Kubernetes Objects

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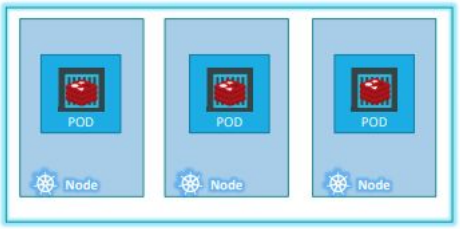
Kubernetes Objects

Kubernetes Objects

- Kubernetes objects are persistent entities in the Kubernetes system.
- Kubernetes uses these entities to manage the cluster.

2 PODs

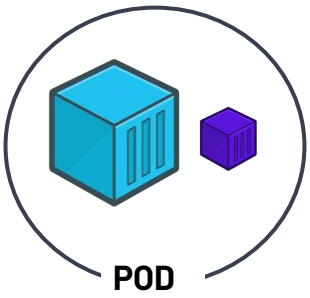


PODs

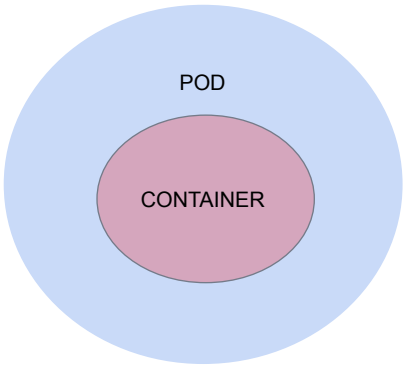
- Kubernetes doesn't deal with containers directly.
- PODs are Kubernetes objects that encapsulate the containers.
- Pods are the smallest deployable units of computing that you can create and manage in Kubernetes.

PODs

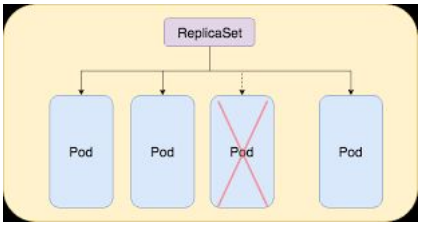
- A POD can have multiple containers.
- Sometimes an application need a helper container, such as logging, monitoring, etc.
- These helper containers should coexist with your application container.



PODs



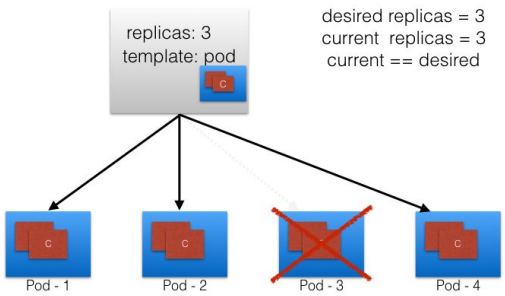
3 ReplicaSets



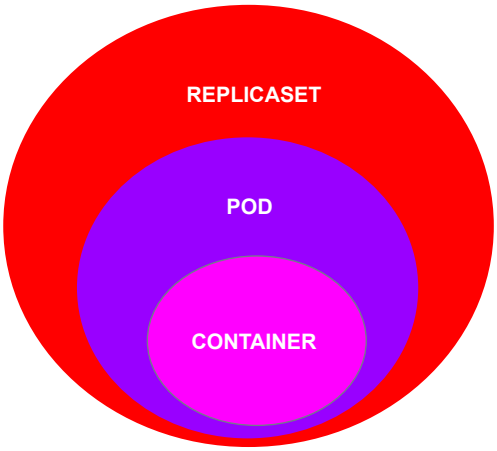
ReplicaSets

- A **ReplicaSet's** purpose is to maintain a stable set of replica Pods running at any given time.
- Even if you have a single POD, the ReplicaSet will bring up a new POD when the existing one fails.

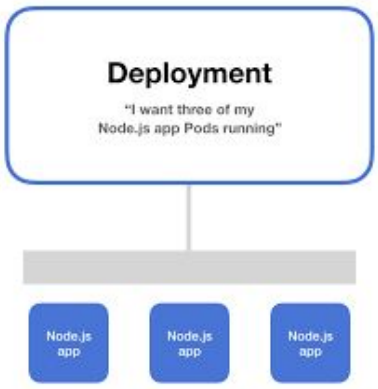
Replica Set



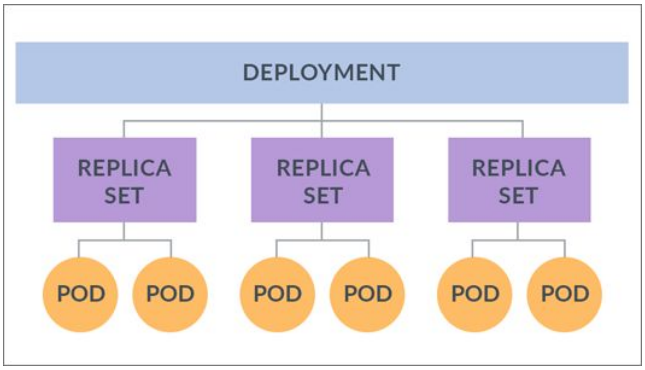
ReplicaSets



4 Deployment

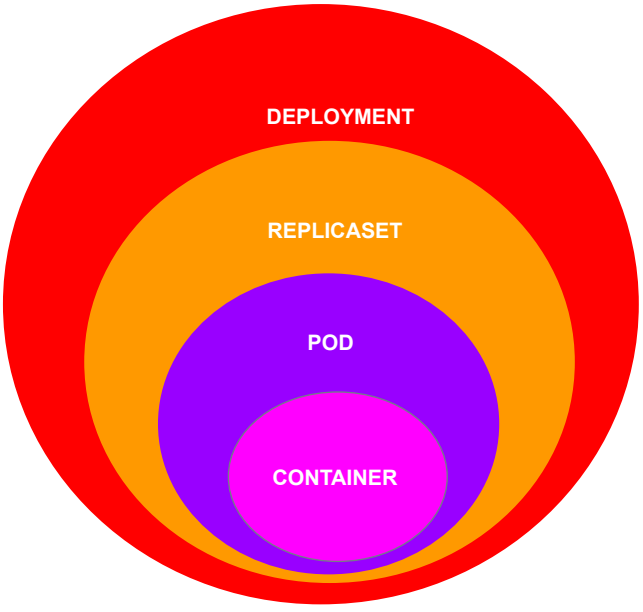


Deployment



- One step higher in the hierarchy, deployments provides declarative updates for Pods and ReplicaSets.

Deployment



5 Namespaces

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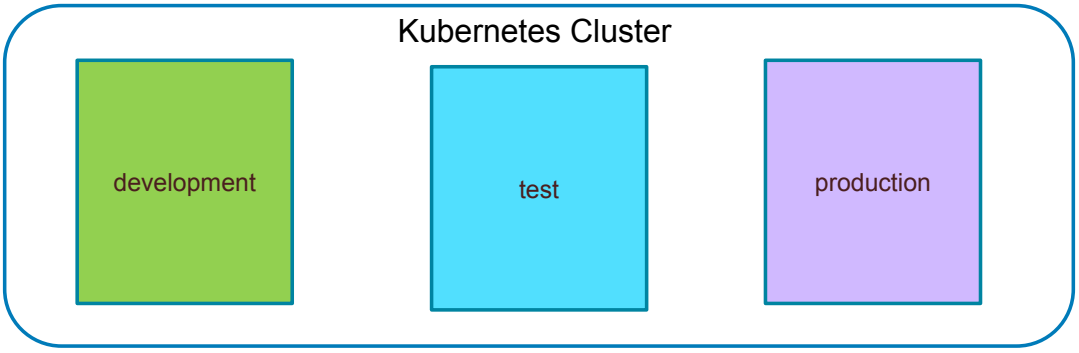
Namespaces

- Kubernetes supports multiple virtual clusters backed by the same physical cluster. These virtual clusters are called **namespaces**.
- Namespaces are intended for use in environments with many users spread across multiple teams, or projects.



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6 Object Model

Object Model

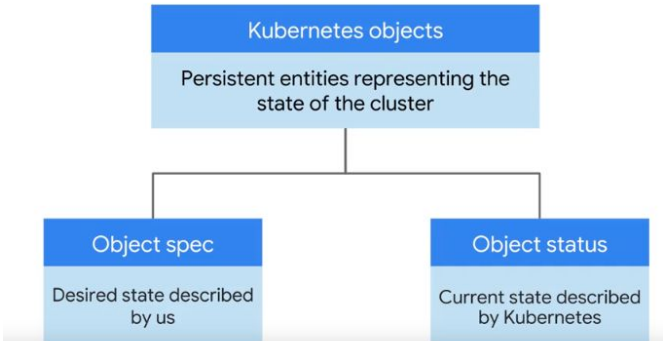
```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
spec:
  selector:
    matchLabels:
      app: nginx
  replicas: 2
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
      - name: nginx
        image: nginx:1.14.2
        ports:
        - containerPort: 80
```

All objects must have **apiVersion, kind, metadata** and **spec** fields.

- **apiVersion:** Which version of the Kubernetes API you're using to create this object
- **kind:** What kind of object you want to create
- **metadata:** Data that helps uniquely identify the object, including a **name** string, **labels**, and optional **namespace**
- **spec:** What state you desire for the object

Object Model

- Once the Deployment object is created, the Kubernetes system attaches the **status** field to the object.
- **status** is managed by Kubernetes and describes the **actual state** of the object and its history.



Object Model

Pod to ReplicaSet

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
  labels:
    app: nginx
spec:
  containers:
  - name: mynginx
    image: nginx:1.19
    ports:
    - containerPort: 80
```

```yaml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: nginx-rs
  labels:
    environment: dev
spec:
  replicas: 3
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
      - name: mynginx
        image: nginx:1.19
        ports:
        - containerPort: 80
```

7

Labels and Selectors

Labels

- Labels are key/value pairs that are attached to objects, such as pods.
- Labels can be attached to objects at creation time and subsequently added and modified at any time.
- Each object can have a set of key/value labels defined.
- Example labels:
  - **"environment" : "dev", "environment" : "qa", "environment" : "production"**
  - **"tier" : "frontend", "tier" : "backend", "tier" : "cache"**

Labels Selectors

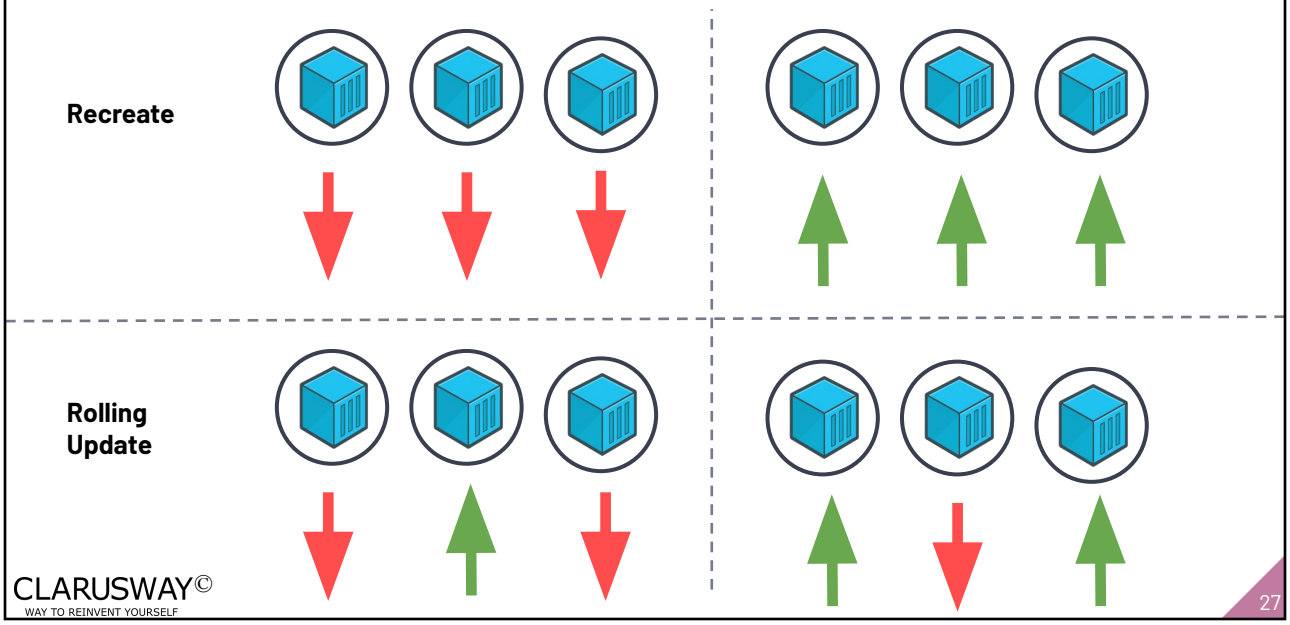
- Unlike **names and UIDs**, labels do not provide uniqueness. In general, we expect many objects to carry the same label(s).
- The Selector matches the label. Labels and selectors are required to make connections between some objects.

8 Annotations

Annotations

- You can use Kubernetes annotations to attach arbitrary non-identifying metadata to objects.
- Clients such as tools and libraries can retrieve this metadata.
- You can use either labels or annotations to attach metadata to Kubernetes objects. Labels can be used to select objects and to find collections of objects that satisfy certain conditions. In contrast, annotations are not used to identify and select objects.

Deployment Strategy



THANKS!

Any questions?

You can find me at:

- James@clarusway.com