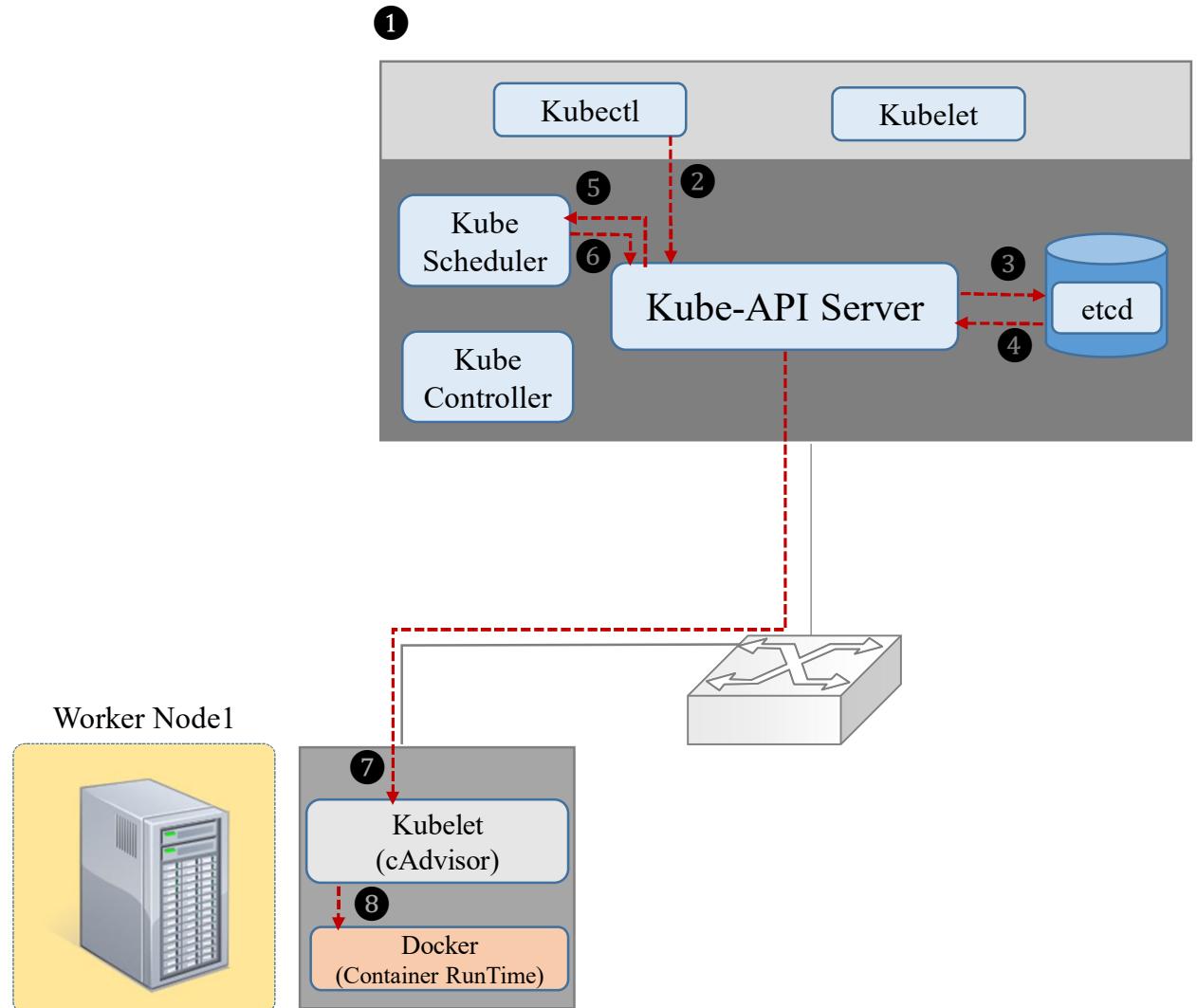


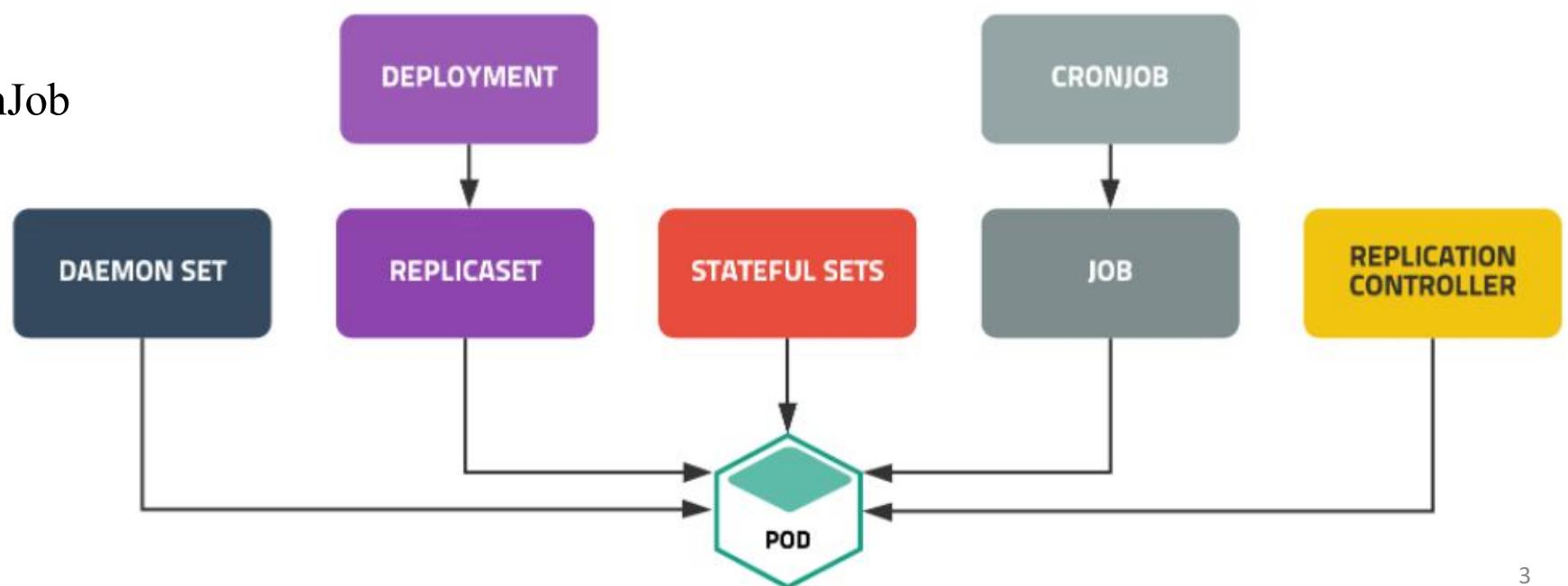
K8S Controller

Controller

- pod 개수를 보장
- 파드들을 관리하는 역할
 - 장시간 실행되는 파드 관리
 - 파드들의 주기적인 배치



- Replication Controller
- ReplicaSet
- Deployment
- DaemonSet
- Statefulset
- Job
- CronJob



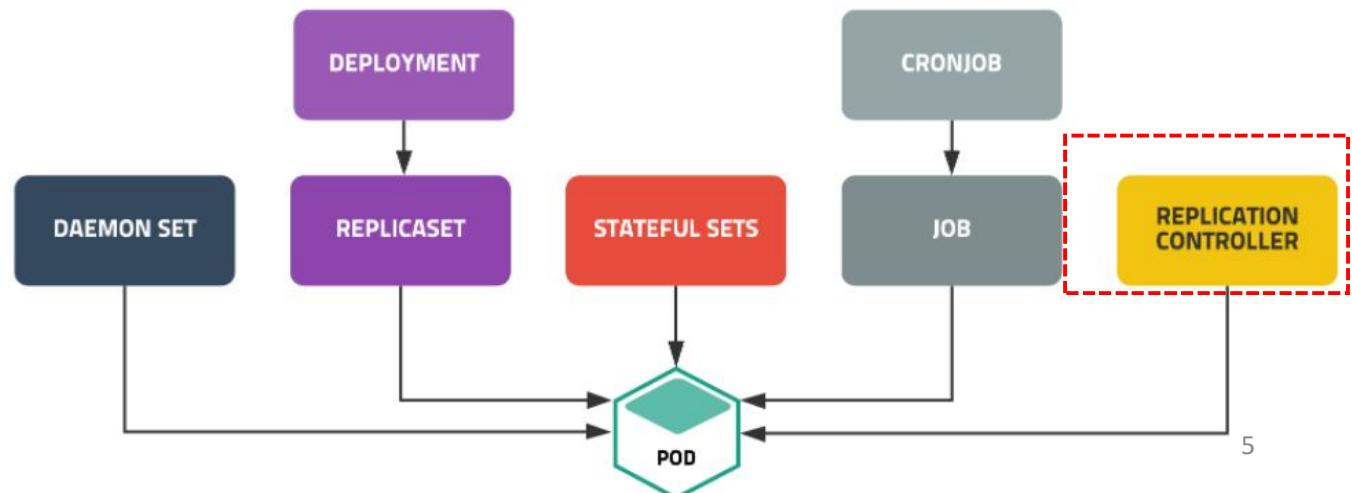
- Replication Controller
- ReplicaSet
- Deployment
- DaemonSet
- Statefulset
- Job
- CronJob

```
apiVersion: v1
kind: ReplicationController
metadata:
  name: rc-main
spec:
  replicas: 2
  selector:
    app: main
    name: apache
    rel: stable
  template:
    metadata:
      labels:
        app: main
        name: apache
        rel: stable
    spec:
      containers:
        - name: webui
          image: httpd:2.2
          ports:
            - containerPort: 80
```

```
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: nginx-replicaset
spec:
  template:
    metadata:
      name: nginx-replicaset
    labels:
      app: nginx-replicaset
    spec:
      containers:
        - name: nginx-replicaset
          image: nginx
          ports:
            - containerPort: 80
  replicas: 3
  selector:
    matchLabels:
      app: nginx-replicaset
```

1. Replication controller

- 지정한 숫자만큼의 pod가 항상 클러스터 안에서 실행되도록 관리
 - 요구하는 Pod 개수 보장
 - 파드 집합의 실행을 항상 안정적으로 유지하는 것을 목표
 - 요구하는 pod 개수가 부족하면 template을 이용해 pod 추가
 - 요구하는 pod 수보다 많으면 최근에 생성된 pod 삭제

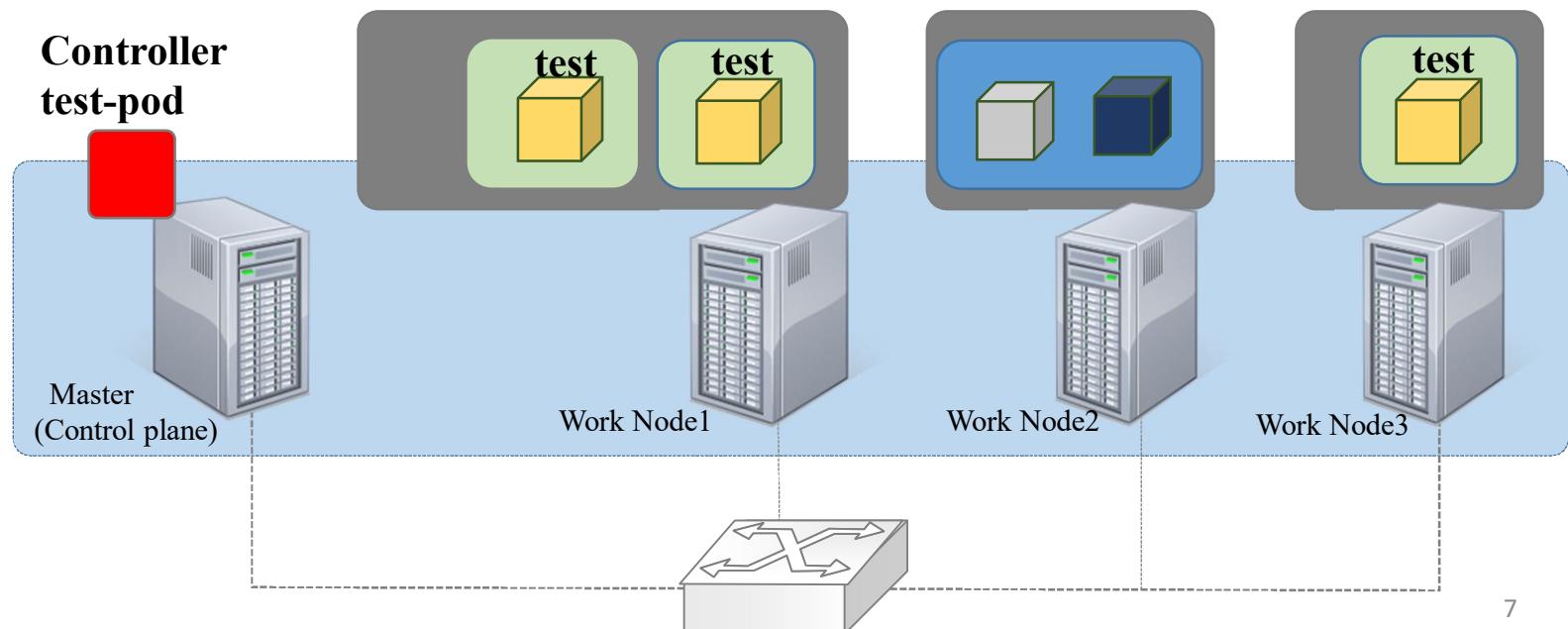


- 기본 구성
 - selector
 - replicas
 - template

```
apiVersion: apps/v1
kind: ReplicationController
metadata:
  name: <RC_name>
spec:
  replicas: <배포 개수>
  selector:
    key: value
  template:
    <컨테이너 템플릿>
```

```
apiVersion: apps/v1
kind: ReplicationController
metadata:
  name: rc_test
spec:
  replicas: 3
  selector:
    app: test
  template:
    <컨테이너 템플릿>
```

```
apiVersion: v1
kind: ReplicationController
metadata:
  name: test-pod
spec:
  replicas: 3
  selector:
    app: test
  template:
```



```
apiVersion: v1
kind: Pod
metadata:
  name: test-pod
  labels:
    app: test
spec:
  containers:
  - name: nginx-container
    image: nginx:1.14
```

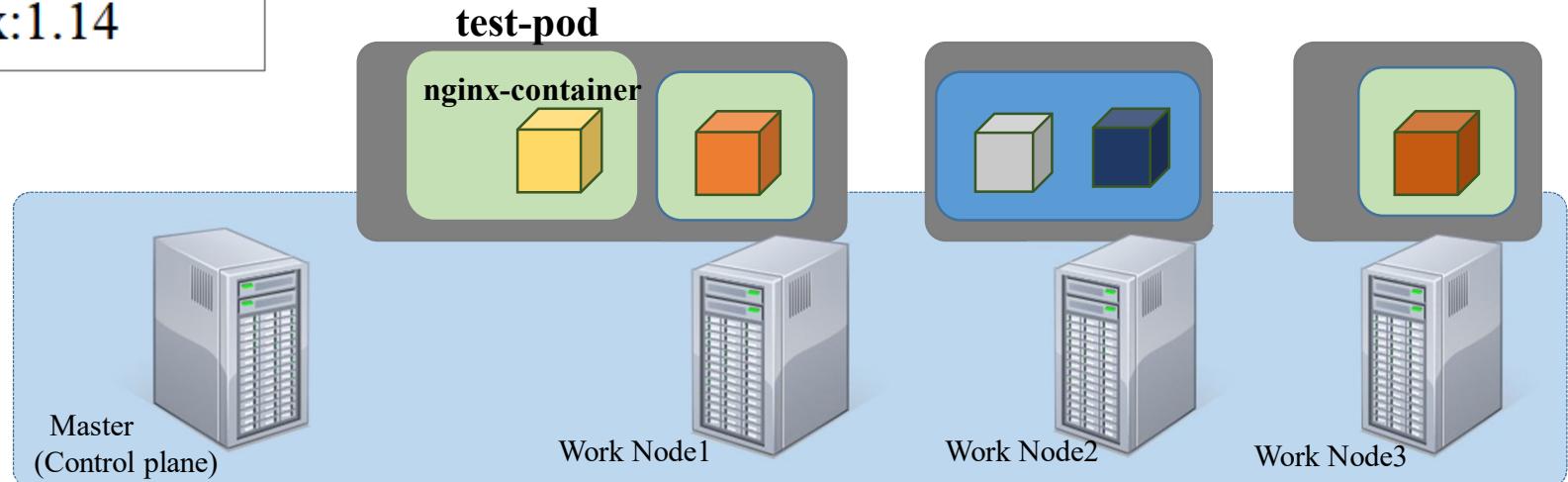
<<rc-exam.yaml>>

kubectl create -f rc_exam

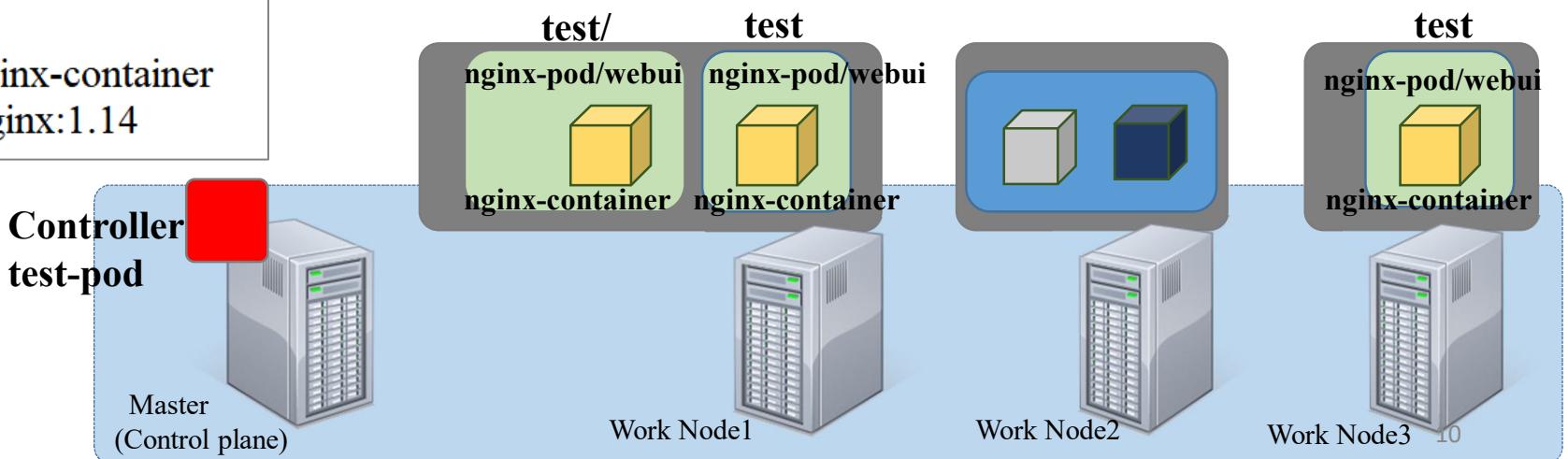
```
apiVersion: v1
kind: ReplicationController
metadata:
  name: test-pod
spec:
  replicas: 3
  selector:
    app: test
  template:
    metadata:
      name: nginx-pod
      labels:
        app: webui
    spec:
      containers:
      - name: nginx-container
        image: nginx:1.14
```

<<rc-exam.yaml>>

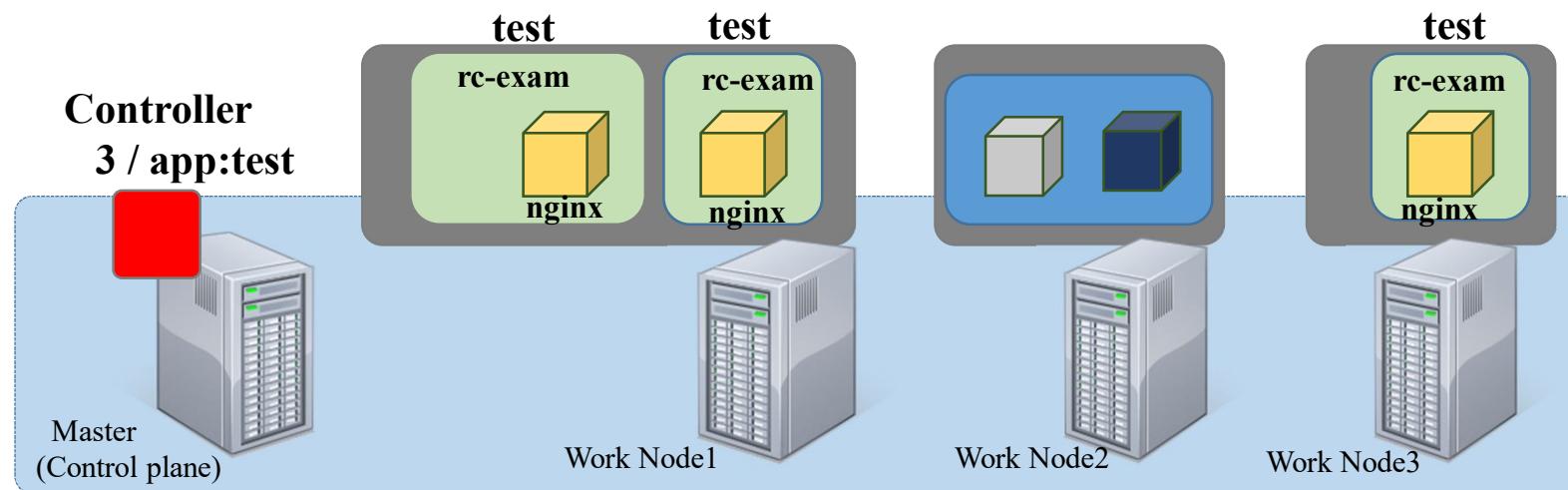
```
apiVersion: v1
kind: Pod
metadata:
  name: test-pod
  labels:
    app: test
spec:
  containers:
  - name: nginx-container
    image: nginx:1.14
```



```
apiVersion: v1
kind: ReplicationController
metadata:
  name: test-pod
spec:
  replicas: 3
  selector:
    app: test
  template:
    metadata:
      name: nginx-pod
    labels:
      app: webui
  spec:
    containers:
    - name: nginx-container
      image: nginx:1.14
```



```
kubectl create rc_exam --image=nginx --replica=3 --selector=app=test
```



```
kubectl get nodes
```

```
kubectl get nodes -o wide
```

```
[node1 ~]$ kubectl get nodes
NAME     STATUS    ROLES
node1   Ready     control-plane,master
node2   Ready     <none>
node3   Ready     <none>
node4   NotReady <none>
[node1 ~]$
[node1 ~]$ kubectl get nodes -o wide
NAME     STATUS    ROLES          AGE    VERSION    INTERNAL-IP
node1   Ready     control-plane,master 2m53s  v1.20.1   192.168.0.8
node2   Ready     <none>        86s   v1.20.1   192.168.0.7
node3   Ready     <none>        53s   v1.20.1   192.168.0.6
node4   Ready     <none>        26s   v1.20.1   192.168.0.5
[node1 ~]$
```

```

apiVersion: v1
kind: ReplicationController
metadata:
  name: rc-nginx
spec:
  replicas: 3
  selector:
    app: webui
  template:
    metadata:
      name: nginx-pod
    labels:
      app: webui
  spec:
    containers:
      - name: nginx-container
        image: nginx:1.14

```

<<rc-nginx.yaml>>

실습 1

kubectl create -f rc.nginx.yaml

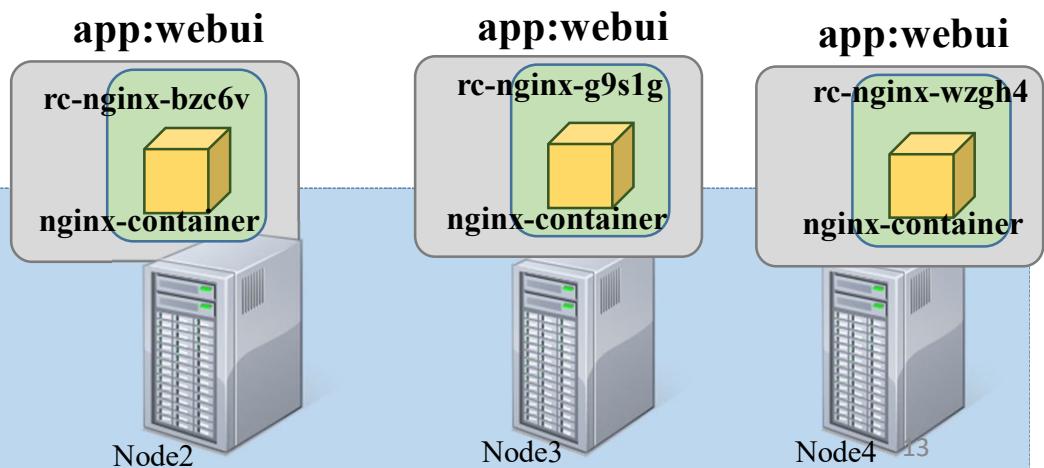
```

[node1 ~]$ kubectl create -f rc-nginx.yaml
replicationcontroller/rc-nginx created
[node1 ~]$ kubectl get pods -o wide
NAME          READY   STATUS    RESTARTS   AGE     IP           NODE
rc-nginx-bzc6v 1/1     Running   0          2m24s  10.5.1.2   node2
rc-nginx-g9s1g 1/1     Running   0          2m24s  10.5.3.2   node3
rc-nginx-wzgh4 1/1     Running   0          2m24s  10.5.4.2   node4
[node1 ~]$

```

Controller(rc-nginx)
3 / app:webui

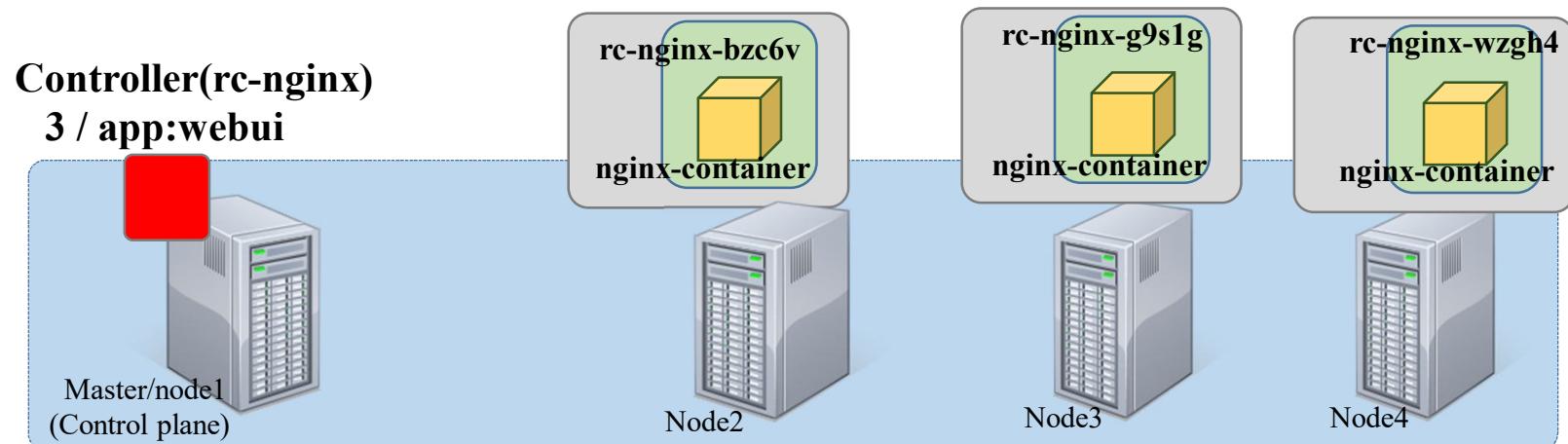
Master/node1
(Control plane)



```

[node1 ~]$ kubectl get pods
NAME          READY   STATUS    RESTARTS   AGE
rc-nginx-bzc6v 1/1     Running   0          10m
rc-nginx-g9s1g 1/1     Running   0          10m
rc-nginx-wzgh4 1/1     Running   0          10m
[node1 ~]$
[node1 ~]$ kubectl get pods --show-labels
NAME          READY   STATUS    RESTARTS   AGE   LABELS
rc-nginx-bzc6v 1/1     Running   0          11m   app=webui
rc-nginx-g9s1g 1/1     Running   0          11m   app=webui
rc-nginx-wzgh4 1/1     Running   0          11m   app=webui
[node1 ~]$
[node1 ~]$ kubectl get rc
NAME      DESIRED   CURRENT   READY   AGE
rc-nginx   3         3         3       11m

```



kubectl describe rc rc-nginx

```
[node1 ~]$ kubectl describe rc rc-nginx
Name:          rc-nginx
Namespace:     default
Selector:      app=webui
Labels:        app=webui
Annotations:   <none>
Replicas:      3 current / 3 desired
Pods Status:   3 Running / 0 Waiting / 0 Succeeded / 0 Failed
Pod Template:
  Labels:  app=webui
  Containers:
    nginx-container:
      Image:      nginx:1.14
      Port:       <none>
      Host Port:  <none>
      Environment: <none>
      Mounts:     <none>
      Volumes:    <none>
  Events:
    Type      Reason          Age      From            Message
    ----      -----          ----     ----
    Normal    SuccessfulCreate 4m58s   replication-controller  Created pod: rc-nginx-wzgh4
    Normal    SuccessfulCreate 4m58s   replication-controller  Created pod: rc-nginx-g9slg
    Normal    SuccessfulCreate 4m58s   replication-controller  Created pod: rc-nginx-bzc6v
```

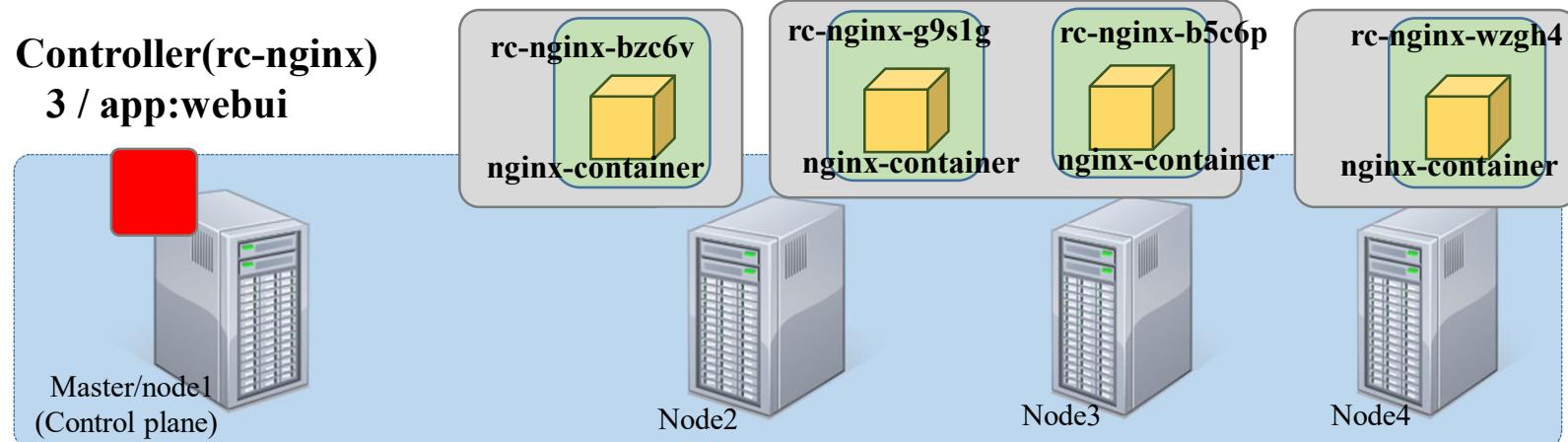
Scale-out

kubectl edit rc rc-nginx

```
# Please edit the object below. Lines beginning
# and an empty file will abort the edit. If an
# reopened with the relevant failures.
#
apiVersion: v1
kind: ReplicationController
metadata:
  creationTimestamp: "2022-05-05T01:37:34Z"
  generation: 1
  labels:
    app: webui
    name: rc-nginx
  namespace: default
  resourceVersion: "1606"
  uid: 6574e3ad-bf27-454d-87fc-8c8ad4359873
spec:
  replicas: 3
  selector:
    app: webui
  template:
    metadata:
      creationTimestamp: null
      labels:
        app: webui
        name: nginx-pod
```

```
# Please edit the object below. Lines beginning
# and an empty file will abort the edit. If an
# reopened with the relevant failures.
#
apiVersion: v1
kind: ReplicationController
metadata:
  creationTimestamp: "2022-05-05T01:37:34Z"
  generation: 1
  labels:
    app: webui
    name: rc-nginx
  namespace: default
  resourceVersion: "1606"
  uid: 6574e3ad-bf27-454d-87fc-8c8ad4359873
spec:
  replicas: 4
  selector:
    app: webui
  template:
    metadata:
      creationTimestamp: null
      labels:
        app: webui
        name: nginx-pod
```

```
[node1 ~]$ kubectl edit rc rc-nginx
replicationcontroller/rc-nginx edited
[node1 ~]$ kubectl get pods
NAME           READY   STATUS    RESTARTS   AGE
rc-nginx-b5c6p 1/1     Running   0          11s
rc-nginx-bzc6v 1/1     Running   0          18m
rc-nginx-g9s1g  1/1     Running   0          18m
rc-nginx-wzgh4  1/1     Running   0          18m
[node1 ~]$ kubectl get pods -o wide
NAME           READY   STATUS    RESTARTS   AGE   IP          NODE
rc-nginx-b5c6p 1/1     Running   0          25s   10.5.3.3   node3
rc-nginx-bzc6v 1/1     Running   0          18m   10.5.1.2   node2
rc-nginx-g9s1g  1/1     Running   0          18m   10.5.3.2   node3
rc-nginx-wzgh4  1/1     Running   0          18m   10.5.4.2   node4
[node1 ~]$
```



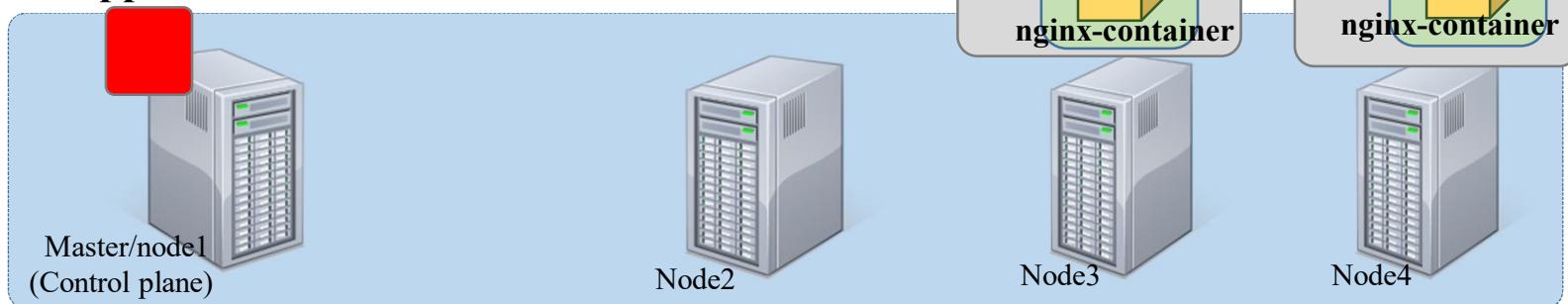
Scale-in

```
kubectl scale rc rc-nginx --replicas=2  
kubectl get pods -o wide
```

```
[node1 ~]$ kubectl get pods -o wide  
NAME          READY   STATUS    RESTARTS   AGE     IP           NODE   NOMINATED NODE  
rc-nginx-b5c6p 1/1     Running   0          25s    10.5.3.3    node3  <none>  
rc-nginx-bzc6v 1/1     Running   0          18m    10.5.1.2    node2  <none>  
rc-nginx-g9s1g  1/1     Running   0          18m    10.5.3.2    node3  <none>  
rc-nginx-wzgh4  1/1     Running   0          18m    10.5.4.2    node4  <none>  
[node1 ~]$  
[node1 ~]$ kubectl scale rc rc-nginx --replicas=2  
replicationcontroller/rc-nginx scaled  
[node1 ~]$ kubectl get pods -o wide  
NAME          READY   STATUS    RESTARTS   AGE     IP           NODE   NOMINATED NODE  
rc-nginx-g9s1g 1/1     Running   0          20m    10.5.3.2    node3  <none>  
rc-nginx-wzgh4  1/1     Running   0          20m    10.5.4.2    node4  <none>  
[node1 ~]$
```

Controller(rc-nginx)

3 / app:webui



Rolling-update(1)

```
kubectl edit rc rc-nginx
```

```
spec:  
  containers:  
    - image: nginx:1.14  
      imagePullPolicy: IfNotPresent  
      name: nginx-container  
      resources: {}  
      terminationMessagePath: /dev/termination-log  
      terminationMessagePolicy: File  
      dnsPolicy: ClusterFirst  
      restartPolicy: Always  
      schedulerName: default-scheduler  
      securityContext: {}  
      terminationGracePeriodSeconds: 30
```

```
spec:  
  containers:  
    - image: nginx:1.15  
      imagePullPolicy: IfNotPresent  
      name: nginx-container  
      resources: {}  
      terminationMessagePath: /dev/termination-log  
      terminationMessagePolicy: File  
      dnsPolicy: ClusterFirst  
      restartPolicy: Always  
      schedulerName: default-scheduler  
      securityContext: {}  
      terminationGracePeriodSeconds: 30
```

Rolling-update(2)

kubectl describe pods rc-nginx-XXXX

```
[node1 ~]$ kubectl get pods
NAME          READY   STATUS    RESTARTS   AGE
rc-nginx-g9slg  1/1    Running   0          31m
rc-nginx-wzgh4  1/1    Running   0          31m
[node1 ~]$ kubectl describe pods rc-nginx-g9slg
Name:         rc-nginx-g9slg
Namespace:    default
Priority:    0
Node:        node3/192.168.0.6
Start Time:  Thu, 05 May 2022 01:37:34 +0000
Labels:      app=webui
Annotations: <none>
Status:     Running
IP:          10.5.3.2
IPs:
  IP:          10.5.3.2
Controlled By: ReplicationController/rc-nginx
Containers:
  nginx-container:
    Container ID:  docker://0bc6a40c0b228bd8816fdb60c41
    Image:        nginx:1.14
    Image ID:     docker-pullable://nginx@sha256:f798e
```

Rolling-update(3)

kubectl delete pod rc-nginx-XXXX

kubectl get pods -o wide

kubectl describe pods rc-nginx-XXXX

```
[node1 ~]$ kubectl delete pod rc-nginx-g9slg
pod "rc-nginx-g9slg" deleted
[node1 ~]$ kubectl get pods -o wide
NAME           READY   STATUS    RESTARTS   AGE     IP
rc-nginx-jq6sc 1/1     Running   0          62s    10.5.1.3
rc-nginx-wzgh4 1/1     Running   0          38m    10.5.4.2
[node1 ~]$
[node1 ~]$ kubectl describe pods rc-nginx-jq6sc
Name:         rc-nginx-jq6sc
Namespace:    default
Priority:    0
Node:        node2/192.168.0.7
Start Time:  Thu, 05 May 2022 02:14:36 +0000
Labels:      app=webui
Annotations: <none>
Status:      Running
IP:          10.5.1.3
IPs:
  IP:          10.5.1.3
Controlled By: ReplicationController/rc-nginx
```

Replication controller

<<Controller Pod 생성>>

- kubectl create -f rc-nginx.yaml → kubectl get pods -o wide

<<scale-out>>

- kubectl edit rc rc-nginx → kubectl get pods -o wide

<<scale-in>>

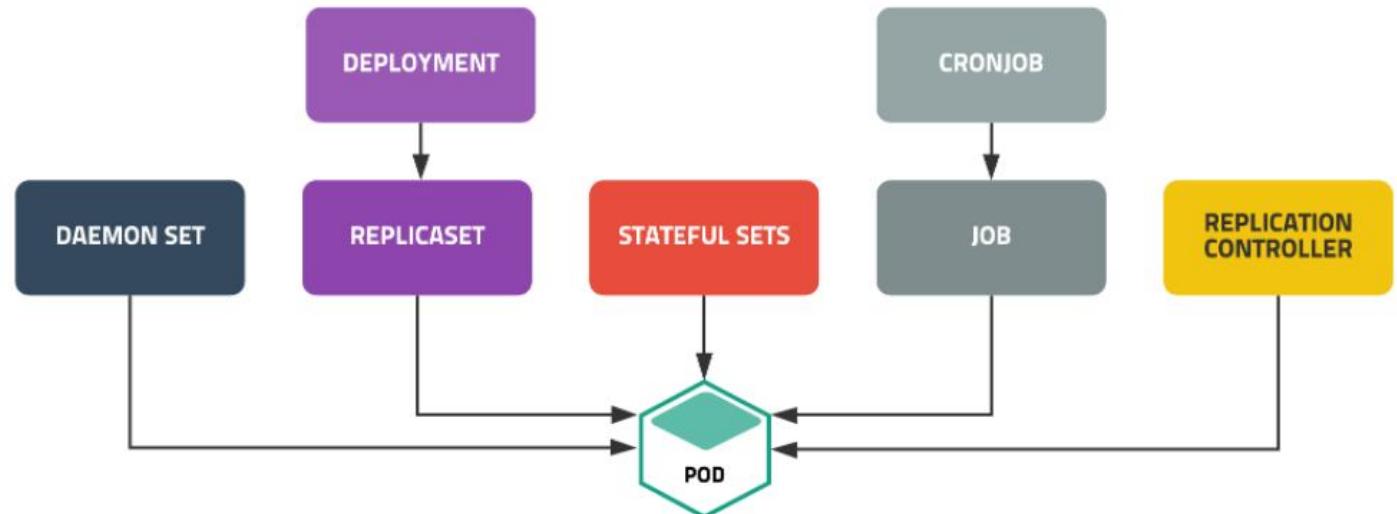
- kubectl scale rc rc-nginx --replicas=2
- kubectl get pods -o wide

<<rolling-update>>

- kubectl edit rc rc-nginx
- kubectl describe pods rc-nginx-XXXX
- kubectl delete pod rc-nginx-XXXX
- kubectl get pods -o wide
- kubectl describe pods rc-nginx-XXXX

2. Replicaset

- Replication controller의 발전형으로 Replication controller와 같은 동작 수행
- Replication controller보다 풍부한 selector 지원
 - 집합기반(set-based)의 selector 지원
- rolling-update 시 deployment 사용

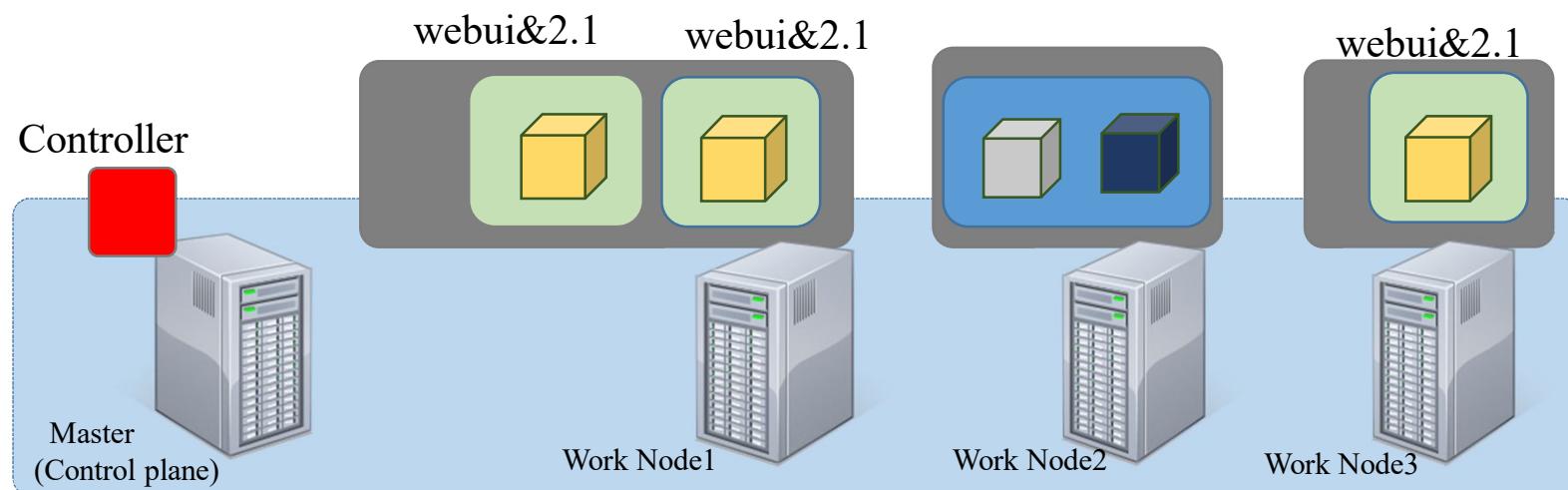


```
apiVersion: v1
kind: ReplicationController
metadata:
  name: rc-nginx
spec:
  replicas: 3
  selector:
    app: webui
  template:
    metadata:
      name: nginx-pod
    labels:
      app: webui
  spec:
    containers:
      - name: nginx-container
        image: nginx:1.14
```

```
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: rs-nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: webui
  template:
    metadata:
      name: nginx-pod
    labels:
      app: webui
  spec:
    containers:
      - name: nginx-container
        image: nginx:1.14
```

```
replicas: 3  
selector:  
  app: webui  
  version: "2.1"
```

```
replicas: 3  
selector:  
  matchLabels:  
    app:webui  
  matchExpressions:  
    - {key: version, operator: In, value: ["2.1" ]}
```



matchExpression

연산자(operator)

In	Key와 values를 지정하여 key, value가 일치하는 pod만 연결
NotIn	Key는 일치하고 values는 일치하지 않는 pod에 연결
Exists	key에 맞는 label의 pod를 연결

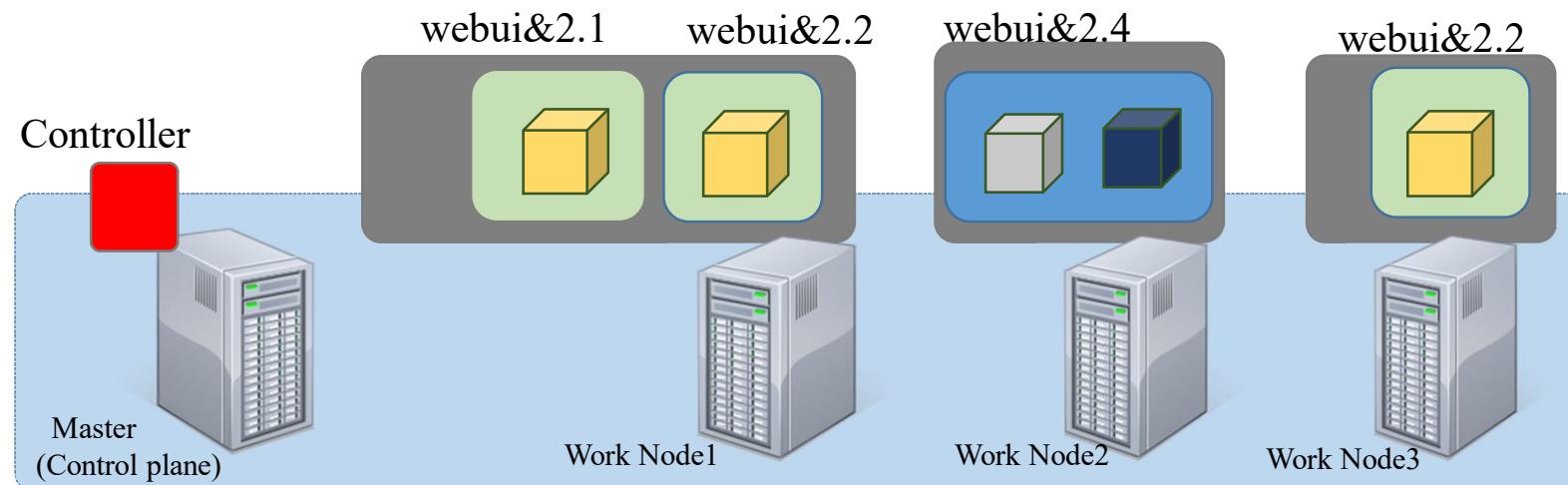
```
replicas: 3
selector:
  matchLabels:
    app:webui          2.1버전 또는 2.2버전 존재
  matchExpressions:
    - {key: version, operator: In, value: ["2.1","2.2"]}
```

```
replicas: 3
selector:
  matchLabels:
    app:webui          버전이 존재해서는 안됨
  matchExpressions:
    - {key: version, operator: NotIn, value: ["2.1","2.2"]}
```

```
replicas: 3
selector:
  matchLabels:
    app:webui          버전이 존재만하면 됨
  matchExpressions:
    - {key: version, operator: Exists}
```

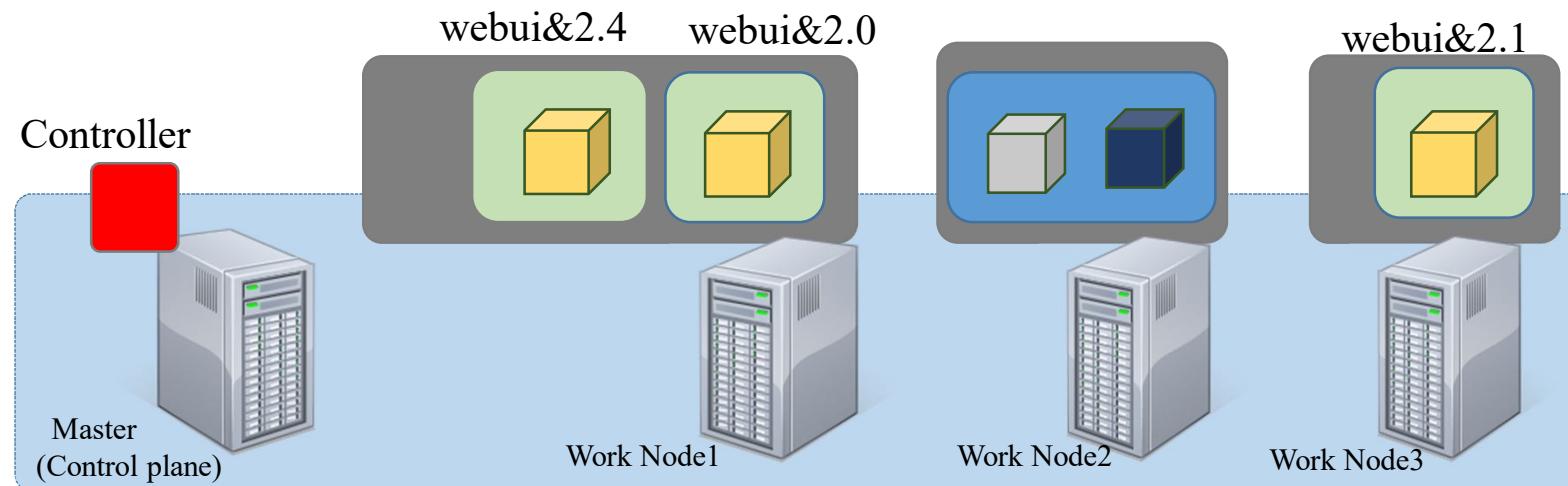
```
replicas: 3
selector:
  matchLabels:
    app:webui
  matchExpressions:
    - {key: version, operator: In, value: ["2.1","2.2"]}
```

label webui 그리고 2.1버전 또는 2.2버전인 pod가 3개 존재



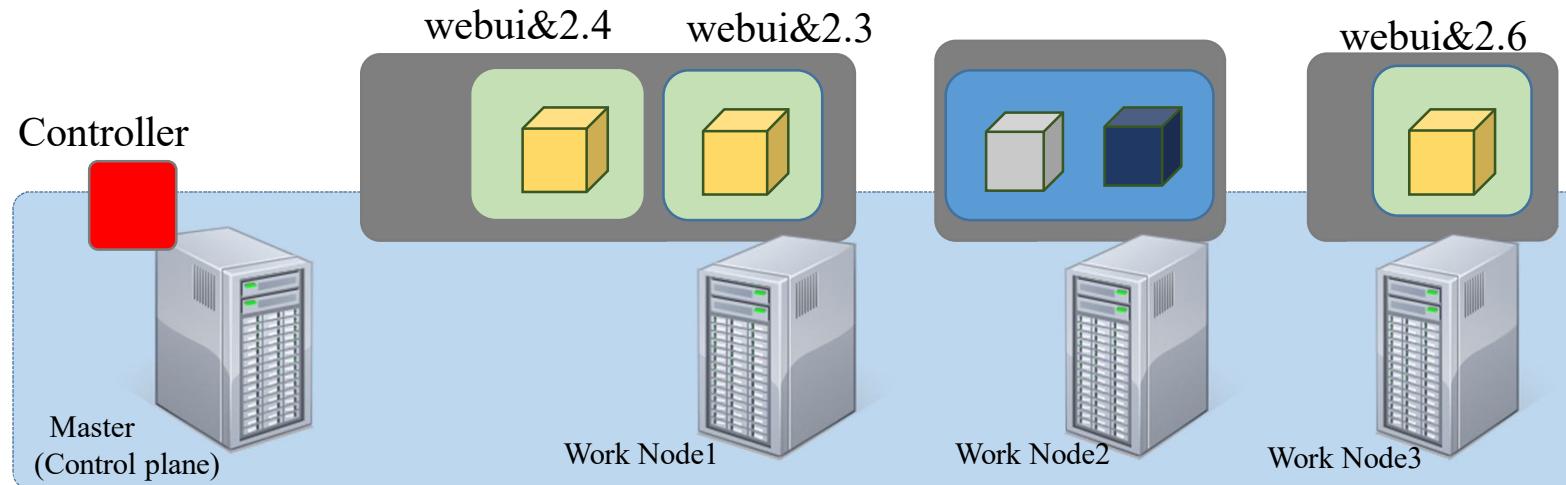
```
replicas: 3
selector:
  matchLabels:
    app:webui
  matchExpressions:
    - {key: version, operator: Exists}
```

label webui 그리고 version 값이 존재하는 pod가 3개 유지



```
replicas: 3
selector:
  matchLabels:
    app:webui
  matchExpressions:
    - {key: version, operator: NotIn, value: ["2.1","2.2"]}
```

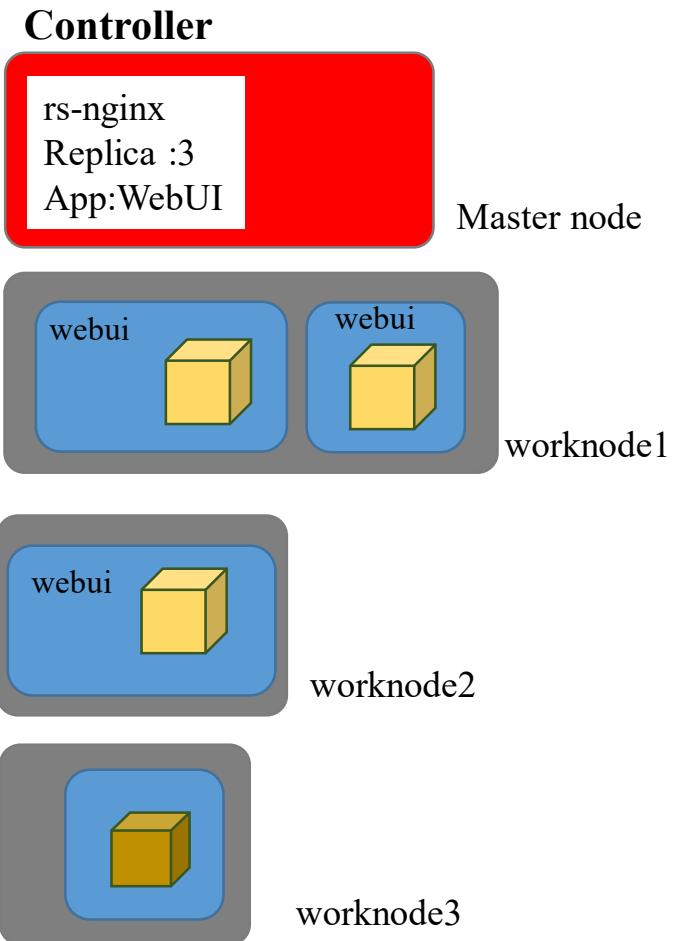
label webui 그리고 version 버전이 2.1 또는 2.2 가 아닌 pod들이 3개 존재



1) Replicaset 사용하기

```
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: rs-nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: webui
  template:
    metadata:
      name: nginx-pod
    labels:
      app: webui
    spec:
      containers:
        - name: nginx-container
          image: nginx:1.14
```

<<rs-nginx.yaml>>



<<ReplicaSet Controller와 Pod 생성>>

```
kubectl delete rc rc-nginx //controller를 삭제하면 pod 삭제  
kubectl get pods -o -wide
```

```
kubectl create -f rs-nginx.yaml 또는 kubectl apply -f rs-nginx  
kubectl get pods --show-labels  
kubectl get rs
```

kubectl create -f rs-nginx.yaml 또는 kubectl apply -f rs-nginx
kubectl get pods --show-labels
kubectl get rs

```
1 [node1 ~]$ kubectl delete rc rc-nginx
replicationcontroller "rc-nginx" deleted
2 [node1 ~]$ kubectl get pods -o wide
No resources found in default namespace.
[node1 ~]$
3 [node1 ~]$ vi rs-nginx.yaml
4 [node1 ~]$ kubectl create -f rs-nginx.yaml
replicaset.apps/rs-nginx created
5 [node1 ~]$ kubectl get pods --show-labels
NAME READY STATUS RESTARTS AGE LABELS
rs-nginx-df9ns 1/1 Running 0 14s app=webui
rs-nginx-15gwy 1/1 Running 0 14s app=webui
rs-nginx-xfb4b 1/1 Running 0 14s app=webui
[node1 ~]$
6 [node1 ~]$ kubectl get replicaset
NAME DESIRED CURRENT READY AGE
rs-nginx 3 3 3 37s
[node1 ~]$
7 [node1 ~]$ kubectl get rs
NAME DESIRED CURRENT READY AGE
rs-nginx 3 3 3 44s
```

```
kubectl delete pods rs-nginx-XXXXXX
```

```
kubectl get pods --show-labels
```

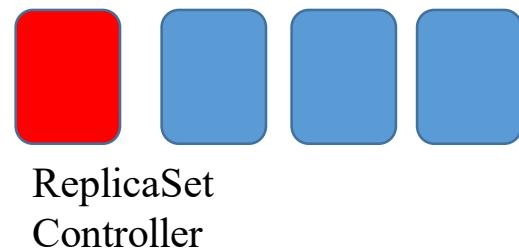
```
① [node1 ~]$ kubectl delete pods rs-nginx-df9ns
pod "rs-nginx-df9ns" deleted
② [node1 ~]$ kubectl get pods --show-labels
NAME           READY   STATUS    RESTARTS   AGE   LABELS
rs-nginx-15gwyj  1/1     Running   0          91s   app=webui
rs-nginx-lvn54   1/1     Running   0          15s   app=webui
rs-nginx-xfb4b   1/1     Running   0          91s   app=webui
```

```
kubectl scale rs rs-nginx --replicas=2
```

```
kubectl get pods --show-labels
```

```
① [node1 ~]$ kubectl scale rs rs-nginx --replicas=2
replicaset.apps/rs-nginx scaled
② [node1 ~]$ kubectl get pods --show-labels
NAME           READY   STATUS    RESTARTS   AGE   LABELS
rs-nginx-15gwyj  1/1     Running   0          2m52s  app=webui
rs-nginx-lvn54   0/1     Terminating   0          96s   app=webui
rs-nginx-xfb4b   1/1     Running   0          2m52s  app=webui
③ [node1 ~]$ kubectl get pods --show-labels
NAME           READY   STATUS    RESTARTS   AGE   LABELS
rs-nginx-15gwyj  1/1     Running   0          3m3s   app=webui
rs-nginx-xfb4b   1/1     Running   0          3m3s   app=webui
```

2) Replicaset와 Pod와의 연관 관계



* Pod는 남겨두고 controller만 삭제

```
kubectl delete rs rs-nginx --cascade=orphan
```

```
kubectl delete replicaset rs-nginx --cascade=orphan
```

```
[node1 ~]$ kubectl delete rs rs-nginx --cascade=false
warning: --cascade=false is deprecated (boolean value) and can be replaced with --cascade=orphan.
replicaset.apps "rs-nginx" deleted
[node1 ~]$ kubectl get rs
No resources found in default namespace.
[node1 ~]$ kubectl get pods --show-labels
NAME           READY   STATUS    RESTARTS   AGE   LABELS
rs-nginx-15gwj 1/1     Running   0          13m   app=webui
rs-nginx-xfb4b 1/1     Running   0          13m   app=webui
[node1 ~]$
```

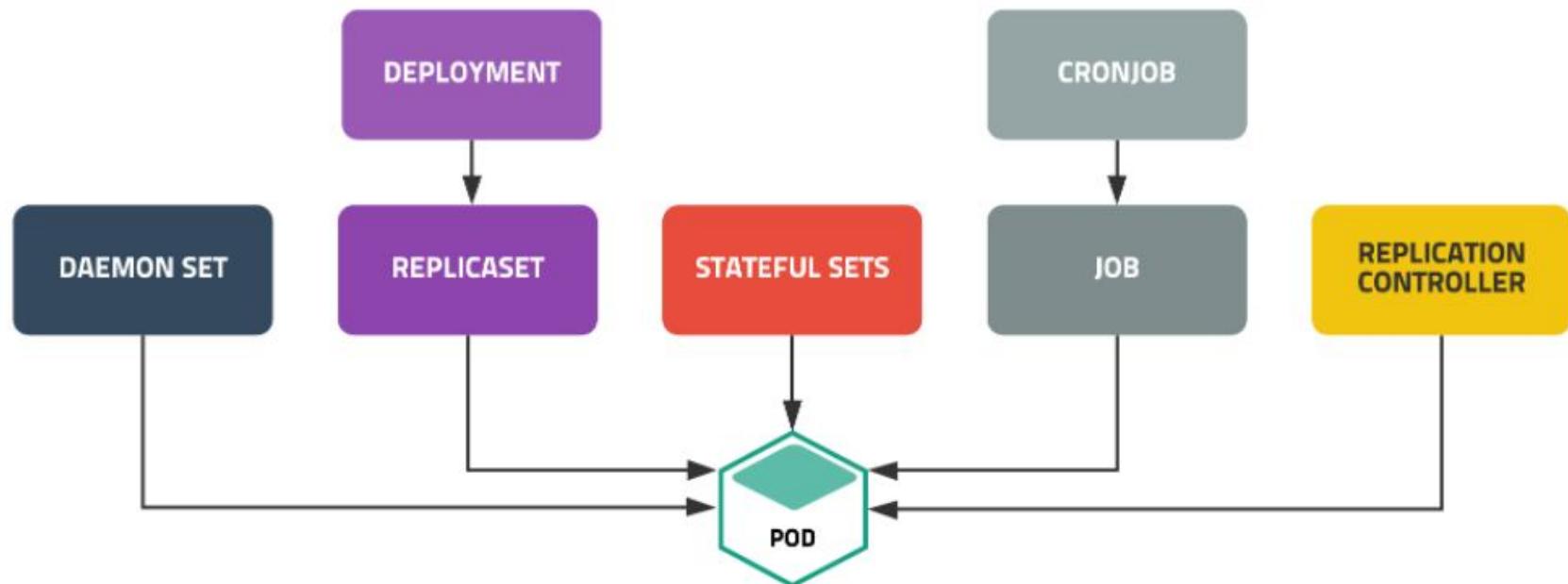
* kubectl delete rs rs-nginx

3. Deployment

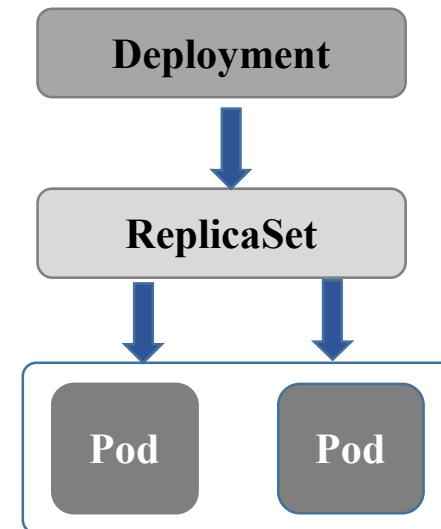
- ReplicaSet을 제어해주는 부모역할
- ReplicaSet을 컨트롤해서 Pod 수를 조절
- Rolling update & Rolling Back

Rolling Update

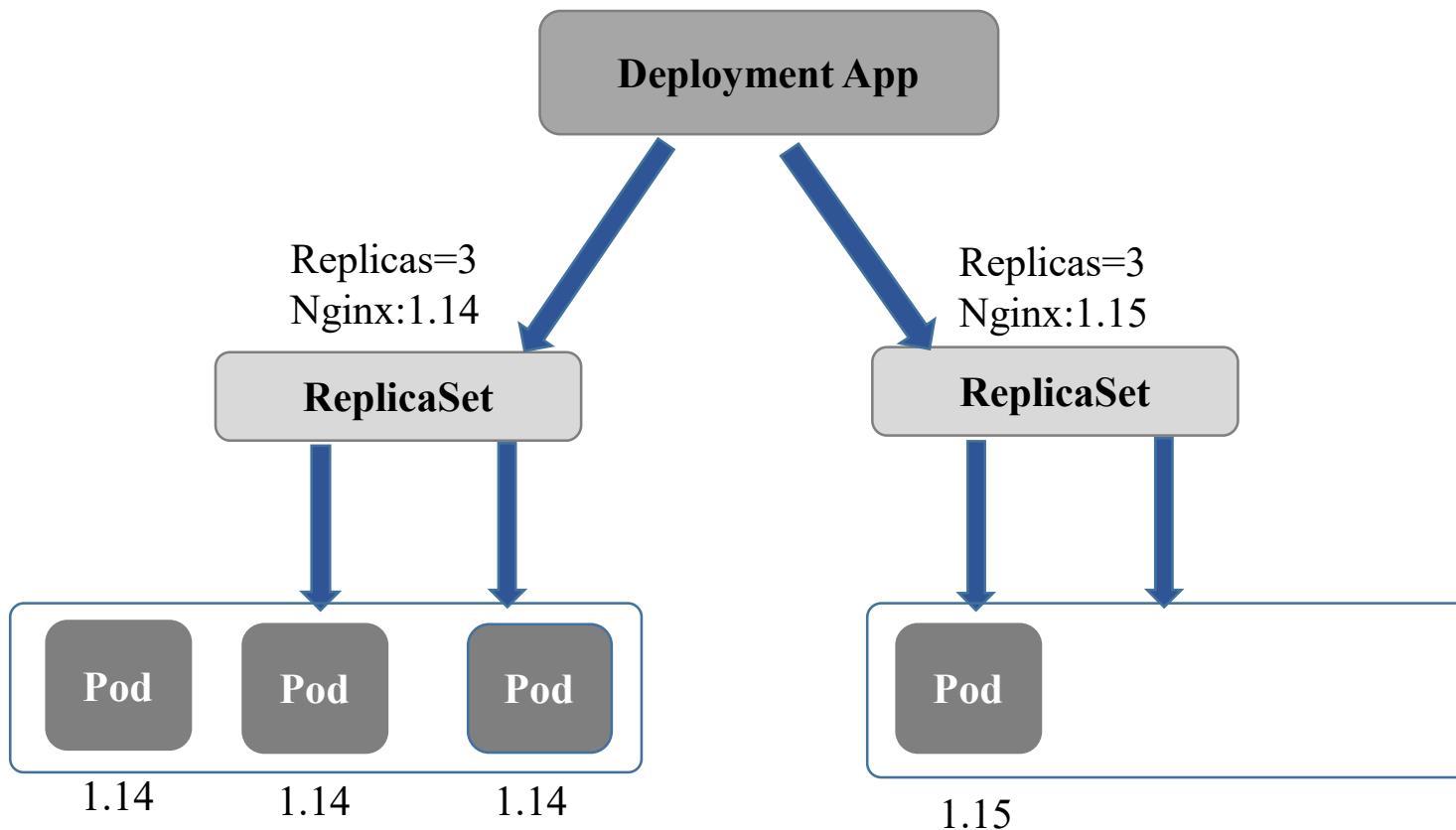
점진적으로 서비스 중단 없이 새로운 버전으로 업데이트



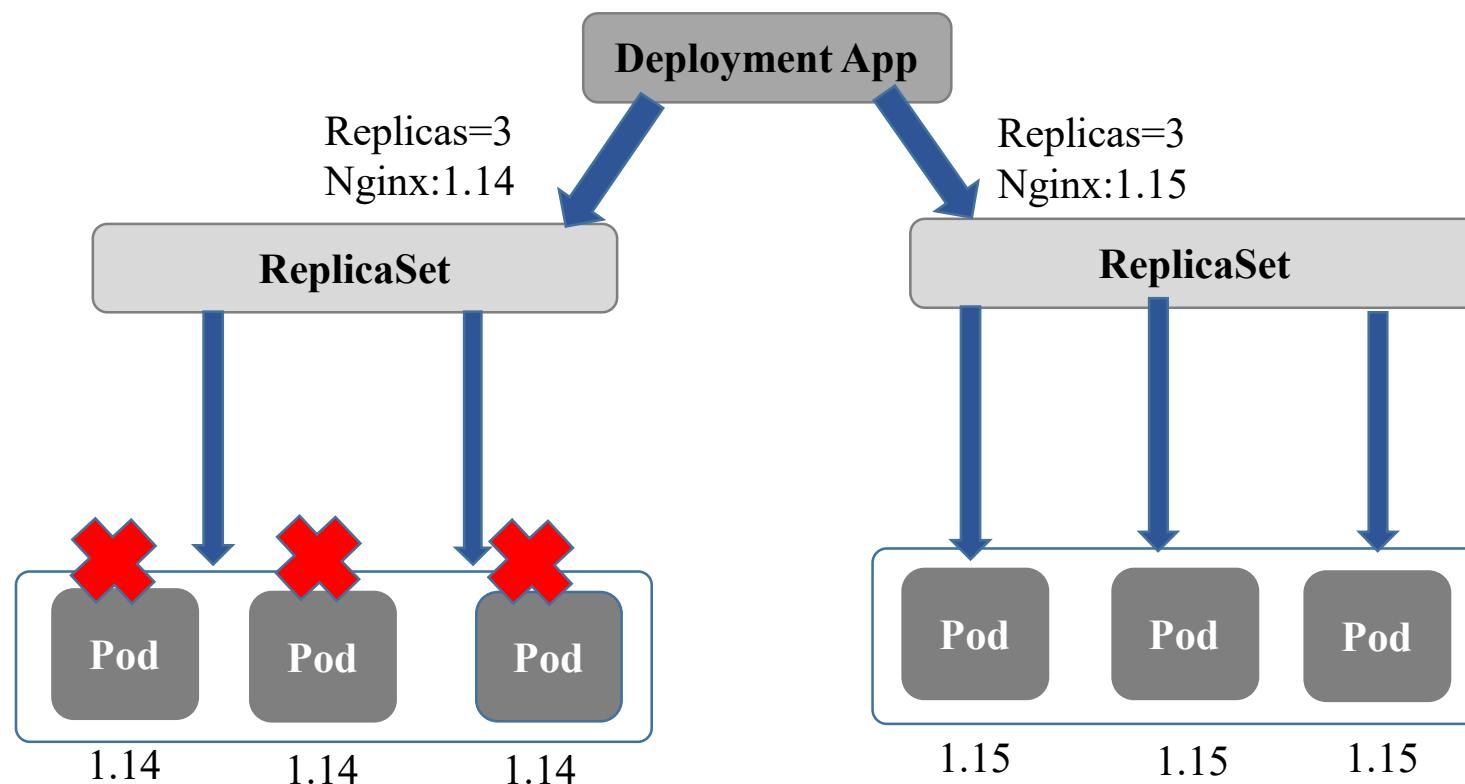
- ReplicaSet을 컨트롤해서 Pod수를 조절 실행시켜야 할 pod 개수를 유지
- Replicaset을 관리하면서 App 배포를 더 세밀하게 관리
 - App을 배포 시 rolling update
 - App 배포 도중 잠시 멈추거나 다시 배포 가능
 - App 배포 이후 이전 버전으로 rolling back 가능



```
kubectl set image deployment app-deploy app=nginx:1.15 --record
```



```
kubectl set image deployment app-deploy app=nginx:1.15 --record
```

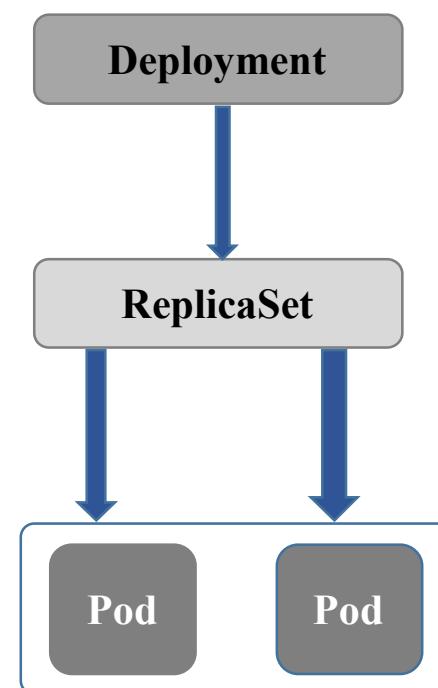


<< rs-nginx.yaml >>

```
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: rs-nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: webui
  template:
    metadata:
      name: nginx-pod
      labels:
        app: webui
    spec:
      containers:
        - name: nginx-container
          image: nginx:1.14
```

<< deploy-nginx.yaml >>

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: deploy-nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: webui
  template:
    metadata:
      name: nginx-pod
      labels:
        app: webui
    spec:
      containers:
        - name: nginx-container
          image: nginx:1.14
```



<< deploy-nginx.yaml >>

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: deploy-nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: webui
  template:
    metadata:
      name: nginx-pod
      labels:
        app: webui
    spec:
      containers:
        - name: nginx-container
          image: nginx:1.14
```

Deployment를 이용한 Pod 생성/유지

```
kubectl create -f deploy-nginx.yaml
```

```
kubectl get pods -o wide
```

```
kubectl get deploy,rs,pod
```

```
[node1 ~]$ vi deploy-nginx.yaml
[node1 ~]$ kubectl create -f deploy-nginx.yaml
deployment.apps/deploy-nginx created
[node1 ~]$ kubectl get pods -o wide
NAME                  READY   STATUS    RESTARTS   AGE     IP          NODE
deploy-nginx-6d4c4cc4b8-4mjrg  1/1    Running   0          31s    10.5.3.2   node4
deploy-nginx-6d4c4cc4b8-dnlcc  1/1    Running   0          31s    10.5.2.2   node3
deploy-nginx-6d4c4cc4b8-xz2s9  1/1    Running   0          31s    10.5.1.2   node2
[node1 ~]$
[node1 ~]$ kubectl get deploy,rs,pod
NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/deploy-nginx  3/3      3           3           45s
NAME                  DESIRED  CURRENT   READY   AGE
replicaset.apps/deploy-nginx-6d4c4cc4b8  3        3         3       45s
NAME                  READY   STATUS    RESTARTS   AGE
pod/deploy-nginx-6d4c4cc4b8-4mjrg  1/1    Running   0          45s
pod/deploy-nginx-6d4c4cc4b8-dnlcc  1/1    Running   0          45s
pod/deploy-nginx-6d4c4cc4b8-xz2s9  1/1    Running   0          45s
[node1 ~]$
```

```
kubectl delete pods deploy-nginx-XXXXXX-XXXXXXX
```

```
kubectl get pods
```

```
kubectl get rs deploy-nginx-XXXX
```

```
[node1 ~]$ kubectl delete pods deploy-nginx-6d4c4cc4b8-4mjrg
pod "deploy-nginx-6d4c4cc4b8-4mjrg" deleted
[node1 ~]$ kubectl get pods
NAME                      READY   STATUS    RESTARTS   AGE
deploy-nginx-6d4c4cc4b8-dnlcc  1/1     Running   0          5m44s
deploy-nginx-6d4c4cc4b8-q4dft  1/1     Running   0          41s
deploy-nginx-6d4c4cc4b8-xz2s9  1/1     Running   0          5m44s

[node1 ~]$ kubectl get rs deploy-nginx-6d4c4cc4b8
NAME        DESIRED   CURRENT   READY   AGE
deploy-nginx-6d4c4cc4b8     3         3         3       7m9s
[node1 ~]$
```

<<replicaset 삭제>>

kubectl get rs

kubectl delete deploy-nginx-XXXX

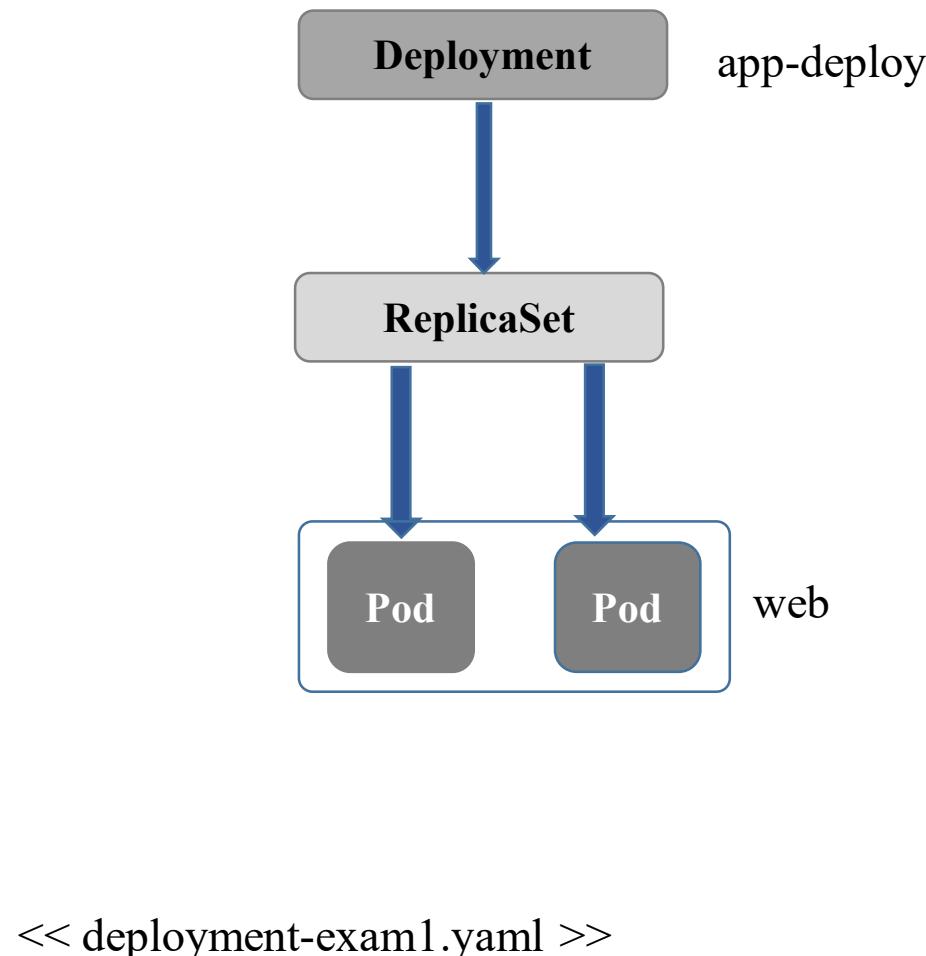
<<Deployment 삭제>>

kubectl get deploy

kubectl delete deployment deploy-nginx

Deployment Rolling Update

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: app-deploy
spec:
  selector:
    matchLabels:
      app: webui
  replicas: 3
  template:
    metadata:
      labels:
        app: webui
    spec:
      containers:
        - image: nginx:1.14
          name: web
          ports:
            - containerPort: 80
```



```
kubectl create -f deployment-exam1.yaml --record
```

```
kubectl get deployment,rs,pod
```

```
controlplane $ vi deployment-exam1.yaml
controlplane $ kubectl create -f deployment-exam1.yaml --record
deployment.apps/app-deploy created
controlplane $ kubectl get deployment,rs,pod
NAME                      READY  UP-TO-DATE  AVAILABLE  AGE
deployment.apps/app-deploy 0/3    3           0          14s

NAME                           DESIRED  CURRENT  READY  AGE
replicaset.apps/app-deploy-7f6ffffdcdd  3        3        0      14s

NAME                      READY  STATUS          RESTARTS  AGE
pod/app-deploy-7f6ffffdcdd-55vmx  0/1    ContainerCreating  0      14s
pod/app-deploy-7f6ffffdcdd-6hh55   0/1    ContainerCreating  0      14s
pod/app-deploy-7f6ffffdcdd-lql4w   0/1    ContainerCreating  0      14s
controlplane $
```

NAME	READY	STATUS	RESTARTS	AGE
pod/app-deploy-7f6ffffdcdd-55vmx	0/1	ContainerCreating	0	14s
pod/app-deploy-7f6ffffdcdd-6hh55	0/1	ContainerCreating	0	14s
pod/app-deploy-7f6ffffdcdd-1ql4w	0/1	ContainerCreating	0	14s

kubectl describe pods app-deploy-XXXXXX-XXXX

```
controlplane $ kubectl describe pods app-deploy-7f6ffffdcdd-55vmx
Name:           app-deploy-7f6ffffdcdd-55vmx
Namespace:      default
Priority:       0
Node:          node01/10.0.0.10
Start Time:    Wed, 11 May 2022 11:32:13 +0000
Labels:         app=webui
                pod-template-hash=7f6ffffdcdd
Annotations:   <none>
Status:        Running
IP:            10.244.1.3
IPs:
  IP:          10.244.1.3
Controlled By: ReplicaSet/app-deploy-7f6ffffdcdd
Containers:
  web:
    Container ID:  docker://4d318941b1917aaacbe3d3a5aa6a9ab7a45656db96c16792754
    Image:         nginx:1.14
    Image ID:     docker-pullable://nginx@sha256:f7988fb6c02e0ce69257d9bd9cf37
```

```
kubectl set image deployment app-deploy web=nginx:1.15 --record
```

```
controlplane $ kubectl set image deployment app-deploy web=nginx:1.15 --record
deployment.apps/app-deploy image updated
controlplane $ kubectl get pods
NAME                   READY   STATUS    RESTARTS   AGE
app-deploy-67777997f5-6891v  1/1     Running   0          9s
app-deploy-7f6ffffdcdd-55vmx  1/1     Running   0          3m2s
app-deploy-7f6ffffdcdd-6hh55  1/1     Running   0          3m2s
app-deploy-7f6ffffdcdd-1ql4w  1/1     Running   0          3m2s
controlplane $ kubectl get pods
NAME                   READY   STATUS          RESTARTS   AGE
app-deploy-67777997f5-6891v  1/1     Running         0          11s
app-deploy-67777997f5-15wwm  0/1     ContainerCreating 0          2s
app-deploy-7f6ffffdcdd-55vmx  1/1     Running         0          3m4s
app-deploy-7f6ffffdcdd-6hh55  1/1     Running         0          3m4s
app-deploy-7f6ffffdcdd-1ql4w  1/1     Terminating     0          3m4s
```

```
kubectl get pods
```

```
controlplane $ kubectl get pods
NAME                   READY   STATUS    RESTARTS   AGE
app-deploy-67777997f5-6891v  1/1     Running   0          46s
app-deploy-67777997f5-h9fmd  1/1     Running   0          34s
app-deploy-67777997f5-15wwm  1/1     Running   0          37s
controlplane $
```

```
controlplane $ kubectl get pods
NAME                      READY   STATUS    RESTARTS   AGE
app-deploy-67777997f5-6891v   1/1     Running   0          46s
app-deploy-67777997f5-h9fmd   1/1     Running   0          34s
app-deploy-67777997f5-15wwm   1/1     Running   0          37s
controlplane $
```

```
controlplane $ kubectl describe pods app-deploy-67777997f5-6891v
Name:           app-deploy-67777997f5-6891v
Namespace:      default
Priority:       0
Node:          node01/10.0.0.10
Start Time:    Wed, 11 May 2022 11:35:06 +0000
Labels:         app=webui
                pod-template-hash=67777997f5
Annotations:   <none>
Status:        Running
IP:            10.244.1.6
IPs:
  IP:          10.244.1.6
Controlled By: ReplicaSet/app-deploy-67777997f5
Containers:
  web:
    Container ID:  docker://1000a6255b6986d395a1de9f2a724ac3ea26d8bb6b290d31ee6
    Image:         nginx:1.15
    Image ID:     docker-pullable://nginx@sha256:23b4dcdf0d34d4a129755fc6f52e1
```

Deployment Rolling Update

```
kubectl set image deploy app-deploy web=nginx:1.16 --record  
kubectl set image deploy app-deploy web=nginx:1.17 --record  
kubectl set image deploy app-deploy web=nginx:1.15 --record
```

```
kubectl rollout status deployment app-deploy  
kubectl rollout pause deployment app-deploy  
kubectl rollout resume deployment app-deploy
```

```
kubectl rollout history deploy app-deploy
```

```
controlplane $ kubectl rollout history deploy app-deploy  
deployment.apps/app-deploy  
REVISION  CHANGE-CAUSE  
7        kubectl create --filename=deployment-exam1.yaml --record=true  
10       kubectl set image deployment app-deploy web=nginx:1.16 --record=true  
11       kubectl set image deployment app-deploy web=nginx:1.17 --record=true  
12       kubectl set image deployment app-deploy web=nginx:1.15 --record=true
```

Deployment Rolling Update

```
kubectl set image deploy app-deploy web=nginx:1.16 --record  
kubectl set image deploy app-deploy web=nginx:1.17 --record  
kubectl set image deploy app-deploy web=nginx:1.15 --record
```

```
kubectl rollout status deployment app-deploy  
kubectl rollout pause deployment app-deploy  
kubectl rollout resume deployment app-deploy
```

```
kubectl rollout history deploy app-deploy
```

```
controlplane $ kubectl rollout history deploy app-deploy  
deployment.apps/app-deploy  
REVISION  CHANGE-CAUSE  
7        kubectl create --filename=deployment-exam1.yaml --record=true  
10       kubectl set image deployment app-deploy web=nginx:1.16 --record=true  
11       kubectl set image deployment app-deploy web=nginx:1.17 --record=true  
12       kubectl set image deployment app-deploy web=nginx:1.15 --record=true
```

Deployment Rollback

```
kubectl rollout history deploy app-deploy
```

```
kubectl rollout undo deploy app-deploy
```

```
kubectl rollout undo deploy app-deploy --to-revision=2
```

```
kubectl describe pods app-deploy-XXXXXX-XXXX
```

```
kubectl create -f deployment-exam2.yaml --record
```

```
Kubectl get deployment,rs,pod
```

```
nano deployment-exam2.yaml
```

```
kubectl apply -f deployment-exam2.yaml
```

```
kubectl rollout history deploy deploy-nginx
```