AWS EKS PV/PVC Tutorial

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Outline

- Use PV with Hostpath
  - Pod with PV/PVC
- Use PV with EBS
  - Pod with PV/PVC
  - StatefulSet with PV/PVC

Use PV with Hostpath

- Create PV/PVC using HostPath

```yaml
apiVersion: v1
kind: PersistentVolume
metadata:
  name: task-pv-volume
  labels:
    type: local
spec:
  storageClassName: manual
  capacity:
    storage: 1Gi
  accessModes:
    - ReadWriteOnce
  hostPath:
    path: "/data"
    type: DirectoryOrCreate
```

```yaml
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: hello-pvc
spec:
  storageClassName: manual
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 1Gi
```

Use PV with Hostpath

- Create Pod using the Hostpath PVC

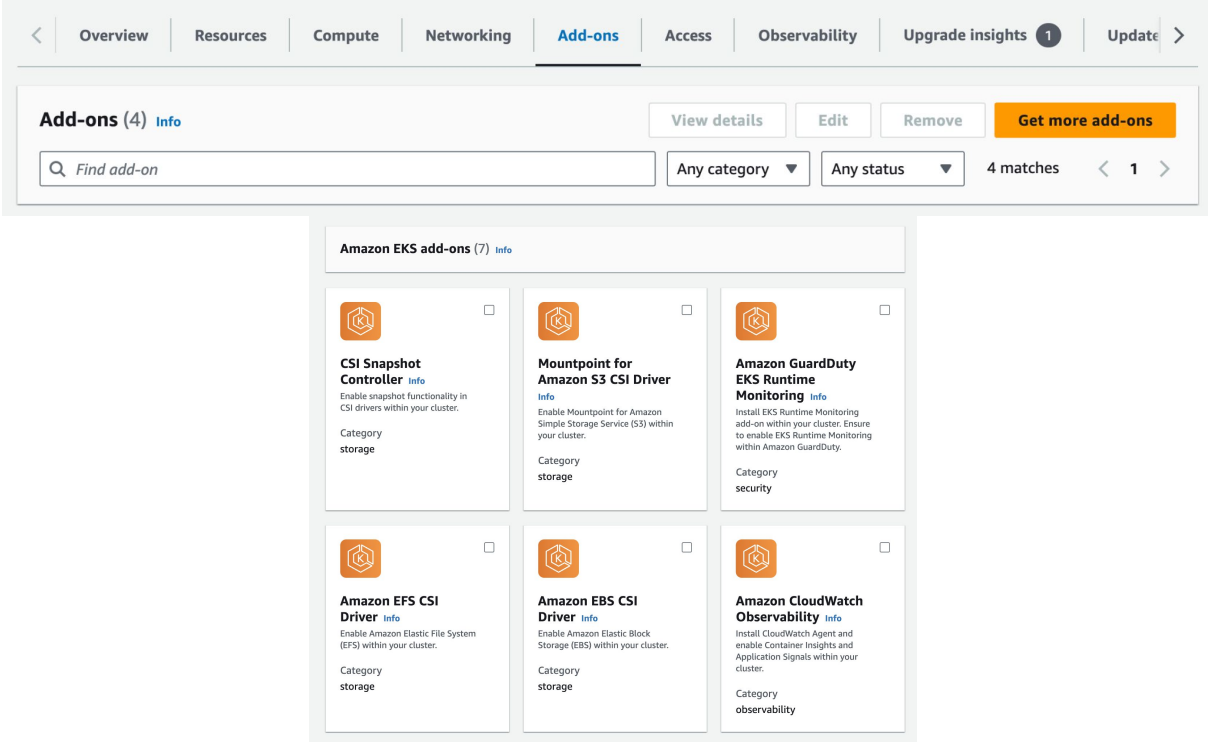
```yaml
apiVersion: v1
kind: Pod
metadata:
  name: stateful-http-server
  labels:
    app: http-server
spec:
  volumes:
    - name: hello-storage
      persistentVolumeClaim:
        claimName: hello-pvc
  containers:
  - name: http-server
    image: yancanmao/app-stateful
    volumeMounts:
    - mountPath: "/data"
      name: hello-storage
```

Test of Effectiveness

```
yancanmao@r-201-111-25-172 kube-yaml % kubectl apply -f pv.yaml
persistentvolume/task-pv-volume created
yancanmao@r-201-111-25-172 kube-yaml % kubectl apply -f pvc.yaml
persistentvolumeclaim/hello-pvc created
yancanmao@r-201-111-25-172 kube-yaml % kubectl apply -f server-pod-pvc.yaml
pod/stateful-http-server created
yancanmao@r-201-111-25-172 kube-yaml % kubectl get pods
NAME                  READY   STATUS    RESTARTS   AGE
stateful-http-server   1/1     Running   0          32s
yancanmao@r-201-111-25-172 kube-yaml % kubectl get pvc
NAME        STATUS   VOLUME           CAPACITY   ACCESS MODES   STORAGECLASS   VOLUMEATTRIBUTESCLASS   AGE
hello-pvc   Bound    task-pv-volume   1Gi        RWO            manual         <unset>                 51s
yancanmao@r-201-111-25-172 kube-yaml % kubectl get pv
NAME             CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS   CLAIM               STORAGECLASS   VOLUMEATTRIBUTESCLASS   REASON   AGE
task-pv-volume   1Gi        RWO            Retain           Bound    default/hello-pvc   manual         <unset>                          61s
yancanmao@r-201-111-25-172 kube-yaml %
```

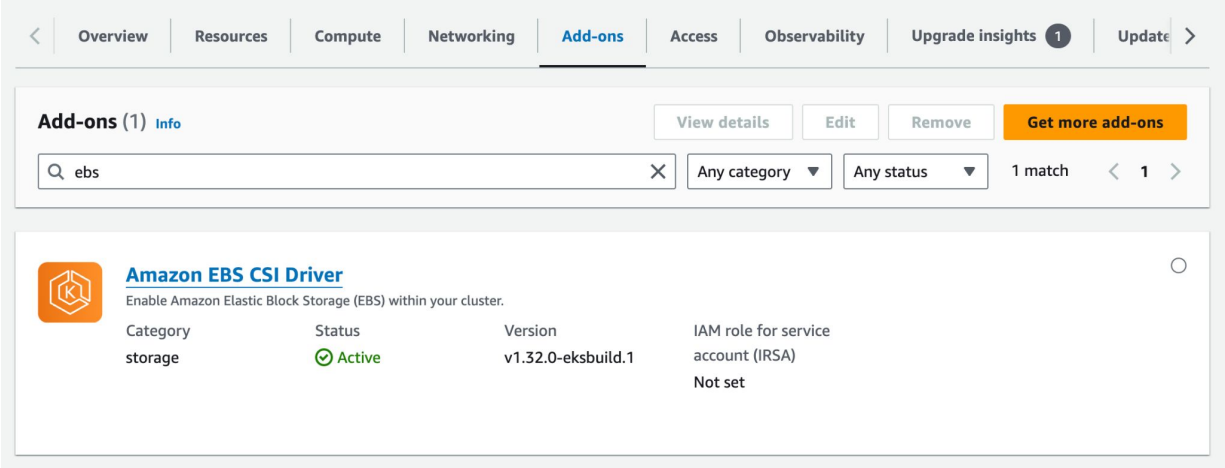
Use PV with EBS

- Get EBS CSI Driver



Use PV with EBS

- Check Amazon EBS CSI Driver is activated in EKS Cluster.



Use PV with EBS

- Create a Storage-Class with retain policy for EBS

```yaml
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: ebs-sc
provisioner: ebs.csi.aws.com
parameters:
  type: gp2
  fsType: ext4
reclaimPolicy: Retain
volumeBindingMode: WaitForFirstConsumer
```

Use PV with EBS

- Create PV using EBS with retain storage-class

```yaml
apiVersion: v1
kind: PersistentVolume
metadata:
  name: ebs-pv
spec:
  capacity:
    storage: 1Gi
  volumeMode: Filesystem
  accessModes:
    - ReadWriteOnce
  persistentVolumeReclaimPolicy: Retain
  storageClassName: ebs-sc
  csi:
    driver: ebs.csi.aws.com
    volumeHandle: vol-06d5f1e046daa076e # Replace with your EBS volume ID
```

Use PV with EBS

- Create PVC based on the EBS PV

```yaml
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: ebs-pvc
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 1Gi
  storageClassName: ebs-sc
```

Use PV with EBS

- Create Pod using the EBS PVC

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: stateful-http-server
  labels:
    app: http-server
spec:
  volumes:
    - name: hello-storage
      persistentVolumeClaim:
        claimName: ebs-pvc
  containers:
  - name: http-server
    image: yancanmao/app-stateful
    volumeMounts:
    - mountPath: "/data"
      name: hello-storage
```

Test of Effectiveness

```
yancanmao@r-201-111-25-172 kube-yaml % kubectl apply -f pv-ebs.yaml
persistentvolume/ebs-pv created
yancanmao@r-201-111-25-172 kube-yaml % kubectl apply -f pvc-ebs.yaml
persistentvolumeclaim/ebs-pvc created
yancanmao@r-201-111-25-172 kube-yaml % kubectl apply -f server-pod-pvc-ebs.yaml
pod/stateful-http-server created
yancanmao@r-201-111-25-172 kube-yaml % kubectl get pods
NAME                  READY   STATUS    RESTARTS   AGE
stateful-http-server   1/1     Running   0          3m7s
yancanmao@r-201-111-25-172 kube-yaml % kubectl get pvc
NAME      STATUS   VOLUME   CAPACITY   ACCESS MODES   STORAGECLASS   VOLUMEATTRIBUTESCLASS   AGE
ebs-pvc   Bound    ebs-pv   1Gi        RWO            ebs-sc         <unset>                 3m31s
yancanmao@r-201-111-25-172 kube-yaml % kubectl get pv
NAME     CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS   CLAIM             STORAGECLASS   VOLUMEATTRIBUTESCLASS   REASON   AGE
ebs-pv   1Gi        RWO            Retain           Bound    default/ebs-pvc   ebs-sc         <unset>                          3m42s
```

Use PV with EBS

- Create StatefulSet using EBS CSI
  - StatefulSet automatically create PV/PVC

```yaml
apiVersion: apps/v1
kind: StatefulSet
metadata:
  name: ebs-statefulset
spec:
  serviceName: "ebs-service"
  replicas: 3
  selector:
    matchLabels:
      app: ebs-app
  template:
    metadata:
      labels:
        app: ebs-app
    spec:
      containers:
      - name: ebs-container
        image: yancanmao/app-stateful
        volumeMounts:
        - name: ebs-storage
          mountPath: "/data"
  volumeClaimTemplates:
  - metadata:
      name: ebs-storage
    spec:
      accessModes: [ "ReadWriteOnce" ]
      storageClassName: "ebs-sc"
      resources:
        requests:
          storage: 1Gi
```

Test of Effectiveness

```
yancanmao@r-201-111-25-172 kube-yaml % kubectl get pods
NAME                READY   STATUS    RESTARTS   AGE
ebs-statefulset-0   1/1     Running   0          3m6s
ebs-statefulset-1   1/1     Running   0          2m58s
ebs-statefulset-2   1/1     Running   0          2m46s
yancanmao@r-201-111-25-172 kube-yaml % kubectl get pvc
NAME                              STATUS   VOLUME                                     CAPACITY   ACCESS MODES   STORAGECLASS   VOLUMEATTRIBUTESCLASS
   AGE
ebs-storage-ebs-statefulset-0   Bound    pvc-75590968-da7c-4dc9-962d-0c482409cd55   1Gi        RWO            ebs-sc         <unset>
   3m11s
ebs-storage-ebs-statefulset-1   Bound    pvc-4308646d-591d-4b51-9bdb-d1b2b771bef4   1Gi        RWO            ebs-sc         <unset>
   3m3s
ebs-storage-ebs-statefulset-2   Bound    pvc-61956407-5e50-4330-8a49-801f261f6b4b   1Gi        RWO            ebs-sc         <unset>
   2m51s
yancanmao@r-201-111-25-172 kube-yaml % kubectl get pv
NAME                                       CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS   CLAIM                                   STORAGECLAS
S   VOLUMEATTRIBUTESCLASS   REASON   AGE
pvc-4308646d-591d-4b51-9bdb-d1b2b771bef4   1Gi        RWO            Retain           Bound    default/ebs-storage-ebs-statefulset-1   ebs-sc
    <unset>                          3m5s
pvc-61956407-5e50-4330-8a49-801f261f6b4b   1Gi        RWO            Retain           Bound    default/ebs-storage-ebs-statefulset-2   ebs-sc
    <unset>                          2m52s
pvc-75590968-da7c-4dc9-962d-0c482409cd55   1Gi        RWO            Retain           Bound    default/ebs-storage-ebs-statefulset-0   ebs-sc
    <unset>                          3m12s
```