Creating Deployments

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Module Overview

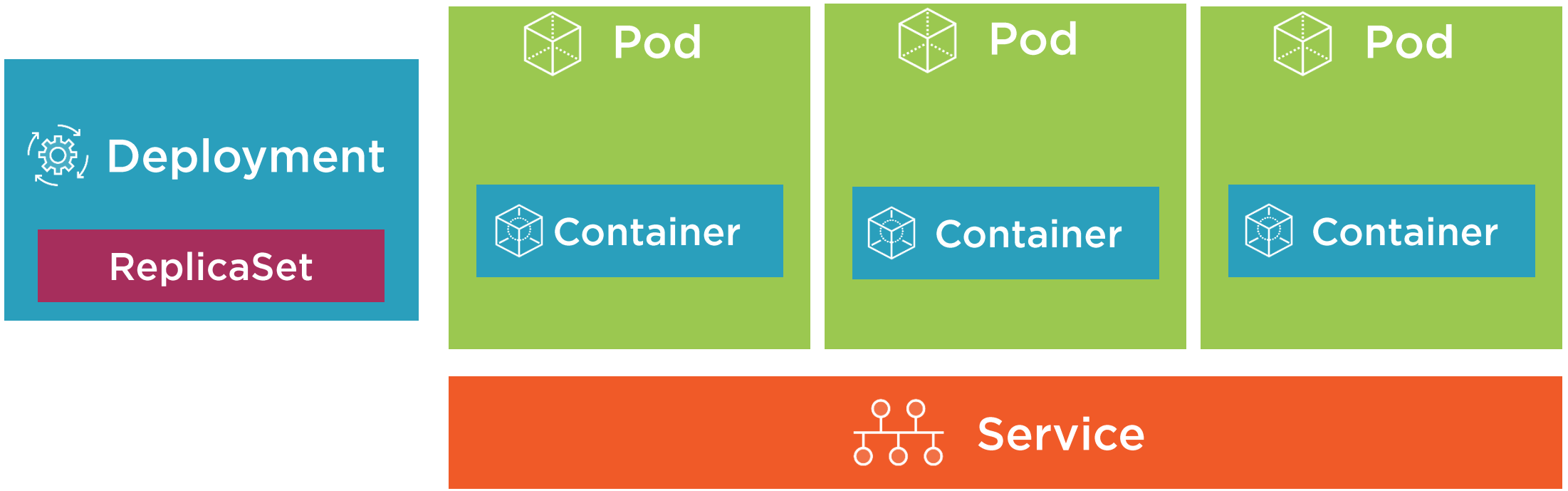
Deployments Core Concepts

Creating a Deployment

kubectl and Deployments

Deployment Options

You Are Here


Deployment
ReplicaSet
Pod
Container
Pod
Container
Pod
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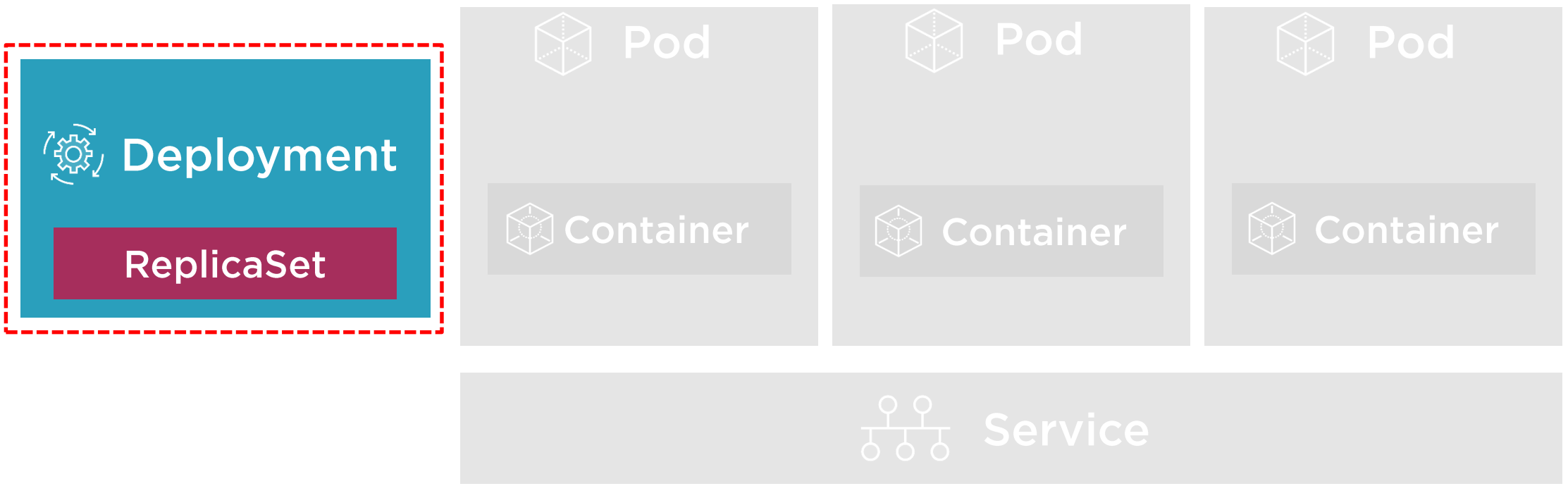
Service

You Are Here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Deployments Core Concepts

A ReplicaSet is a declarative way to manage Pods

A Deployment is a declarative way to manage Pods using a ReplicaSet

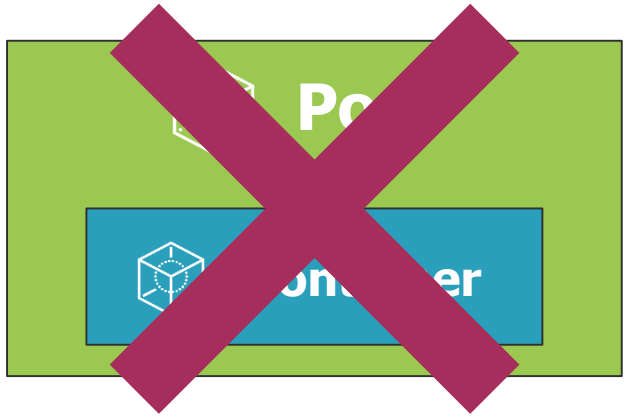
Pods, Deployments, and ReplicaSets

Pods represent the most basic resource in Kubernetes

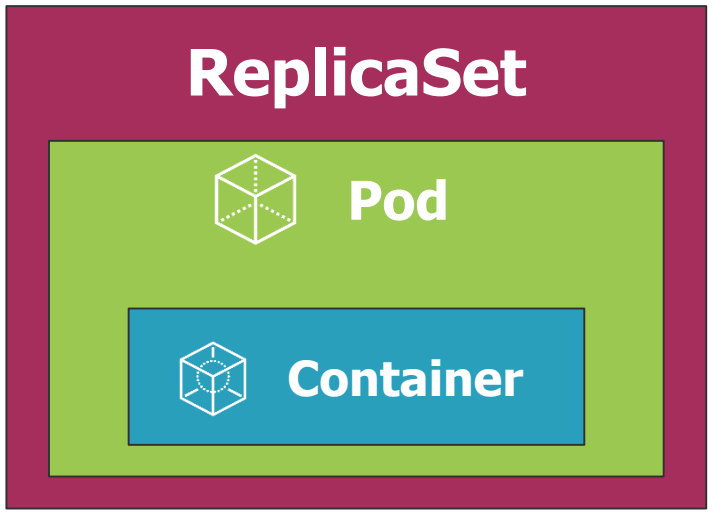
Can be created and destroyed but are never re-created

What happens if a Pod is destroyed?

Deployments and ReplicaSets ensure Pods stay running and can be used to scale Pods



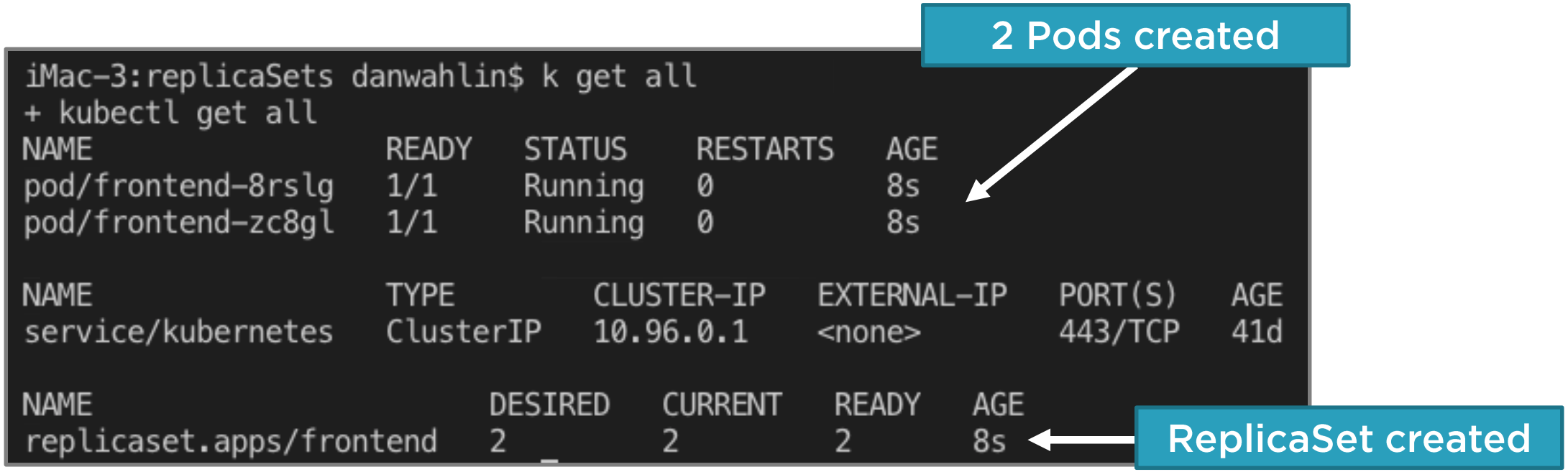
The Role of ReplicaSets



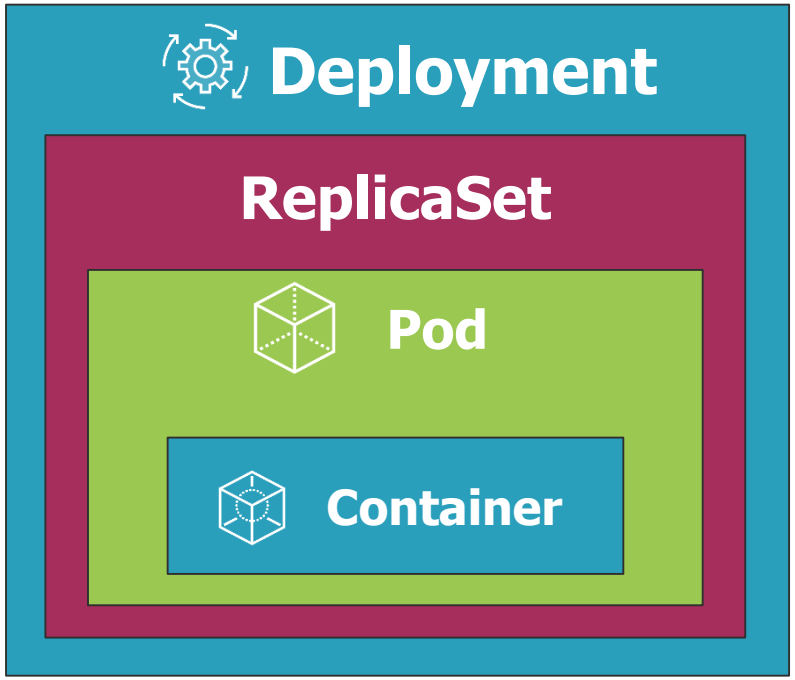
ReplicaSets act as a Pod controller:

- Self-healing mechanism
- Ensure the requested number of Pods are available
- Provide fault-tolerance
- Can be used to scale Pods
- Relies on a Pod template
- No need to create Pods directly!
- Used by Deployments

Result of Creating a ReplicaSet



The Role of Deployments



A Deployment manages Pods:

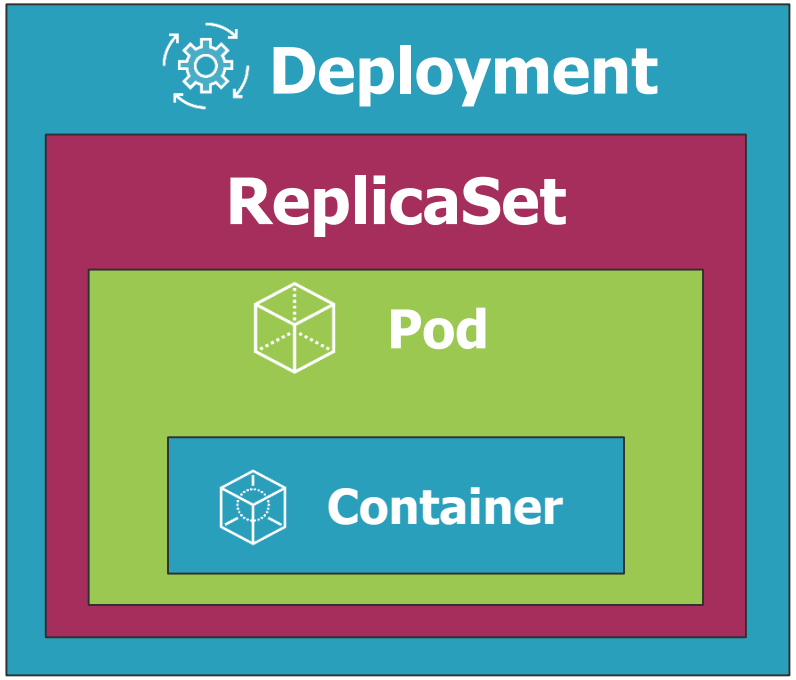
- Pods are managed using ReplicaSets
- Scales ReplicaSets, which scale Pods
- Supports zero-downtime updates by creating and destroying ReplicaSets
- Provides rollback functionality
- Creates a unique label that is assigned to the ReplicaSet and generated Pods
- YAML is very similar to a ReplicaSet

Creating a Deployment

Defining a Deployment with YAML

Deployment

+ kubectl =



Defining a Deployment (From a High-Level)

```
apiVersion: apps/v1
kind: Deployment
metadata:
spec:
  selector:
  template:
    spec:
      containers:
      - name: my-nginx
        image: nginx:alpine
```

- Kubernetes API version and resource type (Deployment)
- Metadata about the Deployment
- Select Pod template label(s)
- Template used to create the Pods
- Containers that will run in the Pod

Defining a Deployment

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: frontend
  labels:
    app: my-nginx
    tier: frontend
spec:
  selector:
    matchLabels:
      tier: frontend
  template:
    metadata:
      labels:
        tier: frontend
    spec:
      containers:
      - name: my-nginx
        image: nginx:alpine
```

- Kubernetes API version and resource type (Deployment)
- Metadata about the Deployment
- The selector is used to "select" the template to use (based on labels)
- Template to use to create the Pod/Containers (note that the selector matches the label)

Defining Probes in a Deployment

```
apiVersion: apps/v1

kind: Deployment

...

template:
  spec:
    containers:
    - name: my-nginx
      image: nginx:alpine
      livenessProbe:
        httpGet:
          path: /index.html
          port: 80
        initialDelaySeconds: 15
        timeoutSeconds: 2
        periodSeconds: 5
        failureThreshold: 1
```

- Define liveness probe (readiness probes can also be defined)
- Check /index.html on port 80

kubectl and Deployments

```
# Create a Deployment
kubectl create -f file.deployment.yml
```

Creating a Deployment

Use the kubectl create command along with the --filename or -f switch

Creating or Applying Changes

Use the kubectl apply command along with the --filename or -f switch

```
# Alternate way to create or apply changes to a
# Deployment from YAML
kubectl apply -f file.deployment.yml

# Use --save-config when you want to use
# kubectl apply in the future
kubectl create –f file.deployment.yml --save-config
```

```
kubectl get deployments
```

Getting Deployments

List all Deployments

```
# List all Deployments and their labels
kubectl get deployment --show-labels

# Get all Deployments with a specific label
kubectl get deployment -l app=nginx
```

Deployments and Labels

List the labels for all Deployments using the --show-labels switch

To get information about a Deployment with a specific label, use the -l switch

Deleting a Deployment

To delete a Deployment use kubectl delete

Will delete the Deployment and all associated Pods/Containers

```
# Delete Deployment
kubectl delete deployment [deployment-name]
```

```
# Scale the Deployment Pods to 5
kubectl scale deployment [deployment-name] --replicas=5

# Scale by refencing the YAML file
kubectl scale –f file.deployment.yml --replicas=5
```

Scaling Pods Horizontally

Update the YAML file or use the kubectl scale command

```
spec:
  replicas: 3
  selector:
    tier: frontend
```

kubectl Deployments in Action

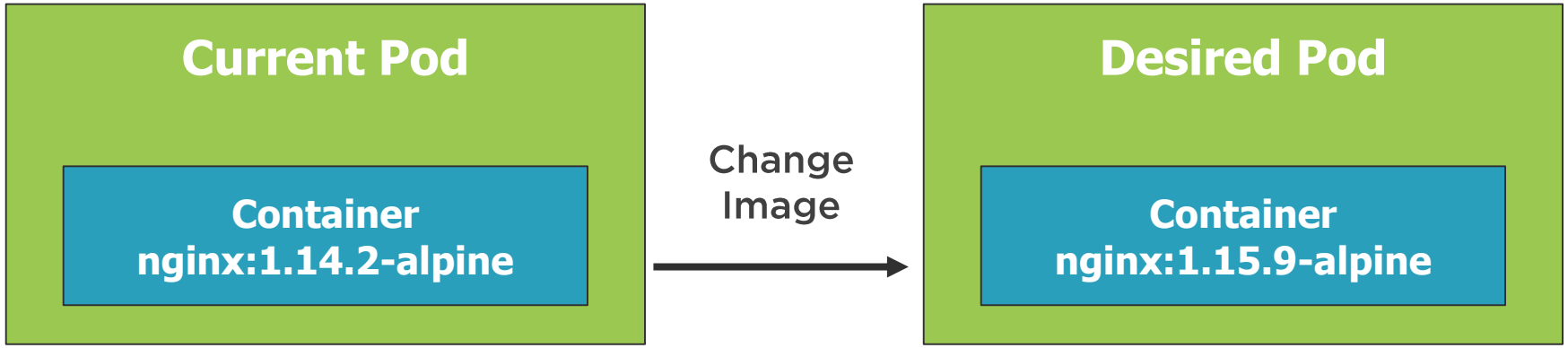
```
kubectl create –f nginx.deployment.yml --save-config

kubectl describe [pod | deployment] [pod-name | deployment-name]

kubectl apply –f nginx.pod.yml

kubectl get deployments --show-labels

kubectl get deployments –l app=my-nginx

kubectl scale -f nginx.deployment.yml --replicas=4
```

kubectl Deployments Commands

Several different kubectl commands can be used to create and work with Deployments

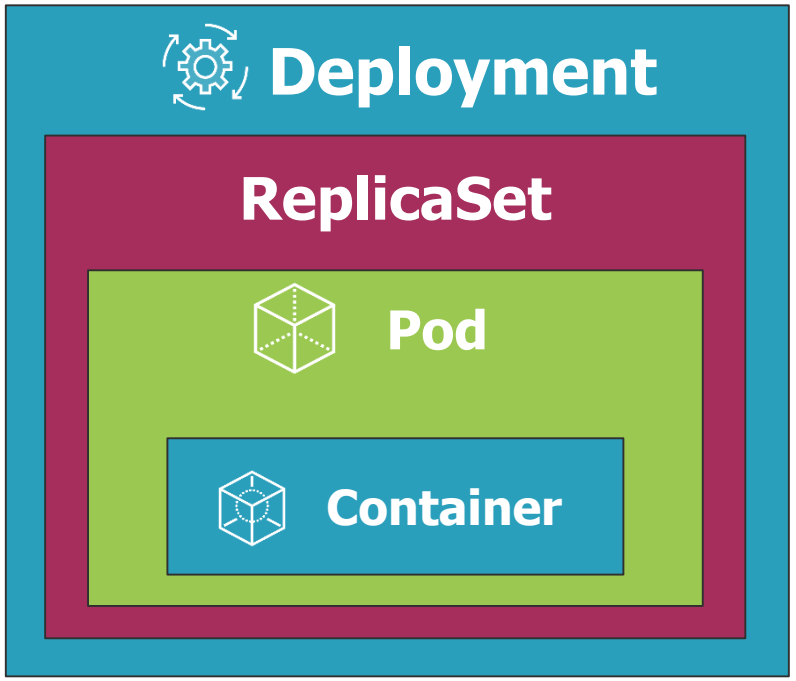
Deployment Options

How Do You Update Existing Pods?



Zero downtime deployments allow software updates to be deployed to production without impacting end users

Deployment Options



One of the strengths of Kubernetes is zero downtime deployments

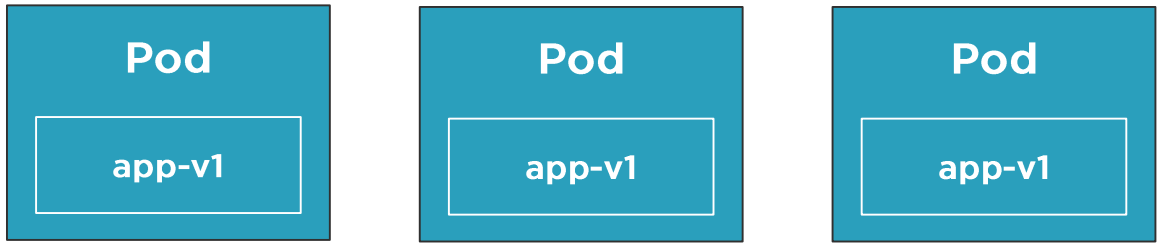
Update an application's Pods without impacting end users

Several options are available:

- Rolling updates
- Blue-green deployments
- Canary deployments
- Rollbacks

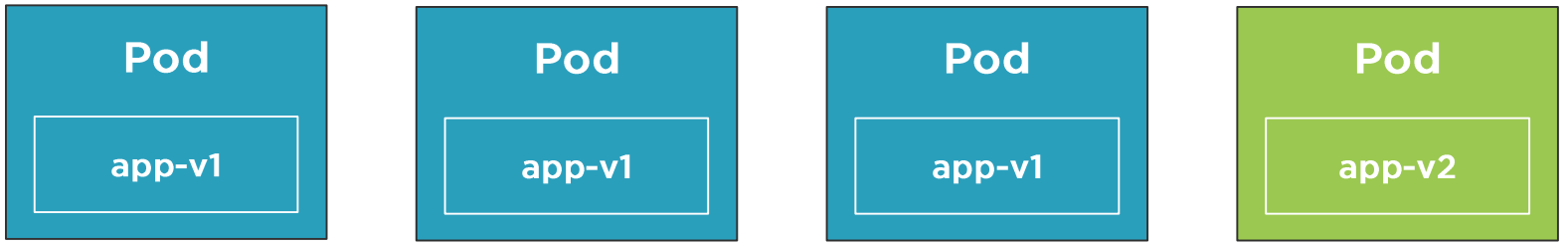
Rolling Deployments

Initial Pod State



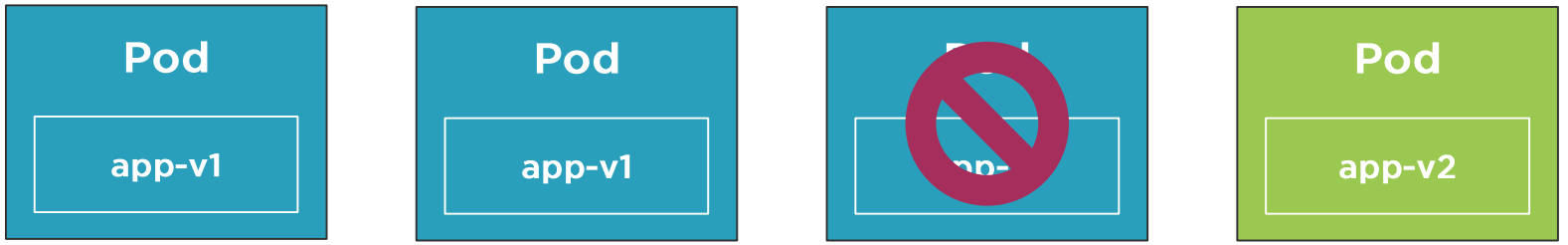
Rolling Deployments

Rollout New Pod



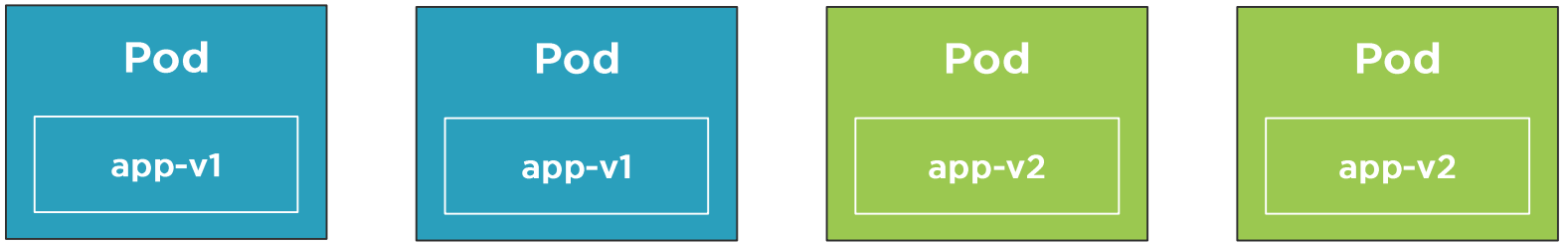
Rolling Deployments

Delete Pod

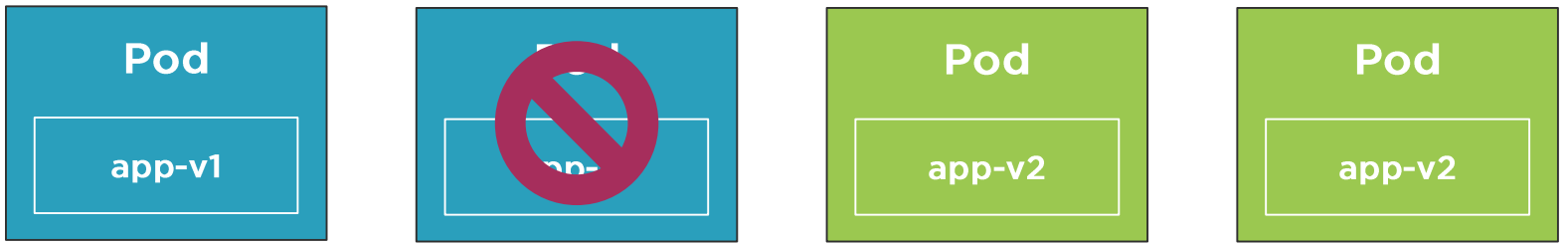


Rolling Deployments

Rollout New Pod

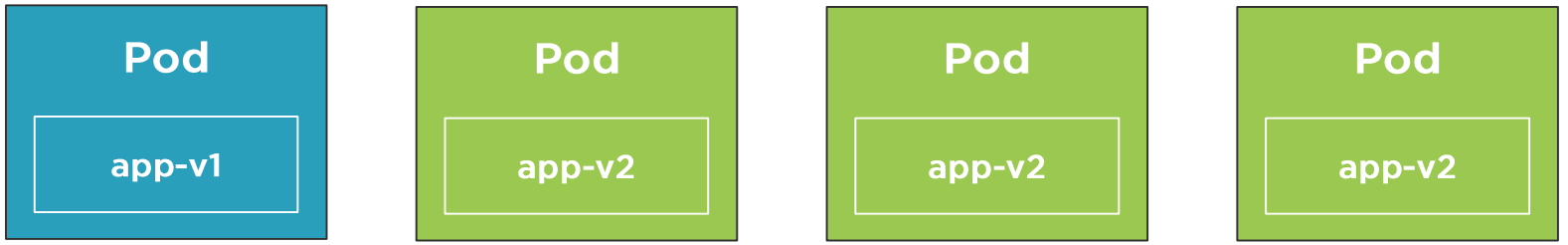


Rolling Deployments

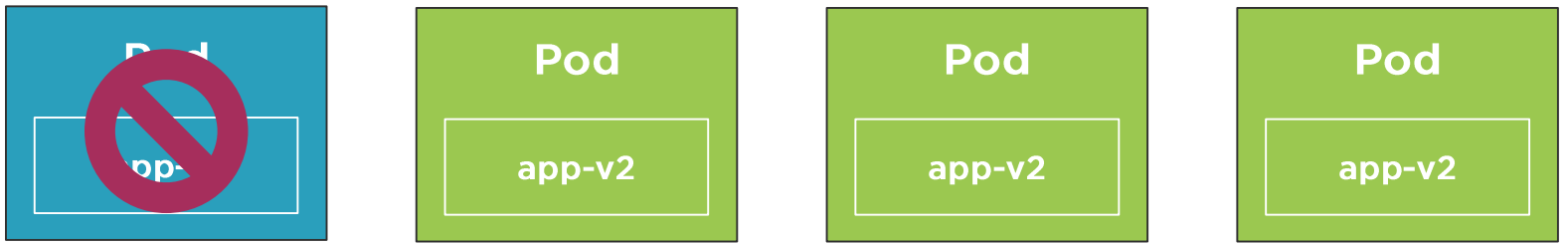


Rolling Deployments

Rollout New Pod

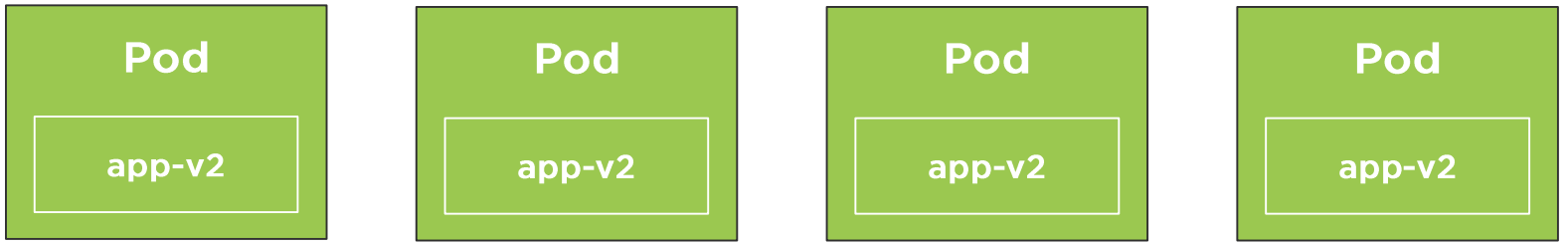


Rolling Deployments



Rolling Deployments

Rollout New Pod



Updating a Deployment

Update a deployment by changing the YAML and applying changes to the cluster with kubectl apply

```
# Apply changes made in a YAML file
kubectl apply -f file.deployment.yml
```

Zero Downtime Deployments in Action

Summary

Pods are deployed, managed, and scaled using deployments and ReplicaSets

Deployments are a higher-level resource that define one or more Pod templates

The kubectl *create* or *apply* commands can be used to run a deployment

Kubernetes supports zero downtime deployments