Kubernetes Storage

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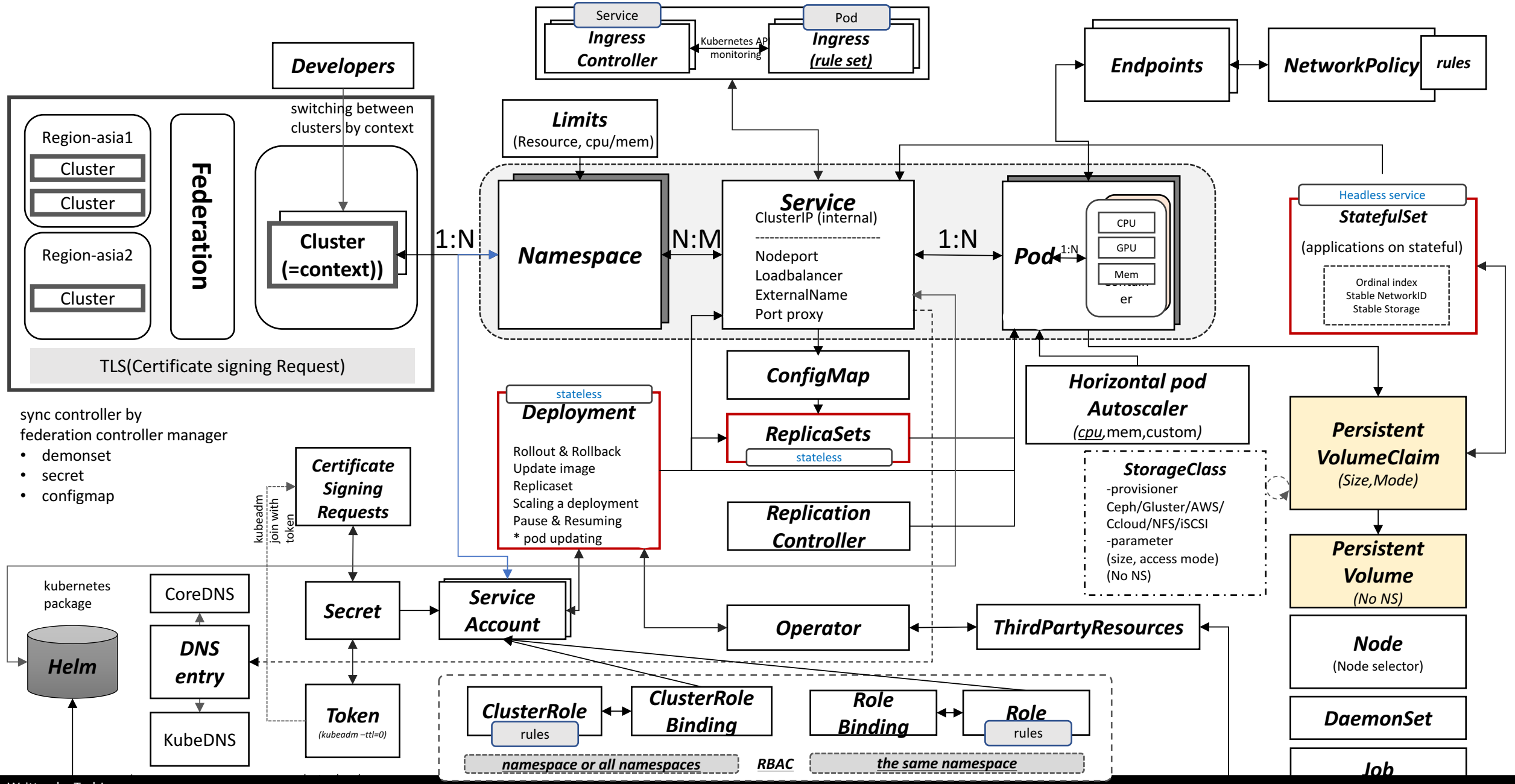
Kinds of Kubernetes & Relationship between them



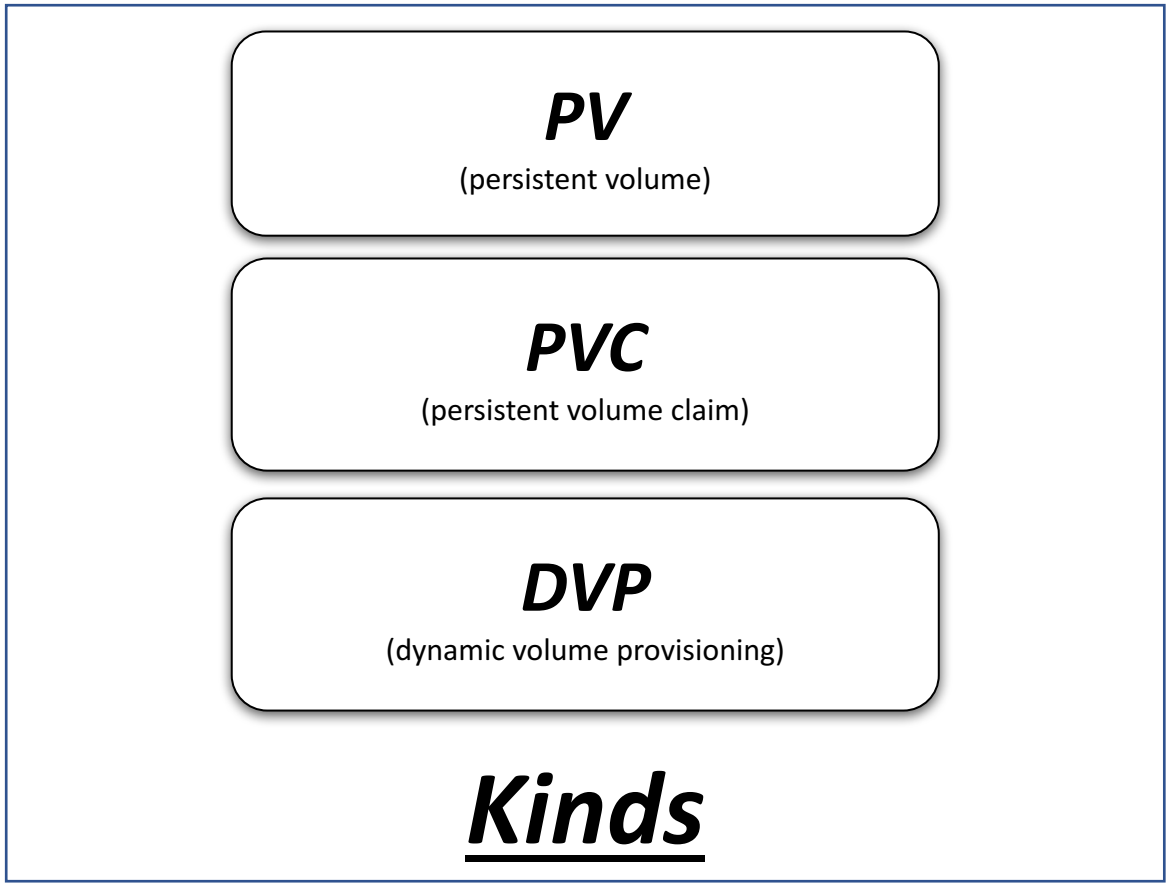
What does *PV/PVC/StorageClasses* provides?

1. ***Store data persistently***
2. ***Data share between containers***
3. ***Build stateful application (Apps, R-DB, KV-Store)***

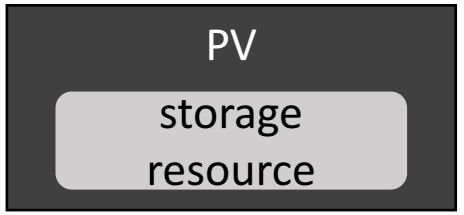
K8S Storage

How does storage be provided into container?

It is nothing but an abstracted layer in which storage classes(plugin) is enabled



What is PV & PVC?



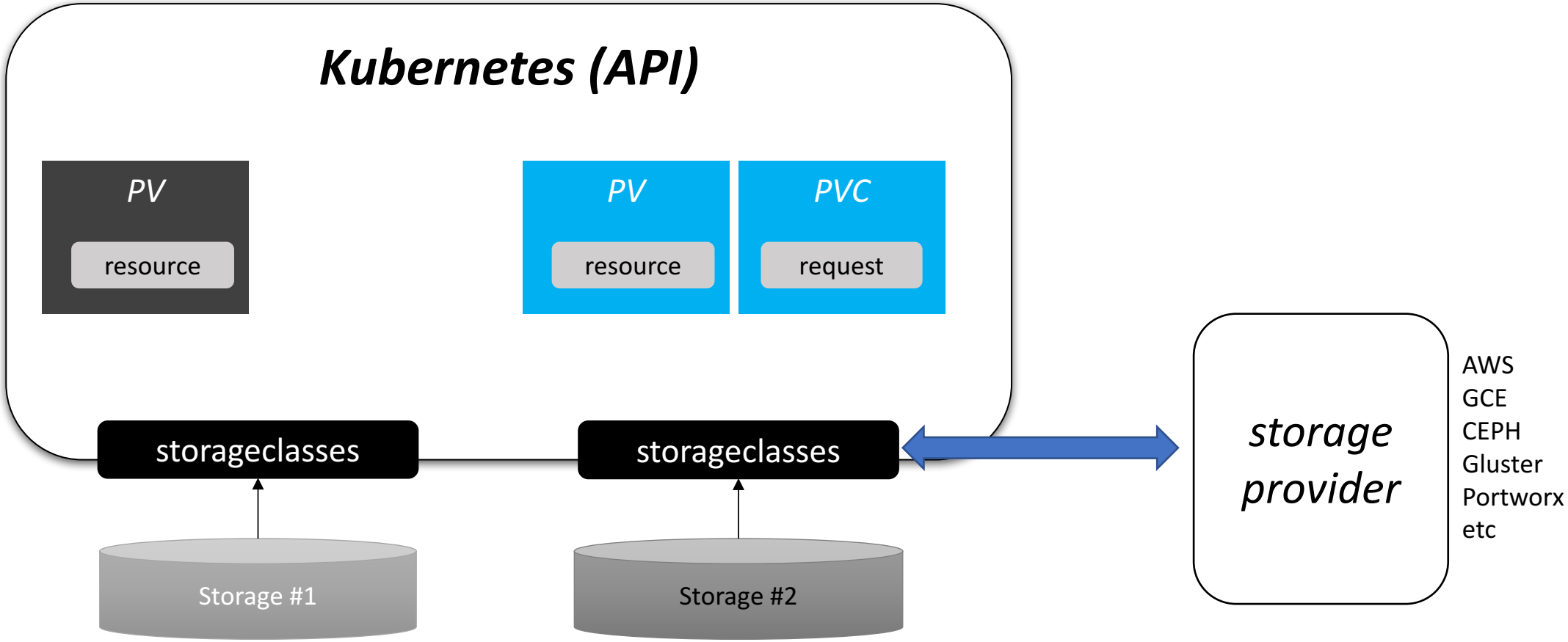
a piece of storage in the cluster that has been provisioned *by an administrator*
have a lifecycle independent of any individual pod that uses the PV

a request for storage *by a user*
It is similar to a pod
can be mounted once read/write or many times read-only

pod	pvc
cpu, memory	size, access mode

How it works?

App owner / plan to launch a service based on container / volume is used to store data



What criterias to map pv for selecting?

1. Capacity

2. Access Mode

- ReadWriteOnce – the volume can be mounted as read-write by a single node
- ReadOnlyMany – the volume can be mounted read-only by many nodes
- ReadWriteMany – the volume can be mounted as read-write by many nodes

Expression

PV

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

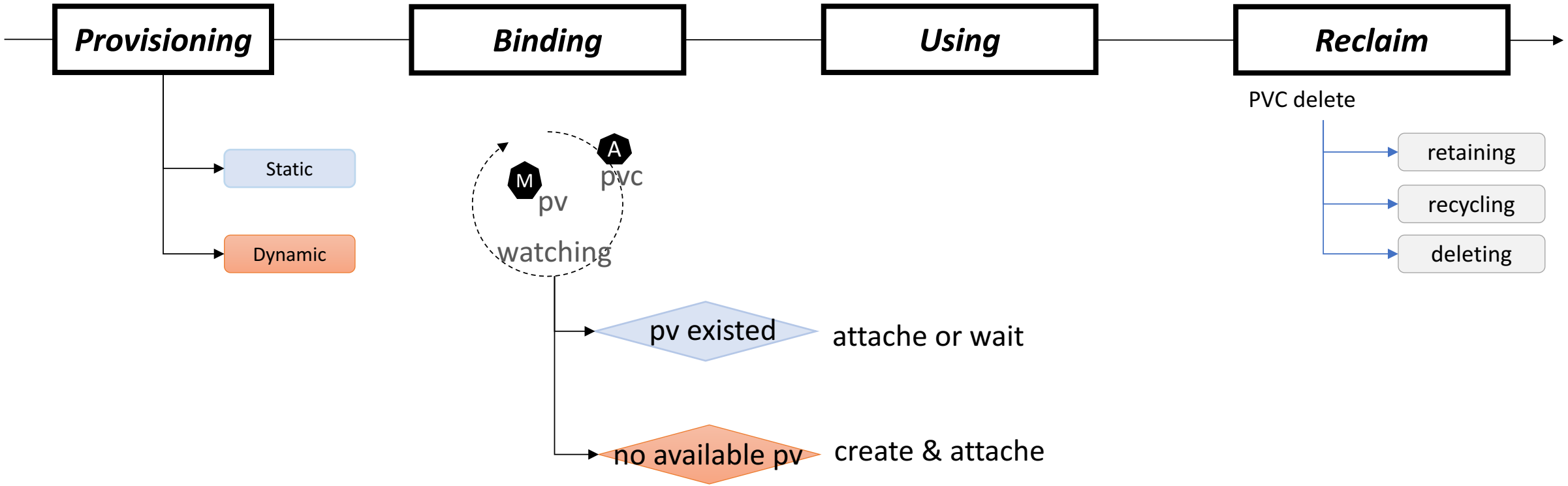
PVC

```yaml
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
  name: myclaim
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 8Gi
  storageClassName: slow
  selector:
    matchLabels:
      release: "stable"
    matchExpressions:
      - {key: environment, operator: In, values: [dev]}
```

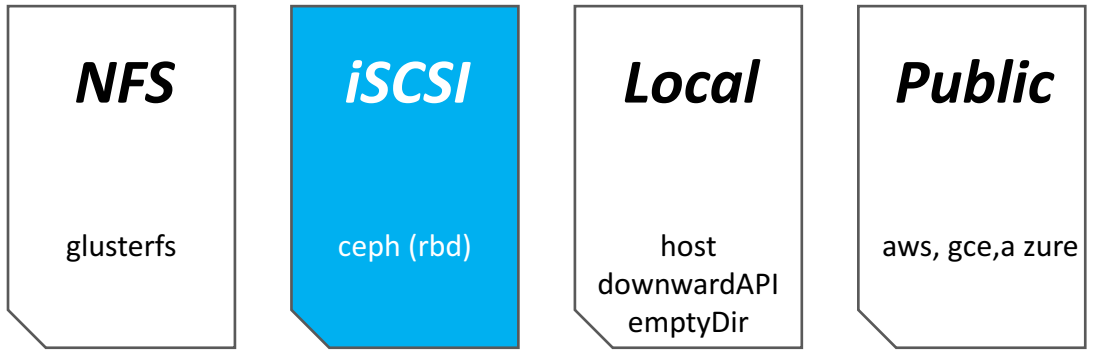
StorageClasses

```yaml
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: ceph-fast
provisioner: kubernetes.io/rbd
parameters:
  monitors: 10.195.5.229:6789
  adminId: admin
  adminSecretName: ceph-secret
  adminSecretNamespace: kube-system
  pool: k8s
  userId: admin
  usersecretName: ceph-secret-admin
  fsType: ext4
```

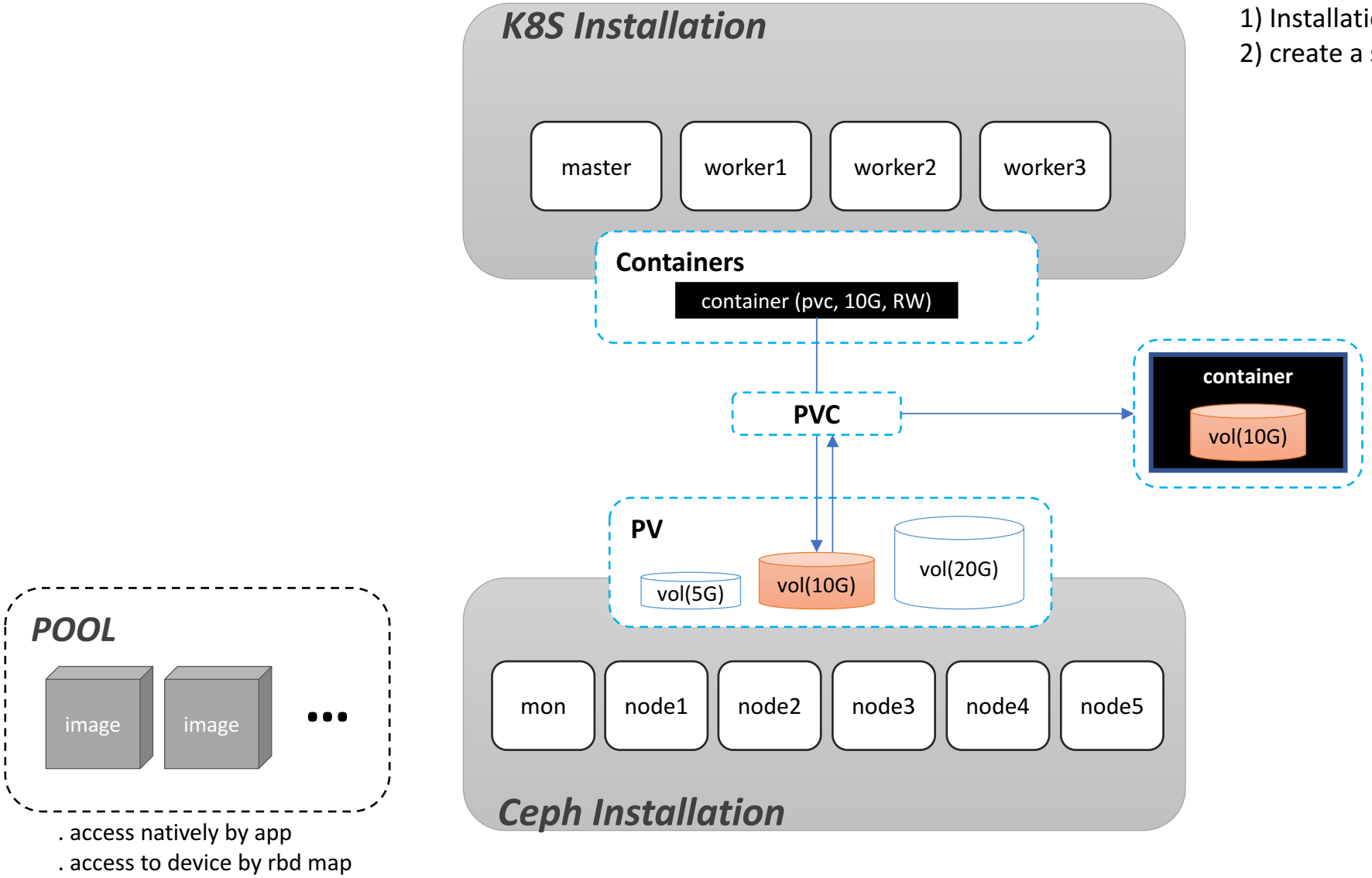
Lifecycle of Volume



What kinds of storage are supported for K8S?



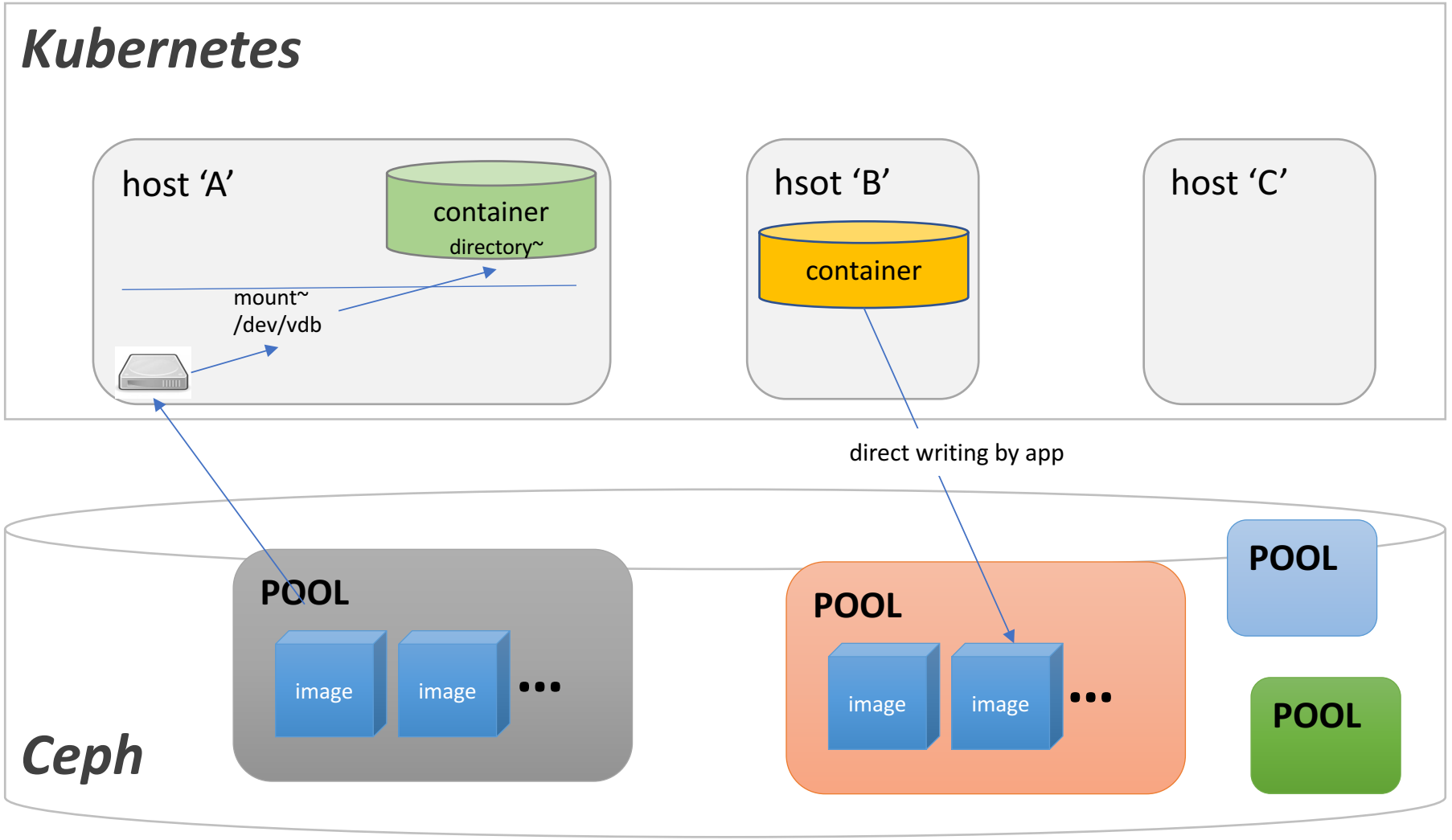
How it works?



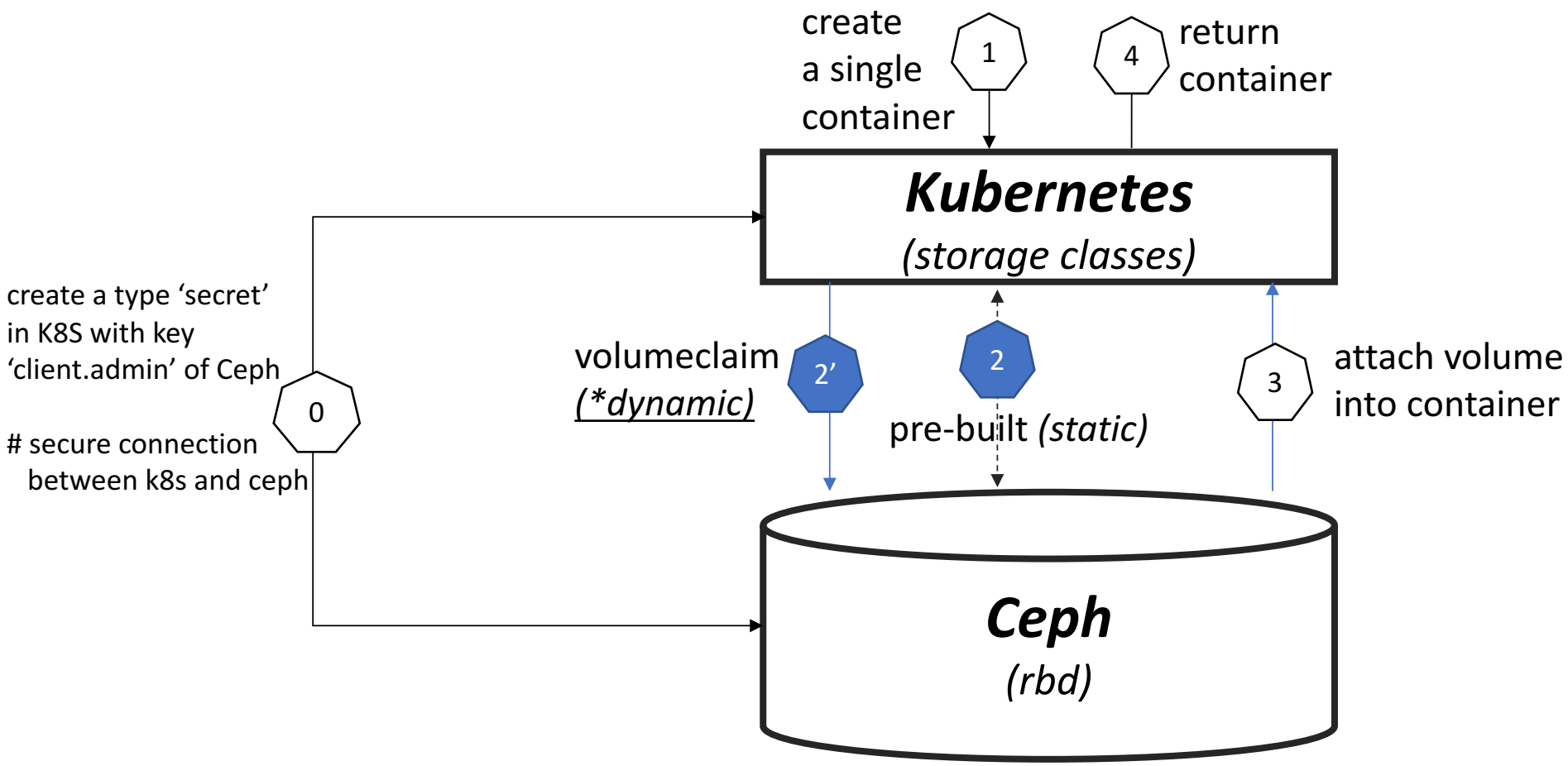
1) Installation of ceph-common package
2) create a secret by kubectl using admin key from ceph

claim

How it works? (use case)



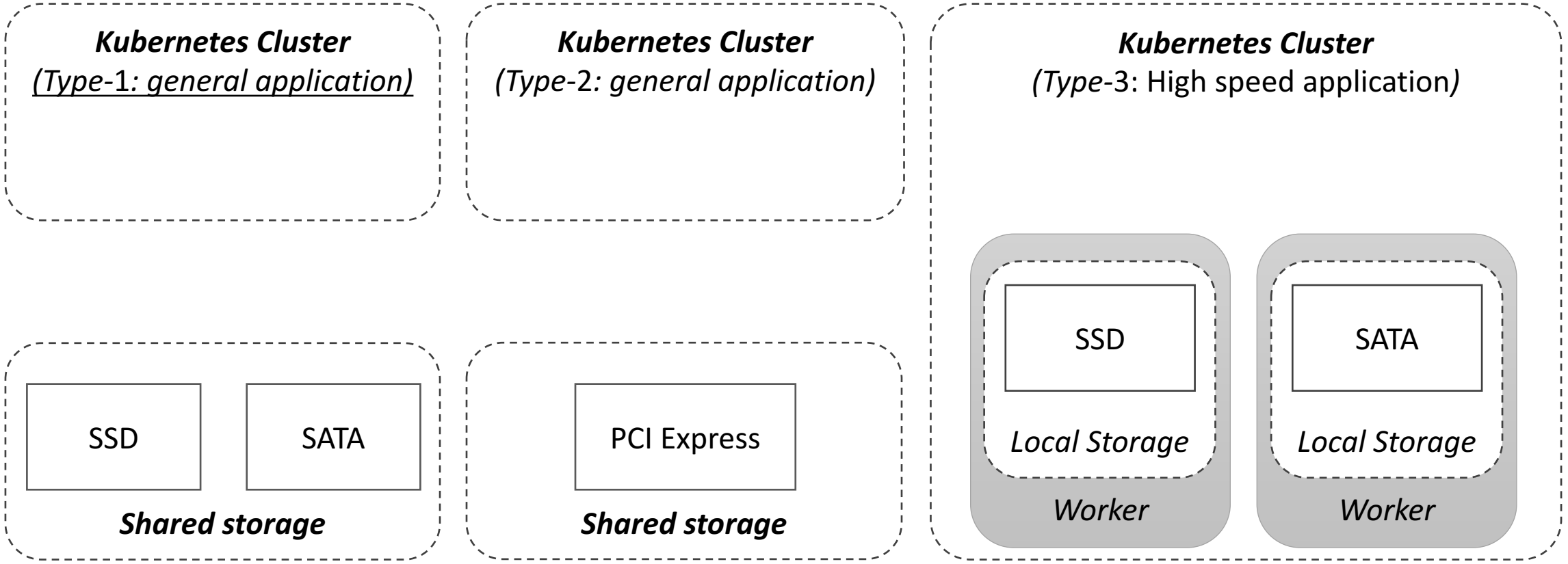
Demo (steps)


create
a single
container
1
4
return
container
Kubernetes
(storage classes)
create a type ‘secret’
in K8S with key
‘client.admin’ of Ceph
secure connection
between k8s and ceph
0
volumeclaim
(*dynamic)
2’
2
pre-built (static)
3
attach volume
into container
Ceph
(rbd)

Demo (result)

```
root@master:~# kubectl get pv
NAME      CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS      CLAIM     STORAGECLASS   REASON    AGE
ceph-pv   2Gi        RWO            Recycle          Available                                      5m
root@master:~# kubectl create -f pvc-ceph.yaml
persistentvolumeclaim "ceph-claim" created
root@master:~# kubectl get pv
NAME      CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS    CLAIM                 STORAGECLASS   REASON    AGE
ceph-pv   2Gi        RWO            Recycle          Bound     default/ceph-claim                           5m
```

Picture


Kubernetes Cluster
(Type-1: general application)
Kubernetes Cluster
(Type-2: general application)
Kubernetes Cluster
(Type-3: High speed application)
SSD
SATA
Shared storage
PCI Express
Shared storage
SSD
Local Storage
Worker
SATA
Local Storage
Worker