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EXPERIMENT – 9

Managing Namespaces in Kubernetes

Step 1: Understand Namespaces

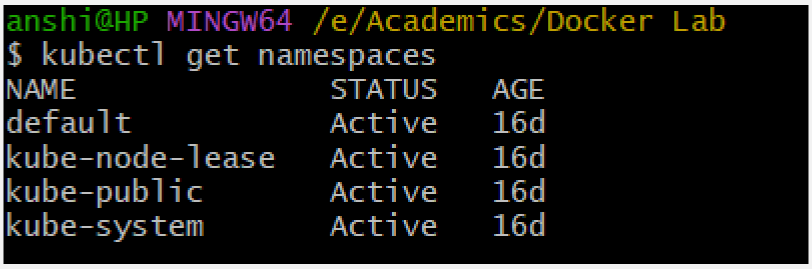
Namespaces provide a mechanism for scoping resources in a cluster. Namespaces can be used to:

- Create environments for different applications or teams.
- Apply policies like resource quotas or network policies on a per-namespace basis.
- Separate operational environments (like development and production).

Step 2: List Existing Namespaces

To list all the namespaces in your Kubernetes cluster:

```
kubectl get namespaces
```



```
anshi@HP MINGW64 /e/Academics/Docker Lab
$ kubectl get namespaces
NAME              STATUS   AGE
default           Active   16d
kube-node-lease   Active   16d
kube-public       Active   16d
kube-system       Active   16d
```

You will typically see default namespaces like default, kube-system, and kube-public.

Step 3: Create a Namespace

You can create a namespace using a YAML file or directly with the kubectl command.

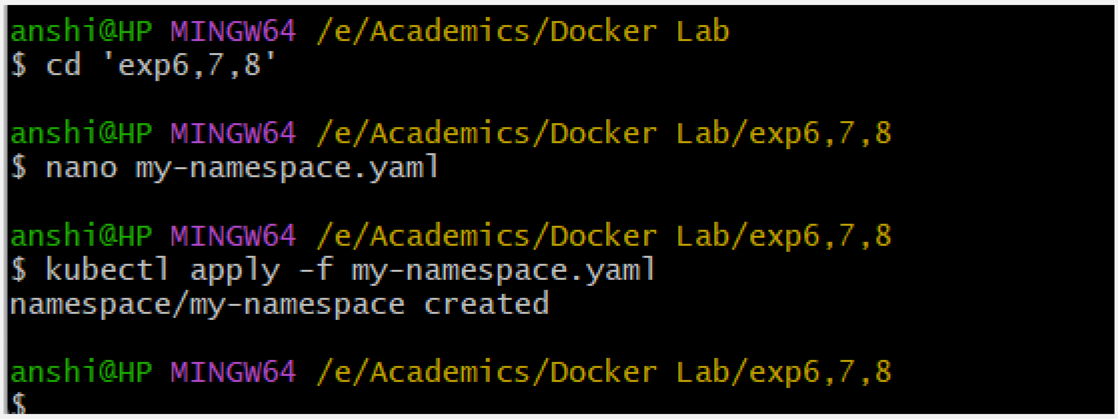
Using YAML File

Create a file named ***my-namespace.yaml*** with the following content:

```
apiVersion: v1

kind: Namespace

metadata:

  name: my-namespace
```

Apply this YAML to create the namespace:

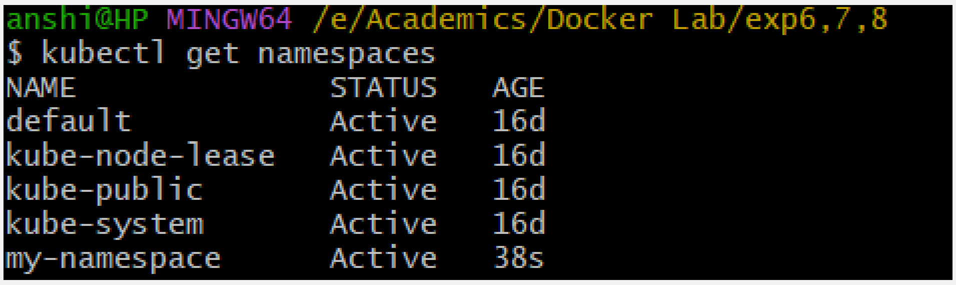
```
kubectl apply -f my-namespace.yaml
```



```
anshi@HP MINGW64 /e/Academics/Docker Lab
$ cd 'exp6,7,8'

anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ nano my-namespace.yaml

anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl apply -f my-namespace.yaml
namespace/my-namespace created

anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$
```

Verify that the namespace is created:

```
kubectl get namespaces
```



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl get namespaces
NAME              STATUS   AGE
default           Active   16d
kube-node-lease   Active   16d
kube-public       Active   16d
kube-system       Active   16d
my-namespace      Active   38s
```

You should see my-namespace listed in the output.

Step 4: Deploy Resources in a Namespace

Create resources such as Pods, Services, or Deployments within the new namespace.

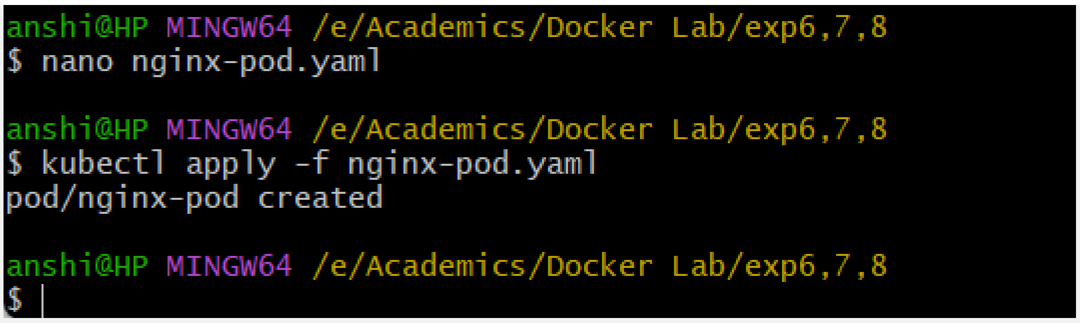
Deploy a Pod in the Namespace

Create a YAML file named ***nginx-pod.yaml*** with the following content:

```
apiVersion: v1

kind: Pod

metadata:

  name: nginx-pod

  namespace: my-namespace   # Specify the namespace for the Pod.

spec:

  containers:

  - name: nginx

    image: nginx:latest

    ports:

    - containerPort: 80
```

Apply this YAML to create the Pod:

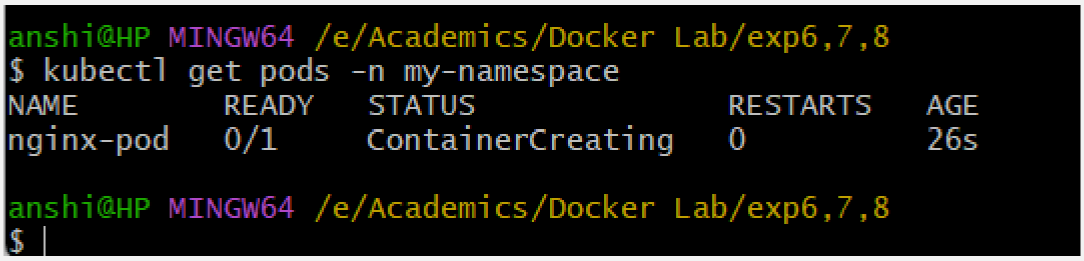
```
kubectl apply -f nginx-pod.yaml
```



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ nano nginx-pod.yaml

anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl apply -f nginx-pod.yaml
pod/nginx-pod created

anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ 
```

Check the status of the Pod within the namespace:

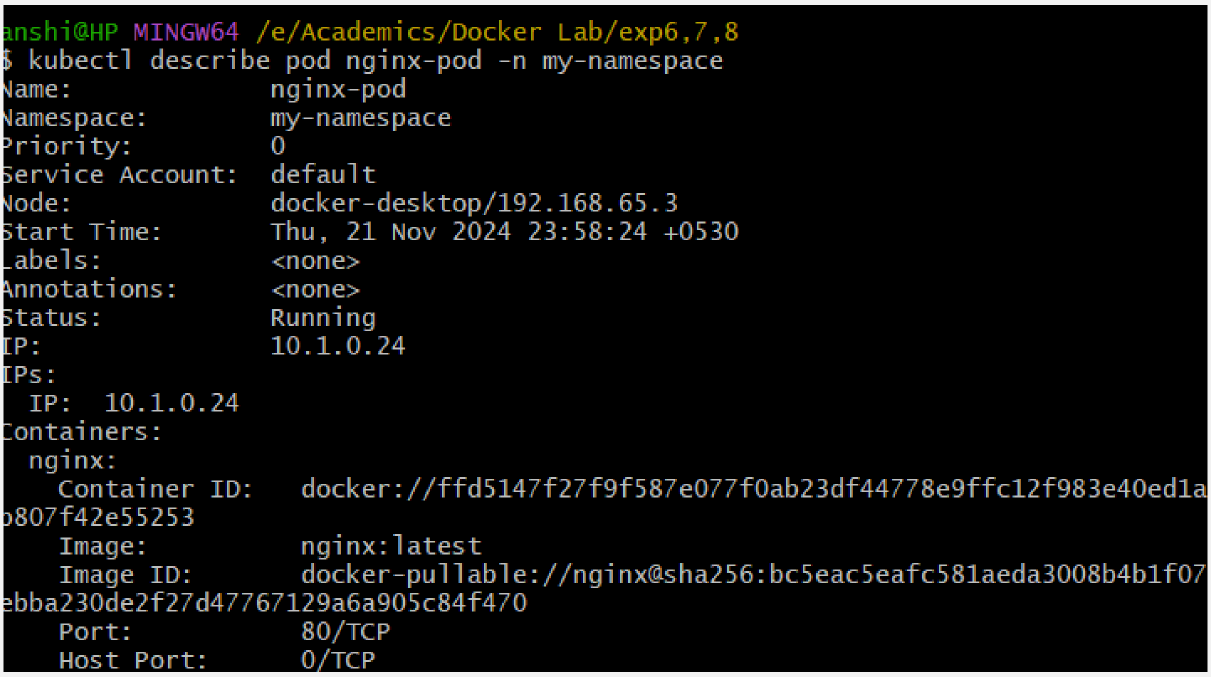
```
kubectl get pods -n my-namespace
```



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl get pods -n my-namespace
NAME        READY   STATUS              RESTARTS   AGE
nginx-pod   0/1     ContainerCreating   0          26s

anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ 
```

To describe the Pod and see detailed information:

```
kubectl describe pod nginx-pod -n my-namespace
```



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl describe pod nginx-pod -n my-namespace
Name:             nginx-pod
Namespace:        my-namespace
Priority:         0
Service Account:  default
Node:             docker-desktop/192.168.65.3
Start Time:       Thu, 21 Nov 2024 23:58:24 +0530
Labels:           <none>
Annotations:      <none>
Status:           Running
IP:               10.1.0.24
IPs:
  IP:  10.1.0.24
Containers:
  nginx:
    Container ID:   docker://ffd5147f27f9f587e077f0ab23df44778e9ffc12f983e40ed1a
b807f42e55253
    Image:          nginx:latest
    Image ID:       docker-pullable://nginx@sha256:bc5eac5eafc581aeda3008b4b1f07
ebba230de2f27d47767129a6a905c84f470
    Port:           80/TCP
    Host Port:      0/TCP
```

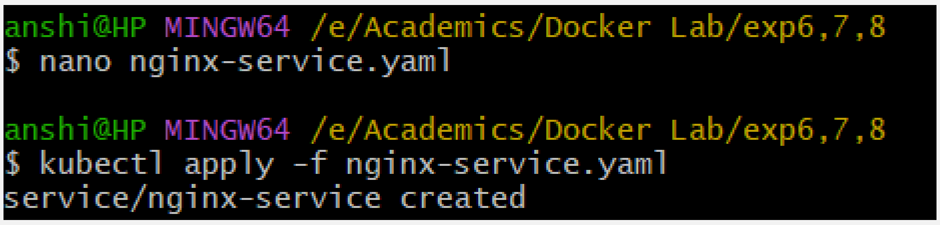
Create a Service in the Namespace

Create a YAML file named ***nginx-service.yaml*** with the following content:

```
apiVersion: v1
kind: Service
metadata:
  name: nginx-service
  namespace: my-namespace   # Specify the namespace for the Service.
spec:
  selector:
    app: nginx-pod
  ports:
  - protocol: TCP
    port: 80
    targetPort: 80
  type: ClusterIP
```

Apply this YAML to create the Service:

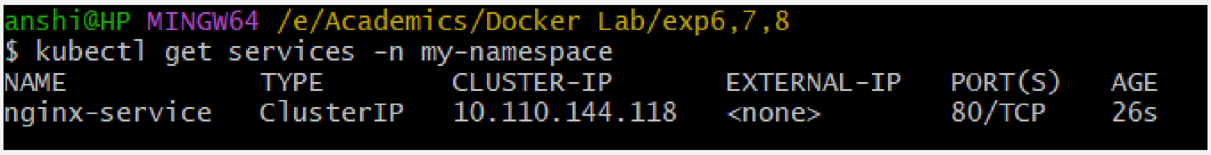
```
kubectl apply -f nginx-service.yaml
```



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ nano nginx-service.yaml

anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl apply -f nginx-service.yaml
service/nginx-service created
```

Check the status of the Service within the namespace:

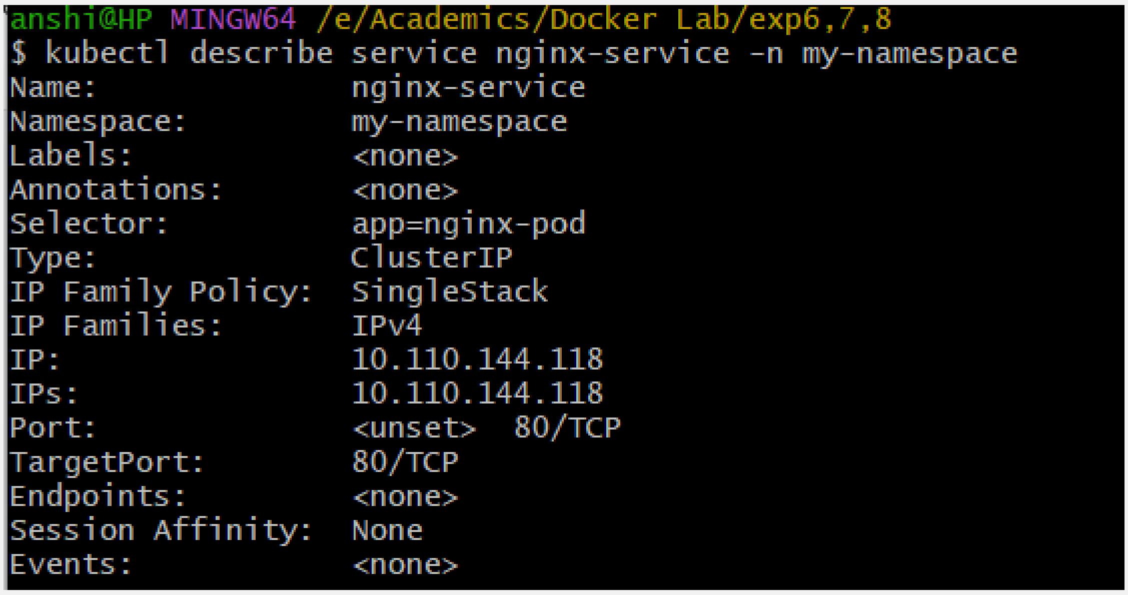
```
kubectl get services -n my-namespace
```



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl get services -n my-namespace
NAME            TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)   AGE
nginx-service   ClusterIP   10.110.144.118   <none>        80/TCP    26s
```

To describe the Service and see detailed information:

```
kubectl describe service nginx-service -n my-namespace
```



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl describe service nginx-service -n my-namespace
Name:              nginx-service
Namespace:         my-namespace
Labels:            <none>
Annotations:       <none>
Selector:          app=nginx-pod
Type:              ClusterIP
IP Family Policy:  SingleStack
IP Families:       IPv4
IP:                10.110.144.118
IPs:               10.110.144.118
Port:              <unset>  80/TCP
TargetPort:        80/TCP
Endpoints:         <none>
Session Affinity:  None
Events:            <none>
```

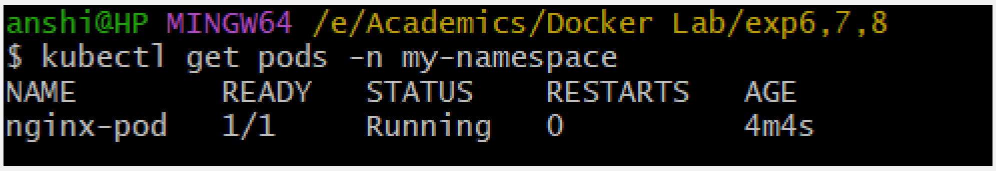
Step 5: Switching Context Between Namespaces

When working with multiple namespaces, you can specify the namespace in kubectl commands or switch the default context.

Specify Namespace in Commands

You can specify the namespace directly in kubectl commands using the -n or --namespace flag:

```
kubectl get pods -n my-namespace
```

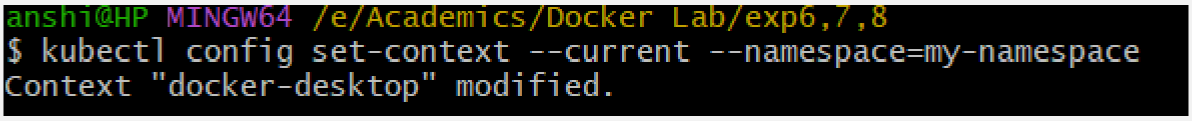


```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl get pods -n my-namespace
NAME        READY   STATUS    RESTARTS   AGE
nginx-pod   1/1     Running   0          4m4s
```

Set Default Namespace for kubectl Commands

To avoid specifying the namespace every time, you can set the default namespace for the current context:

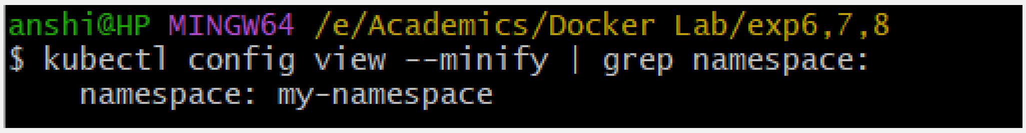
```
kubectl config set-context --current --namespace=my-namespace
```



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl config set-context --current --namespace=my-namespace
Context "docker-desktop" modified.
```

Verify the current context's namespace:

```
kubectl config view --minify | grep namespace:
```

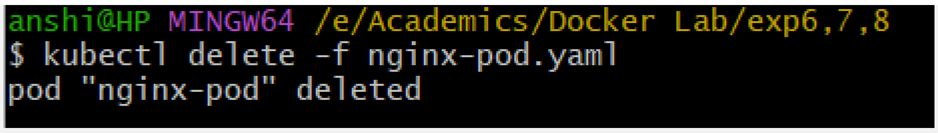


```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl config view --minify | grep namespace:
    namespace: my-namespace
```

Step 6: Clean Up Resources

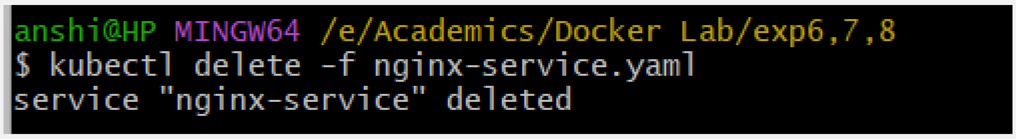
To delete the resources and the namespace you created:

```
kubectl delete -f nginx-pod.yaml
```



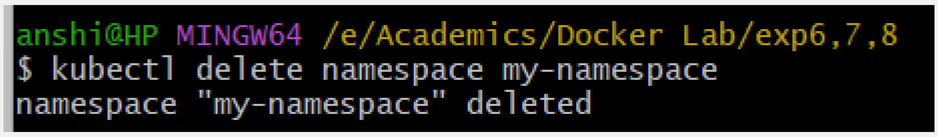
```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl delete -f nginx-pod.yaml
pod "nginx-pod" deleted
```

kubectl delete -f nginx-service.yaml



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl delete -f nginx-service.yaml
service "nginx-service" deleted
```

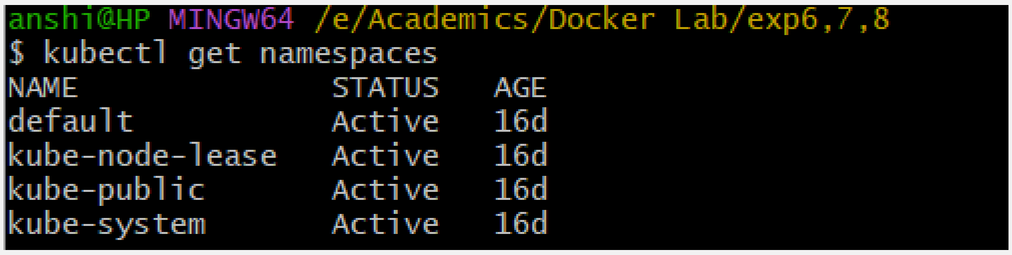
kubectl delete namespace my-namespace



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl delete namespace my-namespace
namespace "my-namespace" deleted
```

Ensure that the namespace and all its resources are deleted:

kubectl get namespaces



```
anshi@HP MINGW64 /e/Academics/Docker Lab/exp6,7,8
$ kubectl get namespaces
NAME              STATUS   AGE
default           Active   16d
kube-node-lease   Active   16d
kube-public       Active   16d
kube-system       Active   16d
```