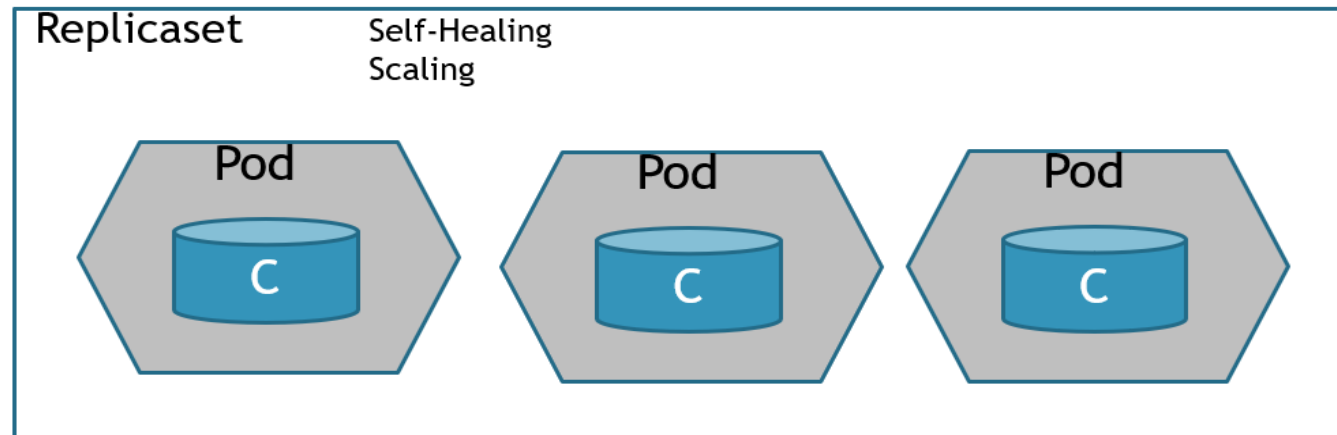


K8s - Day 3

What is a ReplicaSet

- ▶ Fundamental to desired state is the concept of background reconciliation loops (a.k.a. control loops/watch loops)
- ▶ Kubernetes is constantly making sure that current state matches desired state
 - ▶ Desired state - Declarative model
 - ▶ Current state (also known as actual state or observed state)



- ▶ Replicasets are used to guarantee the availability of a specified number of identical Pods
 - ▶ **Self Healing** - To maintain a stable set of replica Pods running at any given time
 - ▶ **Scaling** - Easily add/remove more pods of same type to deal with the increased load

ReplicaSet Manifest

- ▶ Labels
 - ▶ Simple key/value pairs
 - ▶ Attached to objects (like pods or nodes) to categorize
 - ▶ Using a label selector a client can select a set of objects
- ▶ **replicas** indicating how many Pods it should be maintaining
- ▶ **selector** specifies how to identify Pods it can acquire
- ▶ **template** specifying the data of new Pods

```
apiVersion: v1
kind: Pod
metadata:
  labels:
    tier: web-app
  name: web-app-pod
spec:
  containers:
  - image: nginx
    name: web-server
```

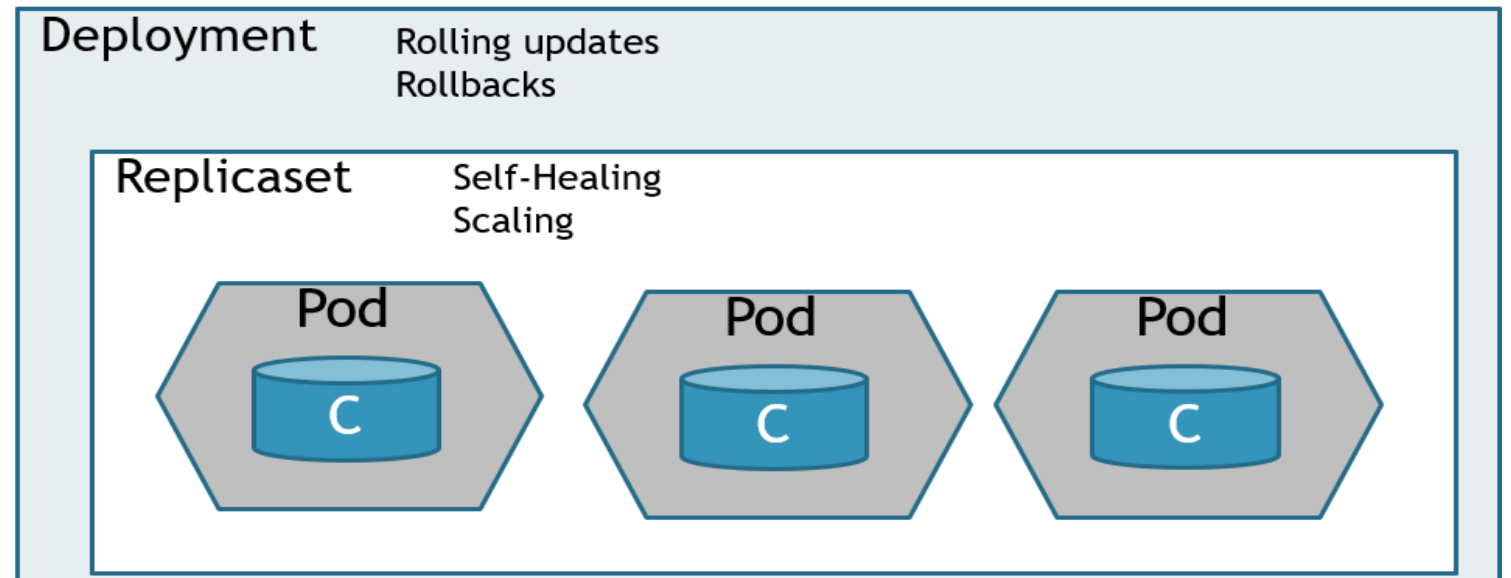
```
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: web-app-rs
spec:
  replicas: 3
  selector:
    matchLabels:
      tier: web-app
  template:
    metadata:
      labels:
        tier: web-app
    spec:
      containers:
      - name: web-server
        image: nginx
```

Replicaset-Commands

- `kubectl api-resources --api-group=`
- `kubectl api-resources --api-group=apps`
- `kubectl explain pods`
- `kubectl explain --recursive pod.spec.containers.image`
- Declarative commands:
 - `kubectl apply -f`, `kubectl replace -f`, and `kubectl delete -f`
- Imperative commands:
 - `kubectl create`, `kubectl edit`, and `kubectl delete`
- Create
 - `kubectl create -f replicaset.yaml`
 - `kubectl apply -f replicaset.yaml`
- Read
 - `watch kubectl get all --show-labels -o wide`
 - `kubectl get replicaset web-app-rs`
 - `kubectl get rs db-mysql-rs`
 -
- Update
 - `kubectl apply -f replicaset.yaml`
 - `kubectl replace -f replicaset.yaml`
 - `kubectl edit rs web-app-rs`
 - `kubectl scale --replicas=3 rs web-app-rs`
- Delete
 - `kubectl delete rs web-app-rs`
 - `kubectl delete -f replicaset.yaml`

What is Deployment

- ▶ Allows you to describe an application's life cycle,
 - ▶ Images to use for the app
 - ▶ number of pod replicas
 - ▶ way in which they should be updated
- ▶ Provides declarative updates for Pods and ReplicaSets
- ▶ Uses the ReplicaSet to control the desired state



What is Deployment

- ▶ Represent a set of multiple, identical Pods with no unique identities
- ▶ Runs multiple replicas of your application and automatically replaces any instances that fail or become unresponsive
- ▶ Managed by the Kubernetes Deployment controller
- ▶ Ensures that only a certain number of Pods are down while they are being updated, default is at least 75% of the desired number of Pods are up (25% max unavailable)
- ▶ Use-cases:
 - ▶ Rolling updates and rollbacks
 - ▶ Scaling
 - ▶ Blue/green or canary deployments

Deployment-Commands

- Create:
 - `kubectl create deployment redis-app --image redis -o yaml --dry-run=client > redis-dep.yaml`
 - `kubectl apply -f redis-dep.yaml`
 - `kubectl apply -f nginx-app-deployment.yaml`
- Read:
 - `watch kubectl get all --show-labels -o wide`
 - `kubectl get deployment nginx-app -o wide --show-labels`
 - `kubectl get deploy nginx-app`
- Update:
 - Edit `nginx-app-deployment.yaml` and `kubectl apply -f nginx-app-deployment.yaml`
 - `kubectl edit deployments.apps nginx-app`
 - `kubectl scale deployment nginx-app --replicas 6`
 - `kubectl describe deployment nginx-app`
 - `kubectl set image deployment nginx-app nginx=nginx:1.18 --record`
 - `kubectl rollout status deployment nginx-app`
 - `kubectl describe deployments.apps nginx-app | grep Annotations -A 2`
 - `kubectl rollout history deployment nginx-app`
 - `kubectl rollout history deployment nginx-app --revision=2`
 - `kubectl rollout history deployment nginx-app --revision=1`
 - `kubectl rollout undo deployment nginx-app --to-revision=1`
 - `kubectl describe deployments.apps nginx-app | grep Annotations -A 2`
 - `kubectl rollout status deployment nginx-app`
 - `kubectl rollout history deployment nginx-app`
 - `kubectl rollout restart deployment nginx-app`
 - `kubectl rollout status deployment nginx-app`
 - `kubectl describe deployments.apps nginx-app | grep Annotations -A 2`
 - `kubectl rollout history deployment nginx-app`
- Delete:
 - `kubectl delete deployment nginx-app`
 - `kubectl delete -f nginx-app-deployment.yaml`

HPA - Metrics Server

- ▶ <https://kubernetes.io/docs/tasks/run-application/horizontal-pod-autoscale/>
- ▶ <https://kubernetes.io/docs/tasks/run-application/horizontal-pod-autoscale-walkthrough/>
- ▶ <https://kubernetes.io/docs/tasks/debug/debug-cluster/resource-metrics-pipeline/>