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Exercise 2.5: Create a Simple Deployment

> Creating a pod does not take advantage of orchestration abilities of Kubernetes. We will now create a `Deployment` which gives us scalability, reliability, and updates.

1. Now run a containerized webserver **nginx**. Use **kubectl create** to create a simple, single replica deployment running the nginx web server. It will create a single pod as we did previously but with new controllers to ensure it runs as well as other features.

```
student@cp:~$  kubectl create deployment firstpod --image=nginx
```

```
deployment.apps/firstpod created
```

2. Verify the new deployment exists and the desired number of pods matches the current number. Using a comma, you can request two resource types at once. The **Tab** key can be helpful. Type enough of the word to be unique and press the **Tab** key, it should complete the word. The deployment should show a number `1` for each value, such that the desired number of pods matches the up-to-date and running number. The pod should show zero restarts.

```
student@cp:~$ kubectl get deployment,pod
```

```
NAME                       READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/firstpod   1/1     1            1           10s

NAME                            READY   STATUS    RESTARTS   AGE
pod/firstpod-65c7f8b5bb-zmlp8   1/1     Running   0          10s
```

3. View the details of the deployment, then the pod. Work through the output slowly. Knowing what a healthy deployment and looks like can be helpful when troubleshooting issues. Again the **Tab** key can be helpful when using long auto-generated object names. You should be able to type firstpod**Tab** and the name will complete when viewing the pod.

```
student@cp:~$ kubectl describe deployment firstpod
```

```
Name:                   firstpod
Namespace:              default
CreationTimestamp:      Mon, 21 Jan 2025 13:48:48 +0530
Labels:                 app=firstpod
Annotations:            deployment.kubernetes.io/revision=1
Selector:               app=firstpod
Replicas:               1 desired | 1 updated | 1 total | 1 available....
StrategyType:           RollingUpdate
MinReadySeconds:        0
<output_omitted>
```

```
student@cp:~$ kubectl describe pod firstpod-65c7f8b5bb-zmlp8
```

```
Name:             firstpod-65c7f8b5bb-zmlp8
Namespace:        default
Priority:         0
Service Account:  default
```

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```
Node:             worker1/10.2.0.79
Start Time:       Mon, 21 Jan 2025 13:48:48 +0530
Labels:           app=firstpod
                  pod-template-hash=65c7f8b5bb
Annotations:      <none>
Status:           Running
IP:               10.0.1.3
IPs:
  IP:           10.0.1.3
Controlled By:  ReplicaSet/firstpod-65c7f8b5bb
<output_omitted>
```

4. Note that the resources are in the default namespace. Get a list of available namespaces.

```
student@cp:˜$ kubectl get namespaces
```

```
NAME              STATUS     AGE
default           Active     20m
kube-node-lease   Active     20m
kube-public       Active     20m
kube-system       Active     20m
```

5. There are four default namespaces. Look at the pods in the `kube-system` namespace.

```
student@cp:˜$ kubectl get pod -n kube-system
```

```
NAME                                  READY    STATUS     RESTARTS    AGE
cilium-cddg2                          1/1      Running    0           66m
cilium-operator-b4dfbf784-f7qtf       1/1      Running    0           66m
coredns-5dd5756b68-dhsdp              1/1      Running    0           66m
coredns-5dd5756b68-fjlcb              1/1      Running    0           66m
etcd-cp                               1/1      Running    0           67m
<output_omitted>
```

6. Now look at the pods in a namespace that does not exist. Note you do not receive an error.

```
student@cp:˜$ kubectl get pod -n fakenamespace
```

```
No resources found in fakenamespaces namespace.
```

7. You can also view resources in all namespaces at once. Use the `--all-namespaces` options to select objects in all namespaces at once.

```
student@cp:˜$ kubectl get pod --all-namespaces
```

```
NAMESPACE     NAME                                  READY    STATUS     RESTARTS    AGE
default       firstpod-65c7f8b5bb-zmlp8             1/1      Running    0           4m5s
kube-system   cilium-cddg2                          1/1      Running    0           75m
kube-system   cilium-operator-b4dfbf784-f7qtf       1/1      Running    0           75m
kube-system   cilium-tc7j5                          1/1      Running    0           12m
<output_omitted>
```

8. View several resources at once. Note that most resources have a short name such as `rs` for ReplicaSet, `po` for Pod, `svc` for Service, and `ep` for endpoint. Note the endpoint still exists after we deleted the pod.

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```
student@cp:~$ kubectl get deploy,rs,po,svc,ep
```

```
NAME                       READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/firstpod   1/1     1            1           3m41s

NAME                                  DESIRED   CURRENT   READY   AGE
replicaset.apps/firstpod-65c7f8b5bb   1         1         1       3m41s

NAME                            READY   STATUS    RESTARTS   AGE
pod/firstpod-65c7f8b5bb-kd7js   1/1     Running   0          3m41s

NAME                   TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)   AGE
service/basicservice   ClusterIP   10.98.110.168   <none>        80/TCP    29s
service/kubernetes     ClusterIP   10.96.0.1       <none>        443/TCP   24m

NAME                     ENDPOINTS          AGE
endpoints/basicservice   <none>             29s
endpoints/kubernetes     10.2.0.78:6443     24m
```

9. Delete the ReplicaSet and view the resources again. Note that the age on the ReplicaSet and the pod it controls is now less than a minute of age. The deployment operator started a new ReplicaSet operator when we deleted the existing one. The new ReplicaSet started another pod when the desired spec did not match the current status.

```
student@cp:~$ kubectl delete rs firstpod-65c7f8b5bb
```

```
replicaset.apps "firstpod-65c7f8b5bb" deleted
```

```
student@cp:~$ kubectl get deployment,rs,po,svc,ep
```

```
NAME                       READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/firstpod   1/1     1            1           5m43s

NAME                                  DESIRED   CURRENT   READY   AGE
replicaset.apps/firstpod-65c7f8b5bb   1         1         1       41s

NAME                            READY   STATUS    RESTARTS   AGE
pod/firstpod-65c7f8b5bb-52kcn   1/1     Running   0          41s

NAME                   TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)   AGE
service/basicservice   ClusterIP   10.98.110.168   <none>        80/TCP    2m31s
service/kubernetes     ClusterIP   10.96.0.1       <none>        443/TCP   26m

NAME                     ENDPOINTS          AGE
endpoints/basicservice   <none>             2m31s
endpoints/kubernetes     10.2.0.78:6443     26m
```

10. This time delete the top-level controller. After about 30 seconds for everything to shut down you should only see the cluster service and endpoint remain for the cluster and the service we created.

```
student@cp:~$ kubectl delete deployment firstpod
```

```
deployment.apps "firstpod" deleted
```

```
student@cp:~$ kubectl get deployment,rs,po,svc,ep
```

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```
NAME                   TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)   AGE
service/basicservice   ClusterIP   10.98.110.168   <none>        80/TCP    2m31s
service/kubernetes     ClusterIP   10.96.0.1       <none>        443/TCP   26m

NAME                     ENDPOINTS        AGE
endpoints/basicservice   <none>           2m31s
endpoints/kubernetes     10.2.0.78:6443   26m
```

11. As we won't need it for a while, delete the `basicservice` service as well.

```
student@cp:˜$ kubectl delete svc basicservice
```

```
service "basicservice" deleted
```

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