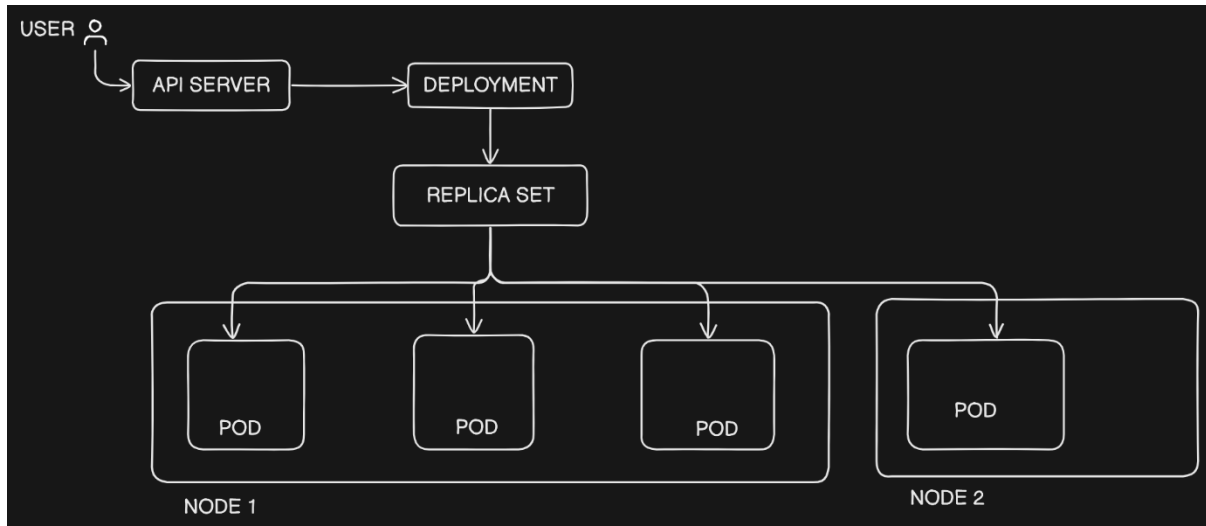


DEPLOYMENT

Deployment is the most common and recommended way to manage pods in Kubernetes. It is built on top of ReplicaSet and provides additional features, including rolling updates, rollbacks, and versioning.



Let's say you want to change the API version from 1.1 → 1.2, if every POD goes to update, we will face huge downtime to avoid the downtime we will use deployment.

We have 3 POD's running and you need to change the version, one POD will go to update and other two will manage the traffic. If traffic increases it can also spin up new POD to manage the traffic.

Once the update is done traffic will flow to that POD and next POD will go for an updated.

We can rollback to previous version also.

```

! deployment.yaml x ! replicationcontroller.yaml • ! replicaset.yaml
cluster > ! deployment.yaml
1 #kubectl explain deployment <-- for specification
2
3 apiVersion: apps/v1
4 kind: Deployment
5 metadata:
6   name: nginx-deploy
7   labels:
8     env: demo
9 spec:
10  template:
11    metadata:
12      labels:
13        env: demo
14        type: frontend
15    spec:
16      containers:
17        - name: nginx
18          image: nginx
19      replicas: 3
20  selector:
21    matchLabels:
22      env: demo
  
```

REPLICATION CONTROLLER, REPLICASET, AND DEPLOYMENT

```
manoj -->
manoj -->kubectl get po
No resources found in default namespace.
manoj -->
manoj -->kubectl apply -f deployment.yaml
deployment.apps/nginx-deploy created
manoj -->
manoj -->kubectl get po
NAME                                READY   STATUS             RESTARTS   AGE
nginx-deploy-5b8d4d9996-9tg72       0/1     ContainerCreating   0           5s
nginx-deploy-5b8d4d9996-rhdh1       1/1     Running             0           5s
nginx-deploy-5b8d4d9996-xx896       1/1     Running             0           5s
manoj -->
manoj -->kubectl get all
NAME                                READY   STATUS             RESTARTS   AGE
pod/nginx-deploy-5b8d4d9996-9tg72   1/1     Running            0           12s
pod/nginx-deploy-5b8d4d9996-rhdh1   1/1     Running            0           12s
pod/nginx-deploy-5b8d4d9996-xx896   1/1     Running            0           12s

NAME                                TYPE          CLUSTER-IP   EXTERNAL-IP   PORT(S)    AGE
service/kubernetes                  ClusterIP     10.96.0.1    <none>        443/TCP    16d

NAME                                READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/nginx-deploy        3/3     3            3           12s

NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/nginx-deploy-5b8d4d9996 3         3         3       12s
manoj -->
manoj -->
```

← deployment

← replicaset

```
manoj -->
manoj -->kubectl get deploy
NAME    READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deploy  3/3     3            3           3m16s
manoj -->
manoj -->kubectl describe deploy nginx-deploy
Name:          nginx-deploy
Namespace:     default
CreationTime:  Mon, 07 Oct 2024 21:14:19 +0530
Labels:        env=demo
Annotations:    deployment.kubernetes.io/revision: 1
Selector:      env=demo
Replicas:      3 desired | 3 updated | 3 total | 3 available | 0 unavailable
StrategyType:  RollingUpdate
MinReadySeconds: 0
RollingUpdateStrategy: 25% max unavailable, 25% max surge
Pod Template:
  Labels:  env=demo, type=frontend
  Containers:
    nginx:
      Image:          nginx
      Port:           <none>
      Host Port:      <none>
      Environment:    <none>
      Mounts:         <none>
      Volumes:        <none>
      Node-Selectors: <none>
      Tolerations:    <none>
  Conditions:
    Type             Status      Reason
    ----             -
    Available         True        MinimumReplicasAvailable
    Progressing       True        NewReplicaSetAvailable
    OldReplicaSets:   <none>
    NewReplicaSet:    nginx-deploy-5b8d4d9996 (3/3 replicas created)

Type             Reason             Age             From              Message
--             --
Normal          ScalingReplicaSet   3m35s          deployment-controller  Scaled up replica set nginx-deploy-5b8d4d9996 to 3
manoj -->
manoj -->
```

now let me roll the image from
"nginx" -> "nginx:1.9.1"

```
manoj -->
manoj -->kubectl rollout history deploy/nginx-deploy
deployment.apps/nginx-deploy
REVISION  CHANGE-CAUSE
1          <none>

manoj -->
manoj -->kubectl set image deploy nginx-deploy nginx=nginx:1.9.1
deployment.apps/nginx-deploy image updated
manoj -->
manoj -->kubectl rollout history deploy/nginx-deploy
deployment.apps/nginx-deploy
REVISION  CHANGE-CAUSE
1          <none>
2          <none>

manoj -->
manoj -->
```

REPLICATION CONTROLLER, REPLICASET, AND DEPLOYMENT

```
manoj -->
manoj -->kubectl describe deploy nginx-deploy
Name: nginx-deploy
Namespace: default
CreationTimestamp: Mon, 07 Oct 2024 21:14:19 +0530
Labels: env=demo
Annotations: deployment.kubernetes.io/revision: 2
Selector: env=demo
Replicas: 3 desired | 3 updated | 3 total | 3 available | 0 unavailable
StrategyType: RollingUpdate
MinReadySeconds: 0
RollingUpdateStrategy: 25% max unavailable, 25% max surge
Pod Template:
  Labels: env=demo
  Containers:
    type=frontend
    nginx:
      Image: nginx:1.9.1
      Port: <none>
      Host Port: <none>
      Environment: <none>
      Mounts: <none>
      Volumes: <none>
      Node-Selectors: <none>
      Tolerations: <none>
Conditions:
  Type Status Reason
  ----
  Available True MinimumReplicasAvailable
  Progressing True NewReplicaSetAvailable
OldReplicaSets: nginx-deploy-5b8d4d9996 (0/0 replicas created)
NewReplicaSet: nginx-deploy-5dd9557947 (3/3 replicas created)
```

we can see image got updated from nginx to nginx:1.9.1

```
Selector: env=demo
Replicas: 3 desired | 3 updated | 3 total | 3 available | 0 unavailable
Annotations: deployment.kubernetes.io/revision: 1
StrategyType: RollingUpdate
Selector: env=demo
Replicas: 3 desired | 3 updated | 3 total | 3 available | 0 unavailable
StrategyType: RollingUpdate
MinReadySeconds: 0
RollingUpdateStrategy: 25% max unavailable, 25% max surge
Pod Template:
  Labels: env=demo
  Containers:
    type=frontend
    nginx:
      Image: nginx
      Port: <none>
      Host Port: <none>
      Environment: <none>
      Mounts: <none>
      Volumes: <none>
      Node-Selectors: <none>
      Tolerations: <none>
Conditions:
  Type Status Reason
  ----
  Available True MinimumReplicasAvailable
  Progressing True NewReplicaSetAvailable
OldReplicaSets: <none>
NewReplicaSet: nginx-deploy-5b8d4d9996 (3/3 replicas created)
```

```
manoj -->
manoj -->kubectl describe deploy nginx-deploy
Name: nginx-deploy
Namespace: default
CreationTimestamp: Mon, 07 Oct 2024 21:14:19 +0530
Labels: env=demo
Annotations: deployment.kubernetes.io/revision: 2
Selector: env=demo
Replicas: 3 desired | 3 updated | 3 total | 3 available | 0 unavailable
StrategyType: RollingUpdate
MinReadySeconds: 0
Progressing True NewReplicaSetAvailable
OldReplicaSets: nginx-deploy-5b8d4d9996 (0/0 replicas created)
NewReplicaSet: nginx-deploy-5dd9557947 (3/3 replicas created)
Events:
  Type Reason Age From Message
  ----
  Normal ScalingReplicaSet 13m deployment-controller Scaled up replica set nginx-deploy-5b8d4d9996 to 3
  Normal ScalingReplicaSet 68s deployment-controller Scaled up replica set nginx-deploy-5dd9557947 to 1
  Normal ScalingReplicaSet 62s deployment-controller Scaled down replica set nginx-deploy-5b8d4d9996 to 2 from 3
  Normal ScalingReplicaSet 62s deployment-controller Scaled up replica set nginx-deploy-5dd9557947 to 2 from 1
  Normal ScalingReplicaSet 56s deployment-controller Scaled down replica set nginx-deploy-5b8d4d9996 to 1 from 2
  Normal ScalingReplicaSet 56s deployment-controller Scaled up replica set nginx-deploy-5dd9557947 to 3 from 2
  Normal ScalingReplicaSet 51s deployment-controller Scaled down replica set nginx-deploy-5b8d4d9996 to 0 from 1
```

we can see here, 3 replicas got updated from old replicas to new replicas

```
manoj -->
manoj -->kubectl rollout history deploy/nginx-deploy
deployment.apps/nginx-deploy
REVISION CHANGE-CAUSE
1 <none>
2 <none>

manoj -->
manoj --># let me go back to the previous image only
manoj -->
```

REPLICATION CONTROLLER, REPLICASET, AND DEPLOYMENT

```
manoj -->
manoj --> kubectl describe deploy nginx-deploy
Name:          nginx-deploy
Namespace:     default
CreationTime:  Mon, 07 Oct 2024 21:14:19 +0530
Labels:       env=demo
Annotations:  deployment.kubernetes.io/revision: 3
Selector:     env=demo
Replicas:     3 desired | 3 updated | 3 total | 3 available | 0 unavailable
StrategyType: RollingUpdate
MinReadySeconds: 0
RollingUpdateStrategy: 25% max unavailable, 25% max surge
Pod Template:
  Labels:  env=demo
  Type:    Type=Frontend
Containers:
  nginx:
    Image:      nginx
    Host Port:  <none>
    Environment: <none>
    Mounts:      <none>
    Volumes:     <none>
    Node-Selectors: <none>
    Tolerations:  <none>
Conditions:
  Type           Status  Reason
  ----           -
  Available      True    MinimumReplicasAvailable
  Progressing    True    NewReplicaSetAvailable
  OldReplicaSets: nginx-deploy-5d9557947 (0/0 replicas created)
  NewReplicaSet:  nginx-deploy-5b8d4d9996 (3/3 replicas created)
Events:
  Type    Reason      Age    From          Message
  ----    -
  Normal  ScalingReplicaSet   21s    deployment-controller  Scaled up replica set nginx-deploy-5b8d4d9996 to 3
  Normal  ScalingReplicaSet   9m25s  deployment-controller  Scaled up replica set nginx-deploy-5d9557947 to 1
  Normal  ScalingReplicaSet   9m19s  deployment-controller  Scaled down replica set nginx-deploy-5b8d4d9996 to 2 from 3
  Normal  ScalingReplicaSet   9m19s  deployment-controller  Scaled up replica set nginx-deploy-5d9557947 to 2 from 1
  Normal  ScalingReplicaSet   9m13s  deployment-controller  Scaled down replica set nginx-deploy-5b8d4d9996 to 1 from 2
  Normal  ScalingReplicaSet   9m13s  deployment-controller  Scaled up replica set nginx-deploy-5d9557947 to 3 from 2
  Normal  ScalingReplicaSet   9m8s   deployment-controller  Scaled down replica set nginx-deploy-5b8d4d9996 to 0 from 1
  Normal  ScalingReplicaSet   9m3s   deployment-controller  Scaled up replica set nginx-deploy-5b8d4d9996 to 1 from 0
  Normal  ScalingReplicaSet   89s    deployment-controller  Scaled down replica set nginx-deploy-5d9557947 to 2 from 3
  Normal  ScalingReplicaSet   89s    deployment-controller  Scaled up replica set nginx-deploy-5b8d4d9996 to 2 from 1
  Normal  ScalingReplicaSet   81s (x3 over 86s)  deployment-controller  (combined from similar events): Scaled down replica set nginx-deploy-5d9557947 to 0 from 1
```

we rollback to previous image only

Key points:

- Automates the creation and management of ReplicaSets and their pods.
- Supports rolling updates to ensure zero downtime during updates.
- Supports rollbacks to previous versions in case of failures.
- Can pause and resume deployments.

Key Differences

- **Replication Controller** is older and lacks features like rolling updates.
- **ReplicaSet** is an improvement on Replication Controller but is usually managed by Deployments.
- **Deployment** is the most advanced and recommended method, providing features like rolling updates, rollbacks, and better pod management.