metadata:
  name: test-pd
spec:
  containers:
  - image: k8s.gcr.io/test-webserver
    name: test-container
    volumeMounts:
    - mountPath: /test-pd
      name: test-volume
  volumes:
  - name: test-volume
    hostPath:
      # directory location on host
      path: /data
```

应用中使用普通卷

创建configmap预制数据卷:

```
kubectl create -f configmap.yaml
```

```
kubectl create -f deployment_cfgmap.yaml
```

```
apiVersion: v1
data:
  wangbo: hello-world
kind: ConfigMap
metadata:
  name: test
```

```
[paas@192-168-0-126 ~]$ kubectl exec -it test-6f6d985cc6-r82f9 sh
# cat /tmp/welcome
hello-world#
```

```
spec:
  containers:
  - image: nginx:1.0
    imagePullPolicy: IfNotPresent
    name: container-0
    volumeMounts:
    - name: test
      mountPath: /tmp
  volumes:
  - configMap:
      defaultMode: 420
      items:
      - key: wangbo
        path: welcome
    name: test
    name: test
```

创建emptyDir临时存储数据卷:

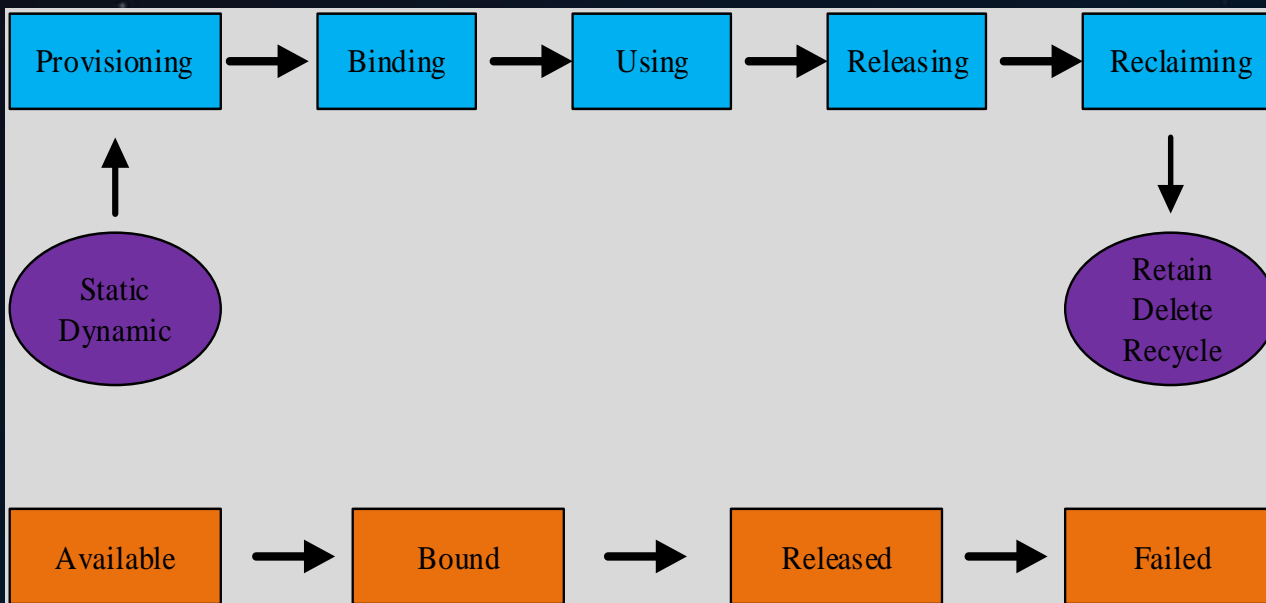
```
kubectl create -f deployment_emptydir.yaml
```

持久化存储卷(PersistentVolume)



存储系统与应用系统区分开，单独资源对象，它不直接和Pod发生关系，通过另一个资源对象PersistentVolumeClaim来绑定关联

PV生命周期



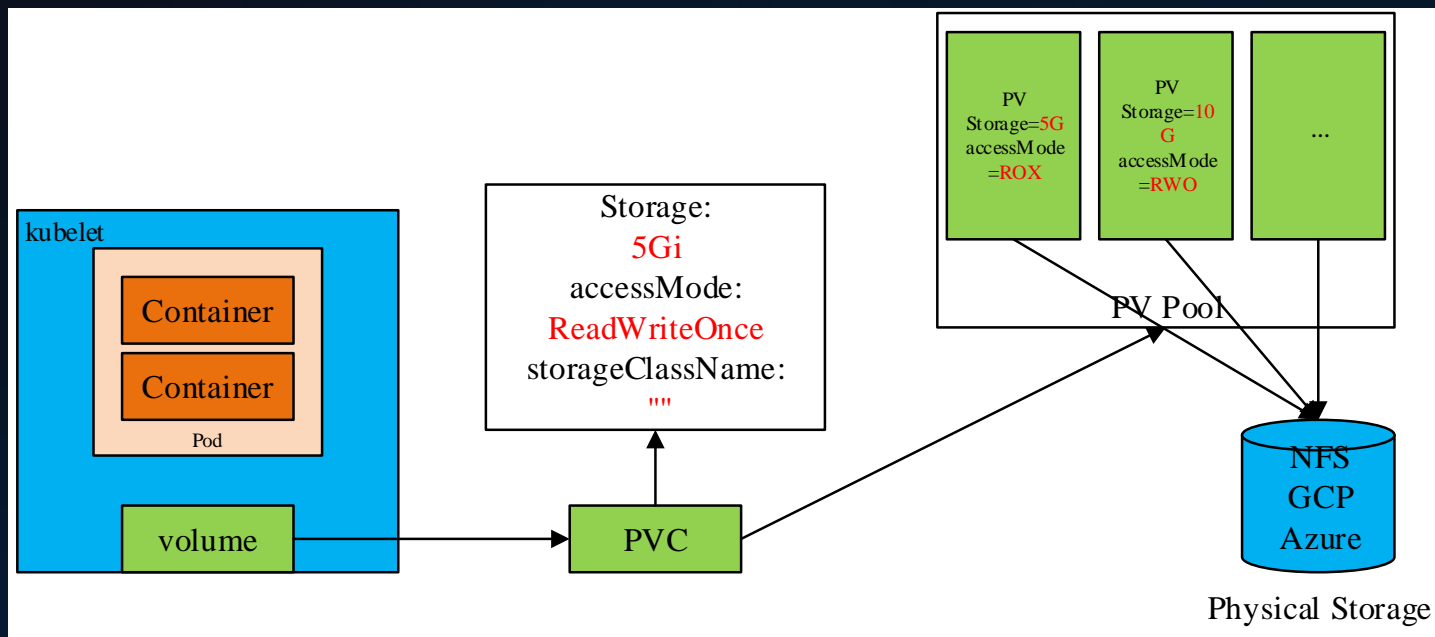
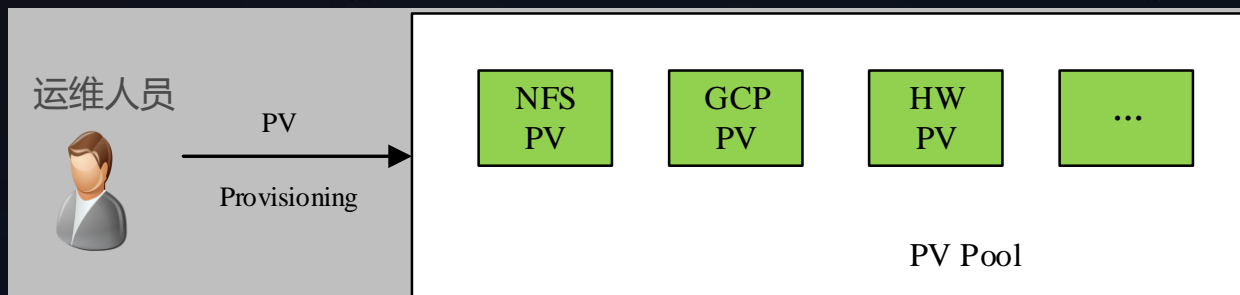
```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: pv0003
spec:
  capacity:
    storage: 5Gi
  volumeMode: Filesystem
  accessModes:
    - ReadWriteOnce
  persistentVolumeReclaimPolicy: Recycle
  storageClassName: slow
  mountOptions:
    - hard
    - nfsvers=4.1
  nfs:
    path: /tmp
    server: 172.17.0.2
```

持久化存储卷(PersistentVolume)



Provisioning : PV的预制创建有两种模式：静态模式和动态模式

静态模式：除创建PVC外，还需手动创建PV

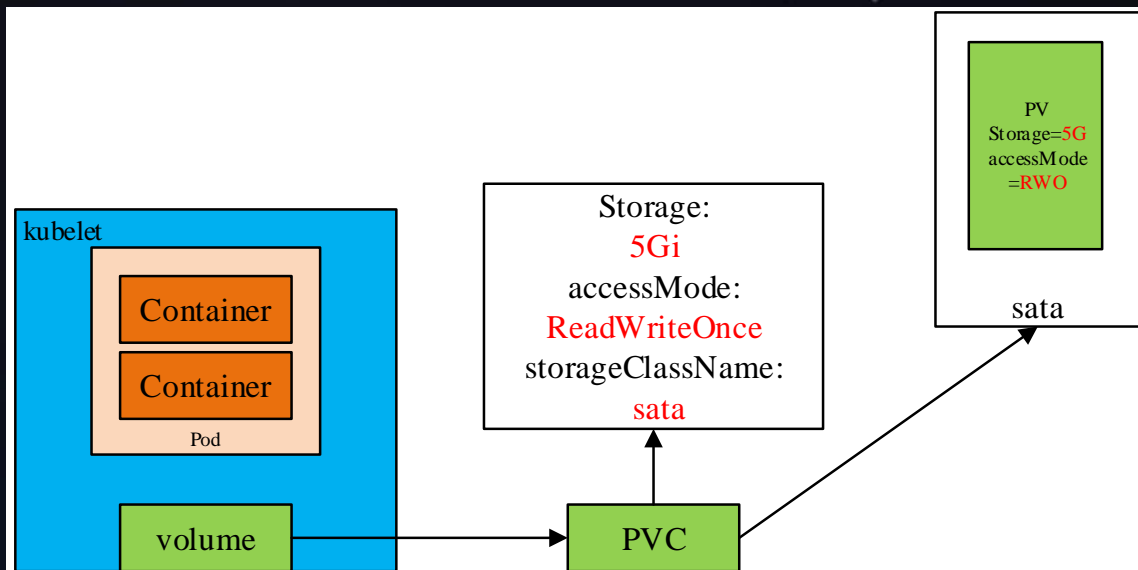


```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: mongodb-pv-claim
  labels:
    app: mongodb
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 5Gi

---
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: rsvp-db
spec:
  replicas: 1
  template:
    metadata:
      labels:
        appdb: rsvpdb
    spec:
      containers:
        - name: rsvpd-db
          image: mongo:3.3
          ports:
            - containerPort: 27017
          volumeMounts:
            - name: mongodb-persistent-storage
              mountPath: /data/db
      volumes:
        - name: mongodb-persistent-storage
          persistentVolumeClaim:
            claimName: mongodb-pv-claim
```


持久化存储卷(PersistentVolume)

动态模式：只需创建PVC，系统根据PVC自动创建PV



支持的自动创建存储类型

```
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  annotations:
    storageclass.beta.kubernetes.io/is-default-class: "false"
  labels:
    kubernetes.io/cluster-service: "true"
  name: sata
parameters:
  kubernetes.io/description: ""
  kubernetes.io/hw:passthrough: "false"
  kubernetes.io/storagetype: BS
  kubernetes.io/volumetype: SATA
  kubernetes.io/zone: az1.dcl
provisioner: flexvolume-huawei.com/fuxivol
reclaimPolicy: Delete
```



```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: mongodb-pv-claim
  labels:
    app: mongodb
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 5Gi
  storageClassName: sata
---
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: rsvp-db
spec:
  replicas: 1
  template:
    metadata:
      labels:
        appdb: rsvpdb
    spec:
      containers:
        - name: rsvpd-db
          image: mongo:3.3
          ports:
            - containerPort: 27017
          volumeMounts:
            - name: mongodb-persistent-storage
              mountPath: /data/db
      volumes:
        - name: mongodb-persistent-storage
          persistentVolumeClaim:
            claimName: mongodb-pv-claim
```

持久化存储卷申明(PersistentVolumeClaim)



用户真正关心自己想要的

存储访问模式，此能力依赖
存储厂商能力

存储大小

存储类型，适配
不同场景

```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: mongodb-pv-claim
  labels:
    app: mongodb
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 5Gi
  storageClassName: sata
```

应用中使用持久化卷

可以先查看集群支持的storageclass:

Kubectl get storageclass

```
[paas@192-168-0-13 ~]$ kubectl get storageclass
NAME                                PROVISIONER                                AGE
nfs-ro                             flexvolume-huawei.com/fuxinfs             6d
nfs-rw                             flexvolume-huawei.com/fuxinfs             6d
obs-glacier                        flexvolume-huawei.com/fuxiobs             6d
obs-standard                       flexvolume-huawei.com/fuxiobs             6d
obs-standard-ia                   flexvolume-huawei.com/fuxiobs             6d
sas                               flexvolume-huawei.com/fuxivol             6d
sata                             flexvolume-huawei.com/fuxivol             6d
ssd                              flexvolume-huawei.com/fuxivol             6d
```

创建pvc，定义需要的访问模式，存储大小及存储类型:

Kubectl create -f pvc.yaml

创建deployment，绑定该pvc:

Kubectl create -f deployment_pvc.yaml

```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  annotations:
    volume.beta.kubernetes.io/storage-class: sata
    volume.beta.kubernetes.io/storage-provisioner:
flexvolume-huawei.com/fuxivol
  labels:
    failure-domain.beta.kubernetes.io/region:
southchina
    failure-domain.beta.kubernetes.io/zone: kvmxn.dc1
  name: test
spec:
  accessModes:
  - ReadWriteMany
  resources:
    requests:
      storage: 10Gi
```

```
spec:
  containers:
  - image: nginx:latest
    imagePullPolicy: IfNotPresent
    name: container-0
    volumeMounts:
    - name: test
      mountPath: /tmp
  volumes:
  - persistentVolumeClaim:
      claimName: test
    name: test
```

课后作业

1. 部署一个deployment应用，使用secret普通卷，该应用启动依赖此secret。
 - Deployment的名称为<hwcka-003-1-你的华为云id>
 - 将所用命令、创建的Deployment及secret完整yaml截图上传，注意需要体现依赖特性，如secret删除后，应用无法启动
 2. 部署一个statefulset应用，使用持久化卷，通过pvc声明所需的存储大小10G及访问模式为RWX。
 - Deployment的名称为<hwcka-003-2-你的华为云id>
 - 将所用命令、创建的statefulset及pvc完整yaml和证明该应用有在存储中写内容的截图上传
- 作业完成后，提交到论坛，包括完整的浏览器截图、华为云账号，作业中所创建的集群、应用名称要带hwcka前缀
 - **提交作业且答对的前50名，可获得满100减50的优惠券一张**



Thank You

直播 每周四 晚20:00