Lab Exercise 6- Create POD in Kubernetes

Objective:

- Understand the basic structure and syntax of a Kubernetes Pod definition file (YAML).
- Learn to create, inspect, and delete a Pod in a Kubernetes cluster.

Prerequisites

- Kubernetes Cluster: You need a running Kubernetes cluster. You can set up a local cluster using tools like Minikube or kind, or use a cloud-based Kubernetes service.
- kubectl: Install and configure kubectl to interact with your Kubernetes cluster.
- Basic Knowledge of YAML: Familiarity with YAML format will be helpful as Kubernetes resource definitions are written in YAML.

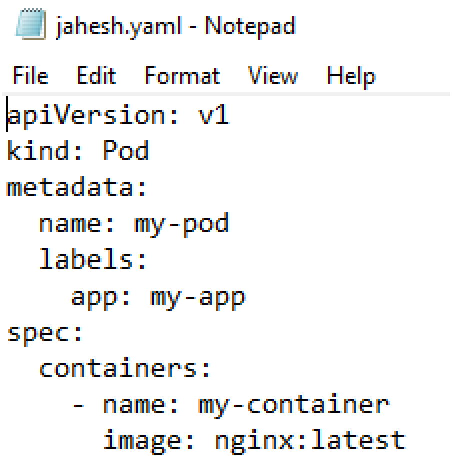
Step-by-Step Guide

Step 1: Create a YAML File for the Pod

We'll create a Pod configuration file named **pod-example.yaml**

```
apiVersion: v1         # The version of the Kubernetes API to use for this object.
kind: Pod              # The type of Kubernetes object. Here it's a Pod.
metadata:              # Metadata about the Pod, such as its name and labels.
  name: my-pod         # The name of the Pod. Must be unique within a namespace.
  labels:              # Labels are key-value pairs to categorize and organize Pods.
    app: my-app        # Label to categorize this Pod as part of 'my-app'.
spec:                  # The specification for the Pod, detailing its containers and other settings.
  containers:          # List of containers that will run in this Pod.
    - name: my-container # The name of the container. Must be unique within the Pod.
```

image: nginx:latest # The Docker image to use for this container. Here, it's the latest version of Nginx.



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

Explanation of the YAML File

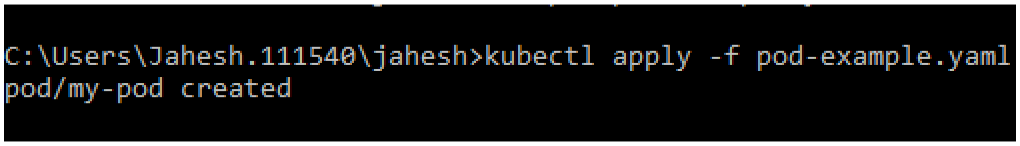
- apiVersion: Specifies the version of the Kubernetes API to use. For Pods, it's typically v1.
- kind: The type of object being created. Here it's a Pod.
- metadata: Provides metadata about the object, including name and labels. The name must be unique within the namespace, and labels help in identifying and organizing Pods.
- spec: Contains the specifications of the Pod, including:
    - containers: Lists all containers that will run inside the Pod. Each container needs:
        - name: A unique name within the Pod.
        - image: The Docker image to use for the container.
        - ports: The ports that this container exposes.
        - env: Environment variables passed to the container.

Step 2: Apply the YAML File to Create the Pod

Use the kubectl apply command to create the Pod based on the YAML configuration file.

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

This command tells Kubernetes to create a Pod as specified in the pod-example.yaml file.

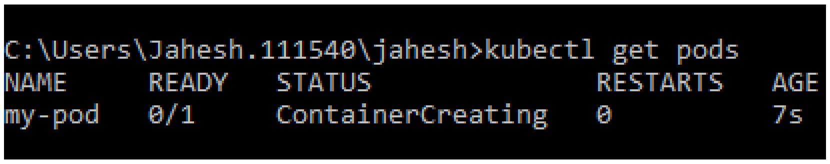


```
C:\Users\Jahesh.111540\jahesh>kubectl apply -f pod-example.yaml
pod/my-pod created
```

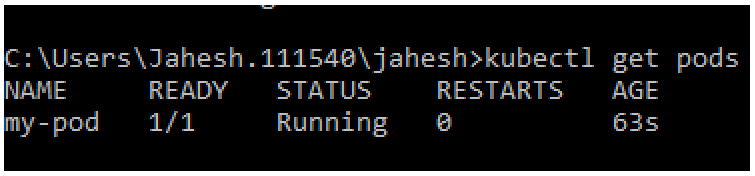
Step 3: Verify the Pod Creation

To check the status of the Pod and ensure it's running, use:

```
kubectl get pods
```



```
C:\Users\Jahesh.111540\jahesh>kubectl get pods
NAME     READY   STATUS              RESTARTS   AGE
my-pod   0/1     ContainerCreating   0          7s
```

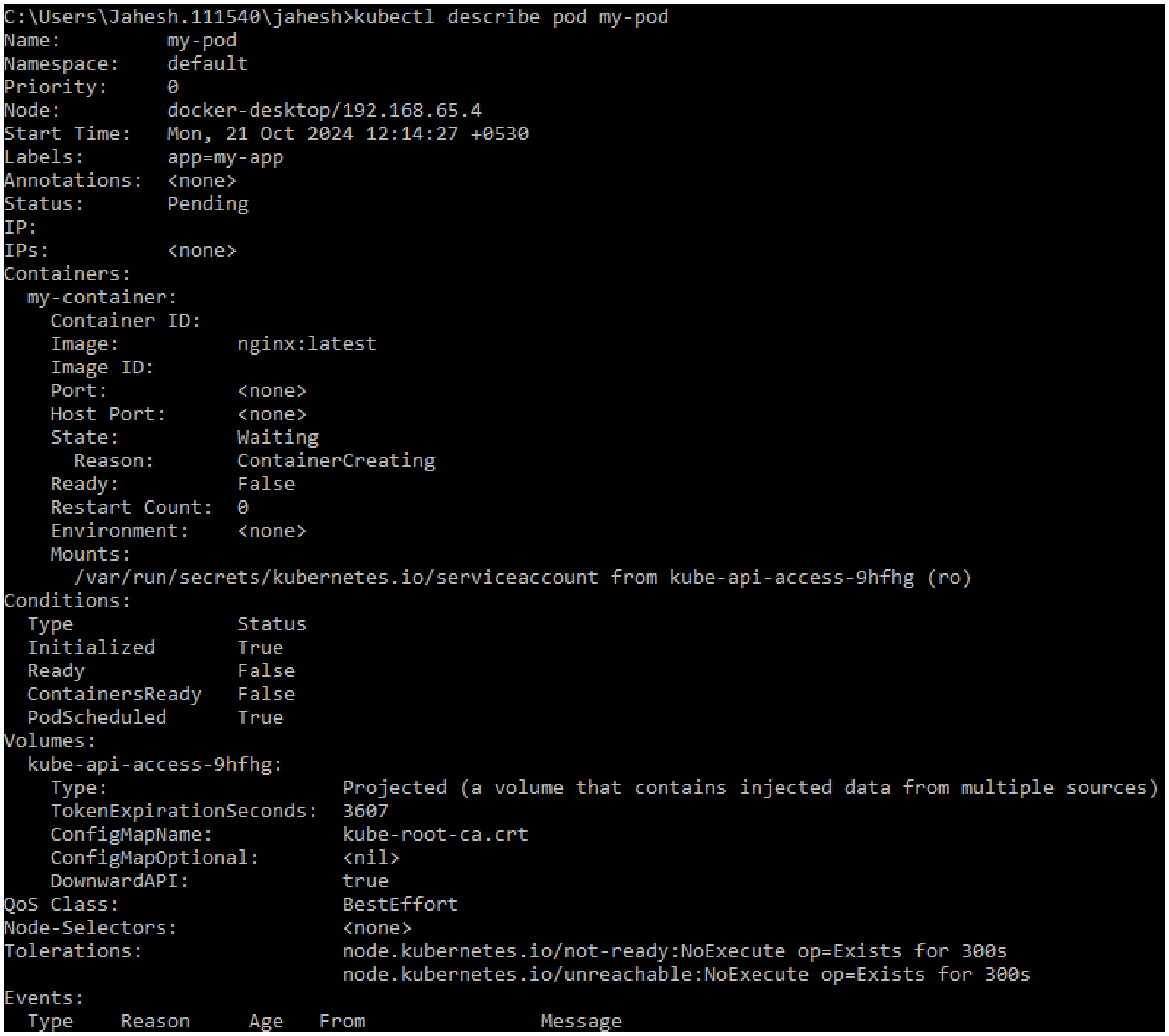


```
C:\Users\Jahesh.111540\jahesh>kubectl get pods
NAME     READY   STATUS    RESTARTS   AGE
my-pod   1/1     Running   0          63s
```

This command lists all the Pods in the current namespace, showing their status, restart count, and other details.

You can get detailed information about the Pod using:

```
kubectl describe pod my-pod
```



```
C:\Users\Jahesh.111540\jahesh>kubectl describe pod my-pod
Name:         my-pod
Namespace:    default
Priority:     0
Node:         docker-desktop/192.168.65.4
Start Time:   Mon, 21 Oct 2024 12:14:27 +0530
Labels:       app=my-app
Annotations:  <none>
Status:       Pending
IP:
IPs:          <none>
Containers:
  my-container:
    Container ID:
    Image:          nginx:latest
    Image ID:
    Port:           <none>
    Host Port:      <none>
    State:          Waiting
      Reason:       ContainerCreating
    Ready:          False
    Restart Count:  0
    Environment:    <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-9hfhg (ro)
Conditions:
  Type              Status
  Initialized       True
  Ready             False
  ContainersReady   False
  PodScheduled      True
Volumes:
  kube-api-access-9hfhg:
    Type:                    Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds:  3607
    ConfigMapName:           kube-root-ca.crt
    ConfigMapOptional:       <nil>
    DownwardAPI:             true
QoS Class:                   BestEffort
Node-Selectors:              <none>
Tolerations:                 node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                             node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type    Reason     Age   From               Message
```

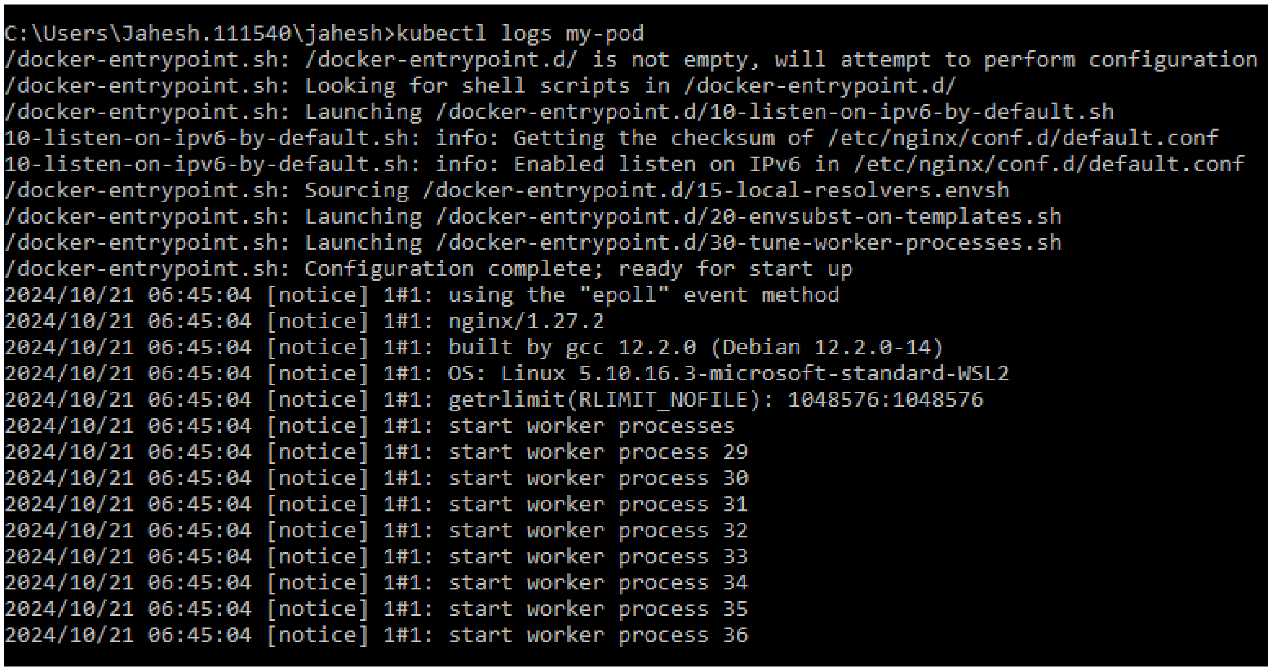
This command provides detailed information about the Pod, including its events, container specifications, and resource usage.

Step 4: Interact with the Pod

You can interact with the running Pod in various ways, such as accessing the logs or executing commands inside the container.

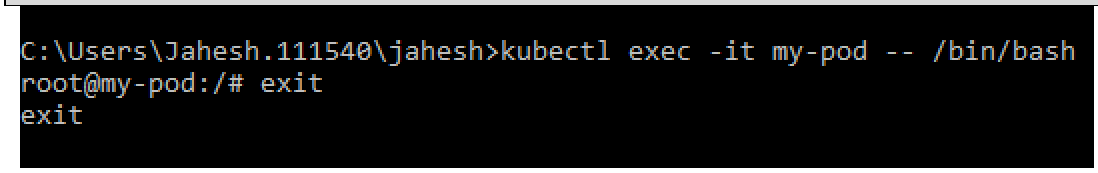
View Logs: To view the logs of the container in the Pod:

```
kubectl logs my-pod
```


```
C:\Users\Jahesh.111540\jahesh>kubectl logs my-pod
/docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
/docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
/docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
/docker-entrypoint.sh: Sourcing /docker-entrypoint.d/15-local-resolvers.envsh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
/docker-entrypoint.sh: Configuration complete; ready for start up
2024/10/21 06:45:04 [notice] 1#1: using the "epoll" event method
2024/10/21 06:45:04 [notice] 1#1: nginx/1.27.2
2024/10/21 06:45:04 [notice] 1#1: built by gcc 12.2.0 (Debian 12.2.0-14)
2024/10/21 06:45:04 [notice] 1#1: OS: Linux 5.10.16.3-microsoft-standard-WSL2
2024/10/21 06:45:04 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2024/10/21 06:45:04 [notice] 1#1: start worker processes
2024/10/21 06:45:04 [notice] 1#1: start worker process 29
2024/10/21 06:45:04 [notice] 1#1: start worker process 30
2024/10/21 06:45:04 [notice] 1#1: start worker process 31
2024/10/21 06:45:04 [notice] 1#1: start worker process 32
2024/10/21 06:45:04 [notice] 1#1: start worker process 33
2024/10/21 06:45:04 [notice] 1#1: start worker process 34
2024/10/21 06:45:04 [notice] 1#1: start worker process 35
2024/10/21 06:45:04 [notice] 1#1: start worker process 36
```

Execute a Command: To run a command inside the container:

```
kubectl exec -it my-pod -- /bin/bash
```

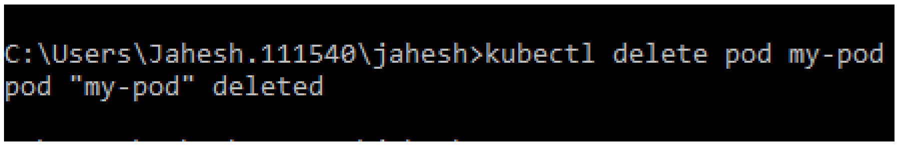

```
C:\Users\Jahesh.111540\jahesh>kubectl exec -it my-pod -- /bin/bash
root@my-pod:/# exit
exit
```

The -it flag opens an interactive terminal session inside the container, allowing you to run commands.

Step 5: Delete the Pod

To clean up and remove the Pod when you're done, use the following command:

```
kubectl delete pod my-pod
```


```
C:\Users\Jahesh.111540\jahesh>kubectl delete pod my-pod
pod "my-pod" deleted
```

This command deletes the specified Pod from the cluster.