ReplicaSet

Introduction:

A ReplicaSet's is used to maintain a stable set of replica Pods running at any given time. It guarantees the availability of a specified number of identical Pods.

It has a selector that specifies how to identify Pods and it uses the template field to create a pod.

Objectives:

1. Creating a ReplicaSet
2. Increasing and decreasing pods
3. Set the image of the pods
4. Deleting a ReplicaSet

1. Creating a ReplicaSet:

We will be using below given template to create a ReplicaSet.

```
# vi replica-definition.yaml
```

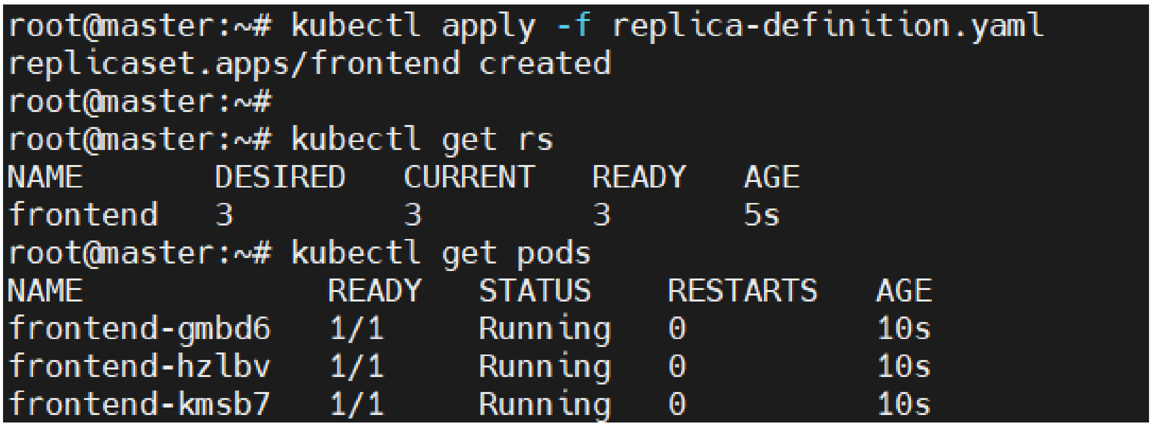
Copy and paste the below yaml code in above file.

```
apiVersion: apps/v1
kind: ReplicaSet
metadata:
    name: frontend
    labels:
        app: guestbook
        tier: frontend
spec:
     replicas: 3
     selector:
         matchLabels:
            tier: frontend
     template:
        metadata:
            labels:
                tier: frontend
        spec:
            containers:
             - name:  container1
               image: nginx
```

Apply the changes using the below command:

```
kubectl apply -f replica-definition.yaml
```

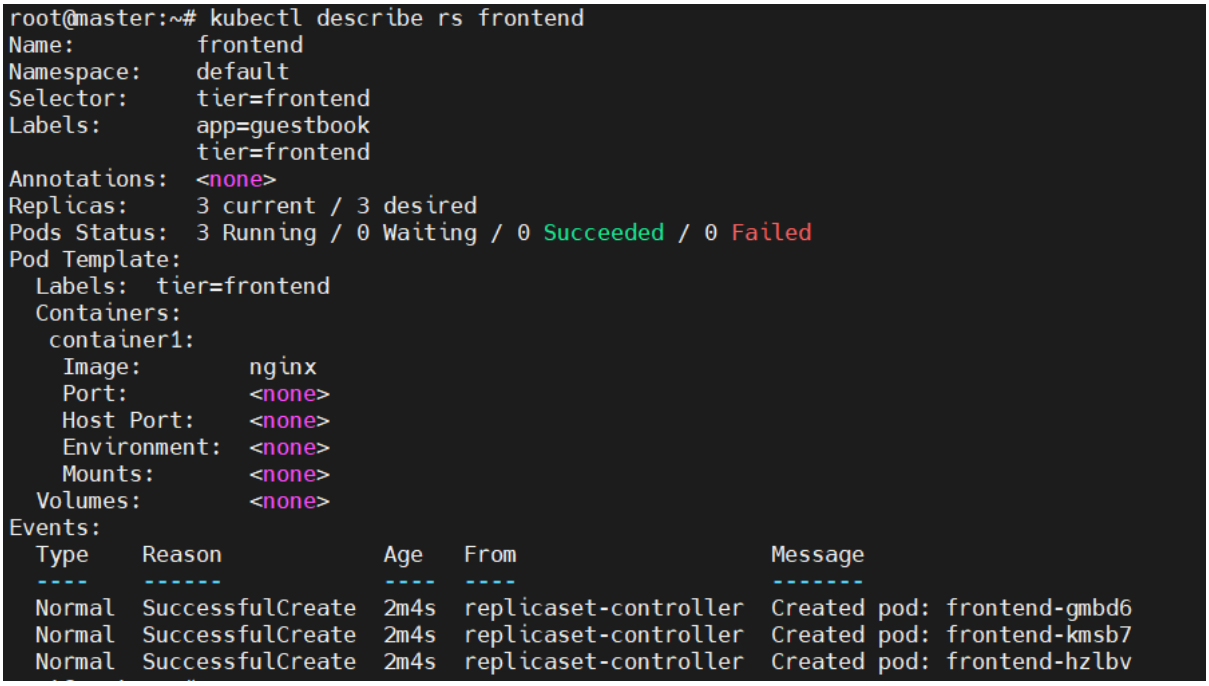
Find the output below:



```
root@master:~# kubectl apply -f replica-definition.yaml
replicaset.apps/frontend created
root@master:~#
root@master:~# kubectl get rs
NAME       DESIRED   CURRENT   READY   AGE
frontend   3         3         3       5s
root@master:~# kubectl get pods
NAME             READY   STATUS    RESTARTS   AGE
frontend-gmbd6   1/1     Running   0          10s
frontend-hzlbv   1/1     Running   0          10s
frontend-kmsb7   1/1     Running   0          10s
```

Get the more details about the ReplicaSet using the describe command.

```
kubectl describe rs frontend
```



```
root@master:~# kubectl describe rs frontend
Name:         frontend
Namespace:    default
Selector:     tier=frontend
Labels:       app=guestbook
              tier=frontend
Annotations:  <none>
Replicas:     3 current / 3 desired
Pods Status:  3 Running / 0 Waiting / 0 Succeeded / 0 Failed
Pod Template:
  Labels:  tier=frontend
  Containers:
   container1:
    Image:        nginx
    Port:         <none>
    Host Port:    <none>
    Environment:  <none>
    Mounts:       <none>
  Volumes:        <none>
Events:
  Type    Reason            Age   From                   Message
  ----    ------            ----  ----                   -------
  Normal  SuccessfulCreate  2m4s  replicaset-controller  Created pod: frontend-gmbd6
  Normal  SuccessfulCreate  2m4s  replicaset-controller  Created pod: frontend-kmsb7
  Normal  SuccessfulCreate  2m4s  replicaset-controller  Created pod: frontend-hzlbv
```

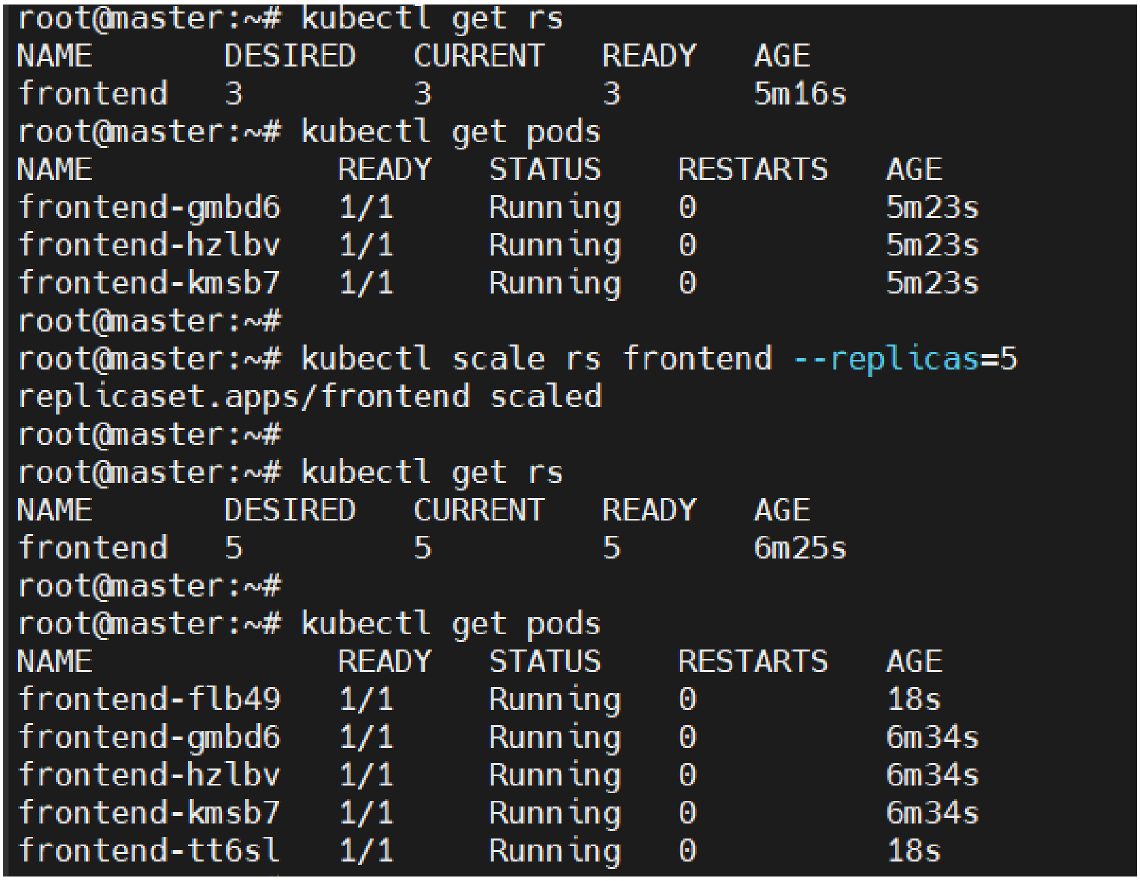
2. Increasing and decreasing pods:

2.1: Increase the pods

We can use scale and edit command to increase and decrease the number of pods. Use the below command to increase the pods in the ReplicaSet.

```
kubectl scale rs frontend --replicas=5
```

This command will increase the pods to 5, so 2 new pods will be added which can be seen in below given output.



```
root@master:~# kubectl get rs
NAME       DESIRED   CURRENT   READY   AGE
frontend   3         3         3       5m16s
root@master:~# kubectl get pods
NAME             READY   STATUS    RESTARTS   AGE
frontend-gmbd6   1/1     Running   0          5m23s
frontend-hzlbv   1/1     Running   0          5m23s
frontend-kmsb7   1/1     Running   0          5m23s
root@master:~#
root@master:~# kubectl scale rs frontend --replicas=5
replicaset.apps/frontend scaled
root@master:~#
root@master:~# kubectl get rs
NAME       DESIRED   CURRENT   READY   AGE
frontend   5         5         5       6m25s
root@master:~#
root@master:~# kubectl get pods
NAME             READY   STATUS    RESTARTS   AGE
frontend-flb49   1/1     Running   0          18s
frontend-gmbd6   1/1     Running   0          6m34s
frontend-hzlbv   1/1     Running   0          6m34s
frontend-kmsb7   1/1     Running   0          6m34s
frontend-tt6sl   1/1     Running   0          18s
```

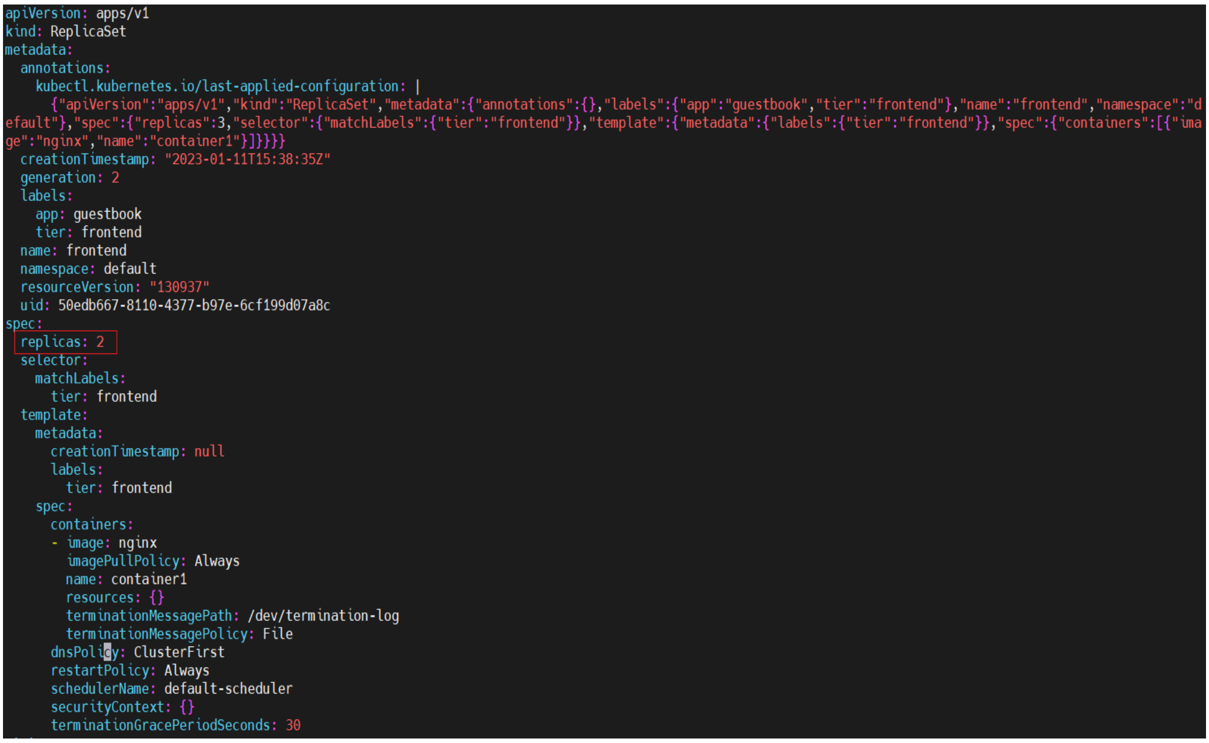
2.2 Decrease the pods

We will try edit command to decrease the number of pods, follow the below steps to get this job done.

```
kubectl edit rs frontend
```

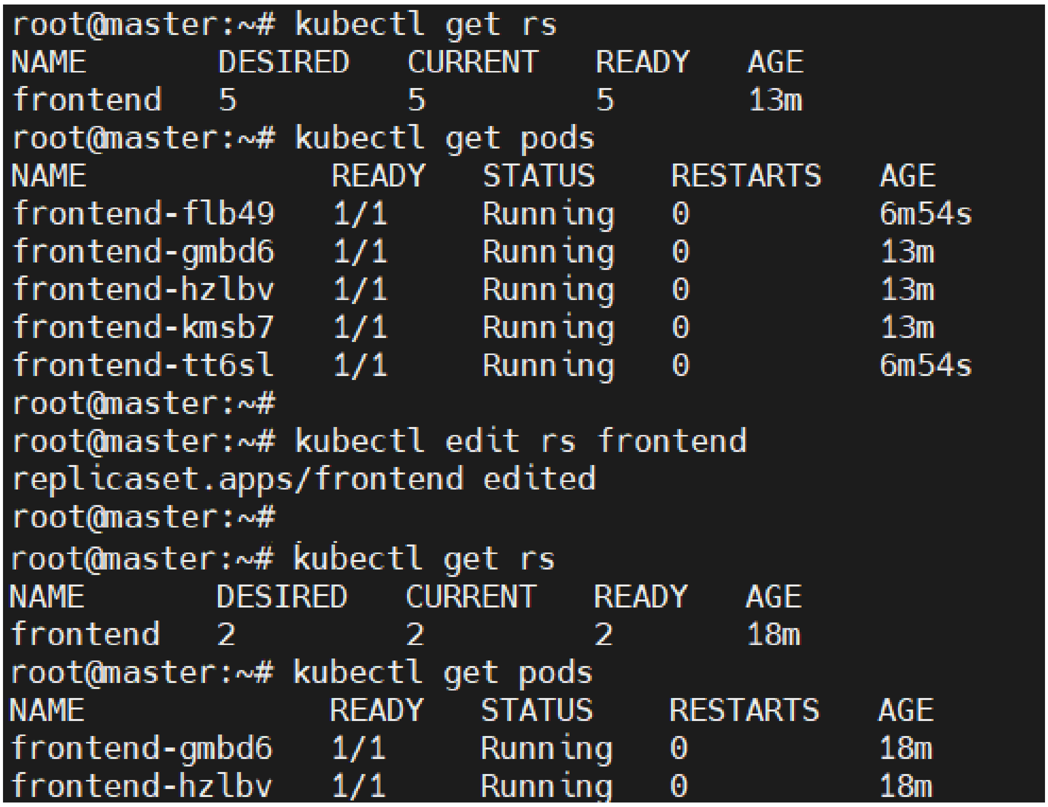
We are going to make the changes in replicas field, earlier it had 5 pods and now we are changing it to 2.

Save and exit the file, it will be implemented automatically and the number of pods will be decreased.



```
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"apps/v1","kind":"ReplicaSet","metadata":{"annotations":{},"labels":{"app":"guestbook","tier":"frontend"},"name":"frontend","namespace":"d
efault"},"spec":{"replicas":3,"selector":{"matchLabels":{"tier":"frontend"}},"template":{"metadata":{"labels":{"tier":"frontend"}},"spec":{"containers":[{"ima
ge":"nginx","name":"container1"}]}}}}
  creationTimestamp: "2023-01-11T15:38:35Z"
  generation: 2
  labels:
    app: guestbook
    tier: frontend
  name: frontend
  namespace: default
  resourceVersion: "130937"
  uid: 50edb667-8110-4377-b97e-6cf199d07a8c
spec:
  replicas: 2
  selector:
    matchLabels:
      tier: frontend
  template:
    metadata:
      creationTimestamp: null
      labels:
        tier: frontend
    spec:
      containers:
      - image: nginx
        imagePullPolicy: Always
        name: container1
        resources: {}
        terminationMessagePath: /dev/termination-log
        terminationMessagePolicy: File
      dnsPolicy: ClusterFirst
      restartPolicy: Always
      schedulerName: default-scheduler
      securityContext: {}
      terminationGracePeriodSeconds: 30
```

See the output below:



```
root@master:~# kubectl get rs
NAME        DESIRED   CURRENT   READY   AGE
frontend    5         5         5       13m
root@master:~# kubectl get pods
NAME              READY   STATUS    RESTARTS   AGE
frontend-flb49    1/1     Running   0          6m54s
frontend-gmbd6    1/1     Running   0          13m
frontend-hzlbv    1/1     Running   0          13m
frontend-kmsb7    1/1     Running   0          13m
frontend-tt6sl    1/1     Running   0          6m54s
root@master:~#
root@master:~# kubectl edit rs frontend
replicaset.apps/frontend edited
root@master:~#
root@master:~# kubectl get rs
NAME        DESIRED   CURRENT   READY   AGE
frontend    2         2         2       18m
root@master:~# kubectl get pods
NAME              READY   STATUS    RESTARTS   AGE
frontend-gmbd6    1/1     Running   0          18m
frontend-hzlbv    1/1     Running   0          18m
```

3. Set the image of the pods:

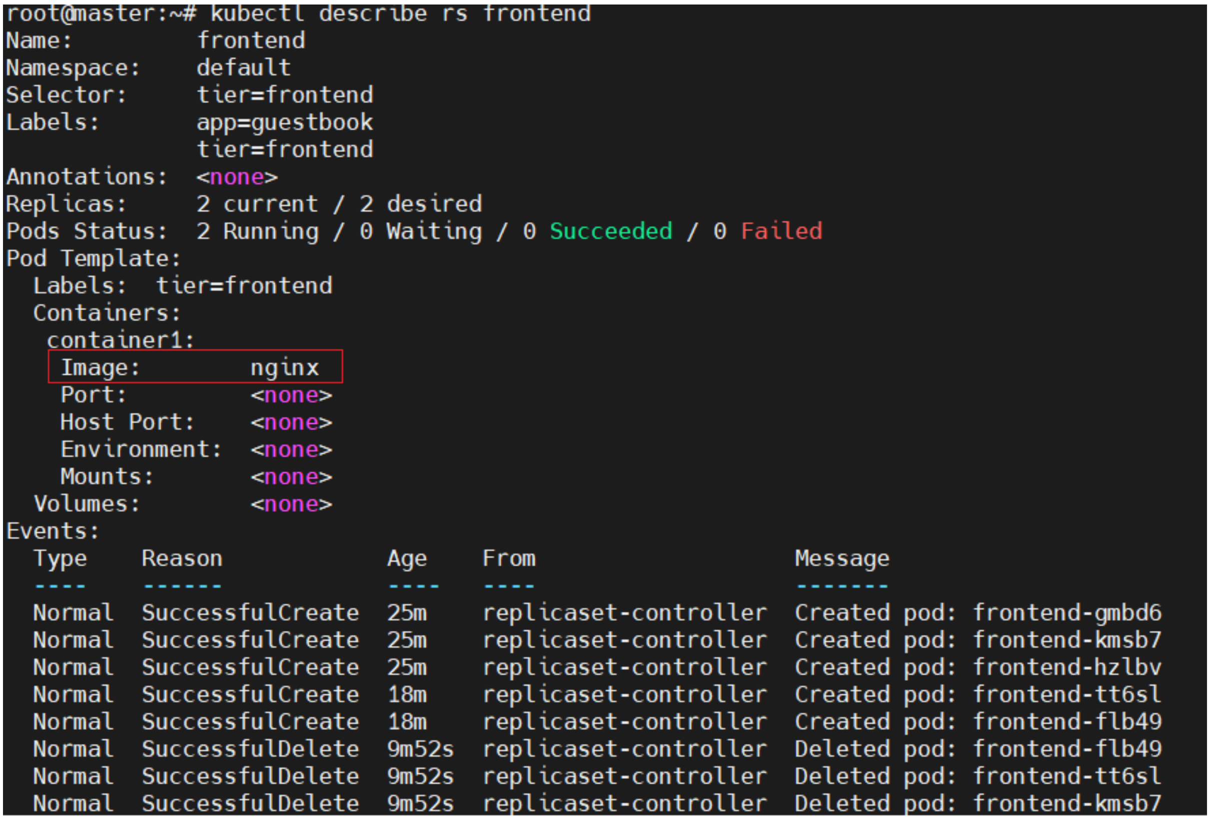
We can use set image or edit command to change the image of pods which are a part of the ReplicaSet.

Use the below command to change the image.

```
kubectl set image rs frontend container1=nginx:1.22.1
```

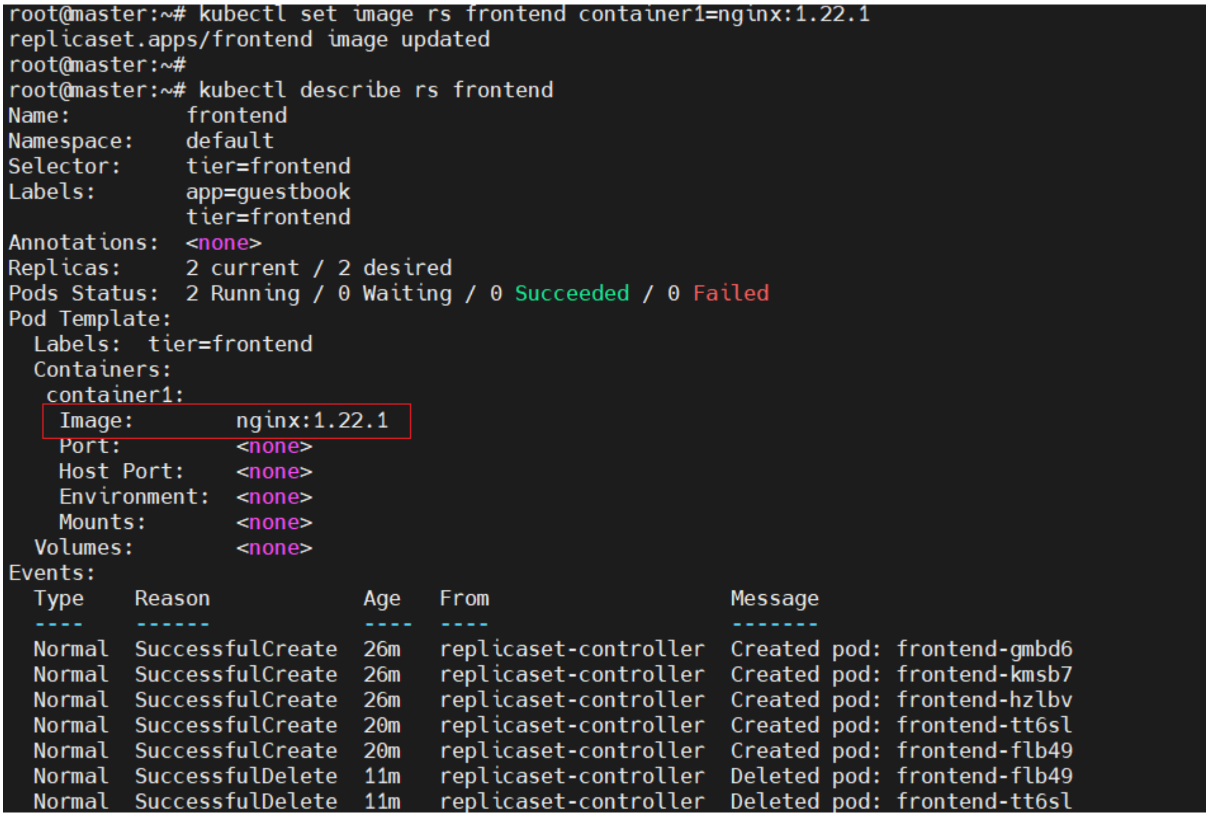
As per the above command we are changing the image of the **container1** of the pods which are a part of the **frontend ReplicaSet**.

Find the output below.



```
root@master:~# kubectl describe rs frontend
Name:         frontend
Namespace:    default
Selector:     tier=frontend
Labels:       app=guestbook
              tier=frontend
Annotations:  <none>
Replicas:     2 current / 2 desired
Pods Status:  2 Running / 0 Waiting / 0 Succeeded / 0 Failed
Pod Template:
  Labels:  tier=frontend
  Containers:
   container1:
    Image:        nginx
    Port:         <none>
    Host Port:    <none>
    Environment:  <none>
    Mounts:       <none>
  Volumes:        <none>
Events:
  Type    Reason            Age    From                   Message
  ----    ------            ----   ----                   -------
  Normal  SuccessfulCreate  25m    replicaset-controller  Created pod: frontend-gmbd6
  Normal  SuccessfulCreate  25m    replicaset-controller  Created pod: frontend-kmsb7
  Normal  SuccessfulCreate  25m    replicaset-controller  Created pod: frontend-hzlbv
  Normal  SuccessfulCreate  18m    replicaset-controller  Created pod: frontend-tt6sl
  Normal  SuccessfulCreate  18m    replicaset-controller  Created pod: frontend-flb49
  Normal  SuccessfulDelete  9m52s  replicaset-controller  Deleted pod: frontend-flb49
  Normal  SuccessfulDelete  9m52s  replicaset-controller  Deleted pod: frontend-tt6sl
  Normal  SuccessfulDelete  9m52s  replicaset-controller  Deleted pod: frontend-kmsb7
```

The above output we have the image nginx and in the below output, we can see the image has been changed using the **set image** command.



```
root@master:~# kubectl set image rs frontend container1=nginx:1.22.1
replicaset.apps/frontend image updated
root@master:~#
root@master:~# kubectl describe rs frontend
Name:         frontend
Namespace:    default
Selector:     tier=frontend
Labels:       app=guestbook
              tier=frontend
Annotations:  <none>
Replicas:     2 current / 2 desired
Pods Status:  2 Running / 0 Waiting / 0 Succeeded / 0 Failed
Pod Template:
  Labels:  tier=frontend
  Containers:
   container1:
    Image:        nginx:1.22.1
    Port:         <none>
    Host Port:    <none>
    Environment:  <none>
    Mounts:       <none>
  Volumes:        <none>
Events:
  Type    Reason            Age   From                   Message
  ----    ------            ----  ----                   -------
  Normal  SuccessfulCreate  26m   replicaset-controller  Created pod: frontend-gmbd6
  Normal  SuccessfulCreate  26m   replicaset-controller  Created pod: frontend-kmsb7
  Normal  SuccessfulCreate  26m   replicaset-controller  Created pod: frontend-hzlbv
  Normal  SuccessfulCreate  20m   replicaset-controller  Created pod: frontend-tt6sl
  Normal  SuccessfulCreate  20m   replicaset-controller  Created pod: frontend-flb49
  Normal  SuccessfulDelete  11m   replicaset-controller  Deleted pod: frontend-flb49
  Normal  SuccessfulDelete  11m   replicaset-controller  Deleted pod: frontend-tt6sl
```

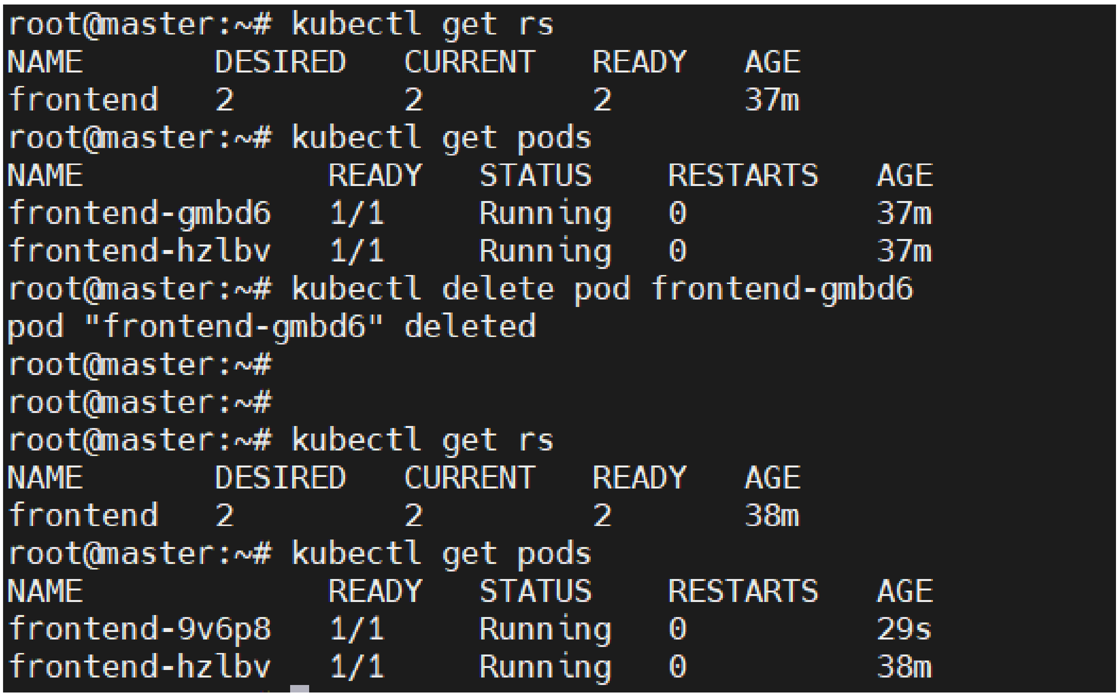
4. Deleting a ReplicaSet:

Let's try to delete the pod which is a part of a ReplicaSet and we will see if a new pod will be created automatically or not.

```
kubectl delete pod frontend-gmbd6
```

Using the above command, we are deleting the pod which is a part of Frontend ReplicaSet.

From the below output, we can see that the pod is deleted and a new pod will be created to maintain the number of replicas specified in ReplicaSet.

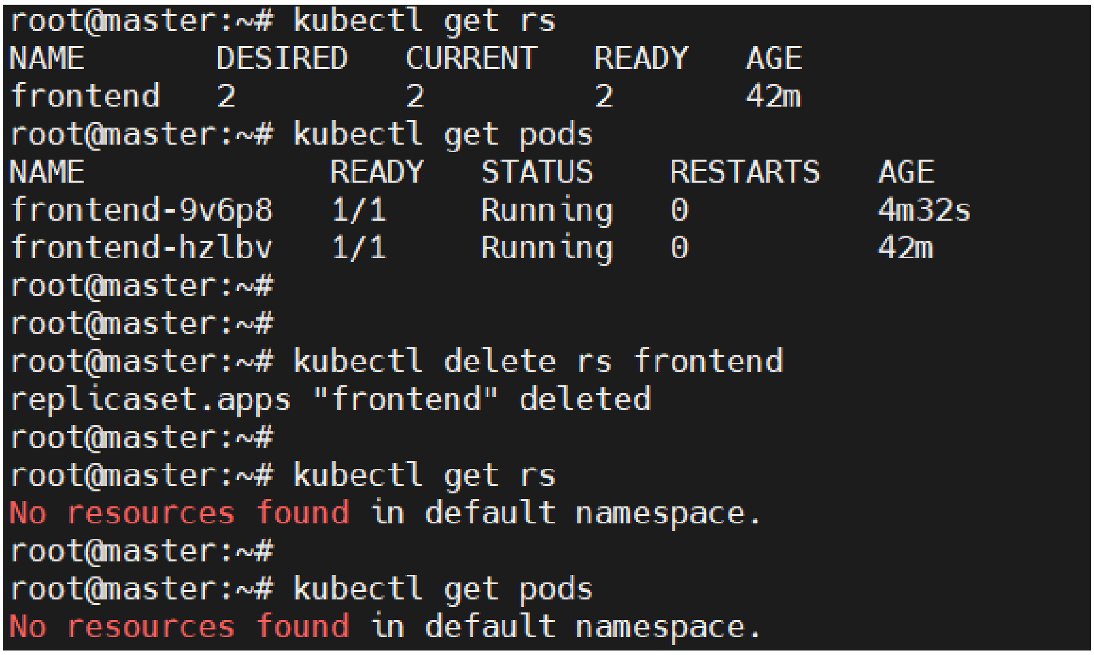


```
root@master:~# kubectl get rs
NAME       DESIRED   CURRENT   READY   AGE
frontend   2         2         2       37m
root@master:~# kubectl get pods
NAME             READY   STATUS    RESTARTS   AGE
frontend-gmbd6   1/1     Running   0          37m
frontend-hzlbv   1/1     Running   0          37m
root@master:~# kubectl delete pod frontend-gmbd6
pod "frontend-gmbd6" deleted
root@master:~#
root@master:~#
root@master:~# kubectl get rs
NAME       DESIRED   CURRENT   READY   AGE
frontend   2         2         2       38m
root@master:~# kubectl get pods
NAME             READY   STATUS    RESTARTS   AGE
frontend-9v6p8   1/1     Running   0          29s
frontend-hzlbv   1/1     Running   0          38m
```

Now we will be deleting the ReplicaSet using the below mentioned command.

```
kubectl delete rs frontend
```

The above command will delete the ReplicaSet as well as the pods related to it.
Find the output below:



```
root@master:~# kubectl get rs
NAME       DESIRED   CURRENT   READY   AGE
frontend   2         2         2       42m
root@master:~# kubectl get pods
NAME             READY   STATUS    RESTARTS   AGE
frontend-9v6p8   1/1     Running   0          4m32s
frontend-hzlbv   1/1     Running   0          42m
root@master:~#
root@master:~#
root@master:~# kubectl delete rs frontend
replicaset.apps "frontend" deleted
root@master:~#
root@master:~# kubectl get rs
No resources found in default namespace.
root@master:~#
root@master:~# kubectl get pods
No resources found in default namespace.
```