UNIVERSITY OF PETROLEUM & ENERGY STUDIES
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ACO LAB

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EXPERIMENT – 7

AIM: Creating Pods in Kubernetes

Below is a lab exercise that will help you understand and practice creating pods in Kubernetes:

Task 1: Start Kubernetes in Docker-Desktop

- Start Kubernetes service in Docker-Desktop

Task 2: Creating a Simple Pod

- Create a simple YAML manifest file named pod.yaml to define a basic Pod in Kubernetes. An example of the file content is as follows:

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

- Apply the Pod configuration using the following command:

  " kubectl apply -f pod.yaml "

```
91983@DELL MINGW64 ~/OneDrive/Desktop/SEM5/Kubernetes (main)
$ kubectl config use-context docker-desktop
Switched to context "docker-desktop".

91983@DELL MINGW64 ~/OneDrive/Desktop/SEM5/Kubernetes (main)
$ kubectl config current-context
docker-desktop

91983@DELL MINGW64 ~/OneDrive/Desktop/SEM5/Kubernetes (main)
$ kubectl apply -f pod.yaml
pod/my-nginx-pod created
```

- Check the status of the Pod using the following command:

  " kubectl get pods "

```
91983@DELL MINGW64 ~/OneDrive/Desktop/SEM5/Kubernetes (main)
$ kubectl get pods
NAME           READY   STATUS    RESTARTS   AGE
my-nginx-pod   1/1     Running   0          2m
```

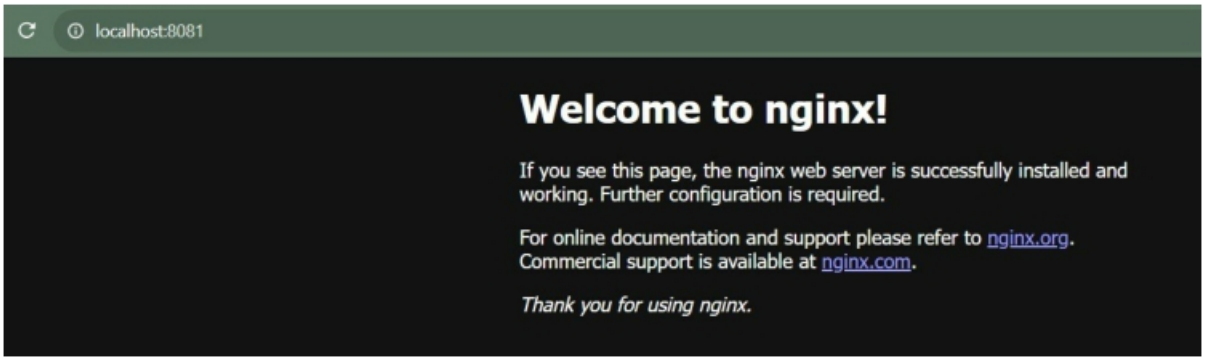
Task 3: Accessing the Pod

- Access the Pod by using port forwarding to the container. Run the following command:

  " kubectl port-forward my-nginx-pod 8081:80 "

```
91983@DELL MINGW64 ~/OneDrive/Desktop/SEM5/Kubernetes (main)
$ kubectl port-forward my-nginx-pod 8081:80
Forwarding from 127.0.0.1:8081 -> 80
Forwarding from [::1]:8081 -> 80
```

- Access the Nginx server running in the Pod by opening a web browser and navigating to http://localhost:8081



Task 4: Exploring Pod Details

- Retrieve detailed information about the Pod using the following command:

  " kubectl describe pod my-nginx-pod "

```
91983@DELL MINGW64 ~/OneDrive/Desktop/SEM5/Kubernetes (main)
$ kubectl describe pod my-nginx-pod
Name:             my-nginx-pod
Namespace:        default
Priority:         0
Service Account:  default
Node:             docker-desktop/192.168.65.3
Start Time:       Mon, 13 Nov 2023 18:14:39 +0530
Labels:           app=lbnginx
Annotations:      <none>
Status:           Running
IP:               10.1.0.10
IPs:
  IP:  10.1.0.10
Containers:
  nginx-container:
    Container ID:   docker://4fbe664c2bc2c81e731e022e9476c763165a98137dfc75ce9f783abb78d20fc9
    Image:          nginx
    Image ID:       docker-pullable://nginx@sha256:86e53c4c16a6a276b204b0fd3a8143d86547c967dc8258b3d47c3a21bb68d3c6
    Port:           <none>
    Host Port:      <none>
    State:          Running
      Started:      Mon, 13 Nov 2023 18:15:39 +0530
    Ready:          True
    Restart Count:  0
    Environment:    <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-bxhch (ro)
```

```
Conditions:
  Type              Status
  Initialized       True
  Ready             True
  ContainersReady   True
  PodScheduled      True
Volumes:
  kube-api-access-bxhch:
    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
  ----    ------     ----  ----               -------
  Normal  Scheduled  10m   default-scheduler  Successfully assigned default/my-nginx-pod to docker-desktop
  Normal  Pulling    10m   kubelet            Pulling image "nginx"
  Normal  Pulled     9m3s  kubelet            Successfully pulled image "nginx" in 57.368s (57.368s including waiting)
  Normal  Created    9m2s  kubelet            Created container nginx-container
  Normal  Started    9m1s  kubelet            Started container nginx-container
```

- Check the logs of the Pod to understand its behavior using the following command:

  “ kubectl logs my-nginx-pod ”

```
91983@DELL MINGW64 ~/OneDrive/Desktop/SEM5/Kubernetes (main)
$ kubectl logs my-nginx-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
2023/11/13 12:45:39 [notice] 1#1: using the "epoll" event method
2023/11/13 12:45:39 [notice] 1#1: nginx/1.25.3
2023/11/13 12:45:39 [notice] 1#1: built by gcc 12.2.0 (Debian 12.2.0-14)
2023/11/13 12:45:39 [notice] 1#1: OS: Linux 5.10.102.1-microsoft-standard-WSL2
2023/11/13 12:45:39 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2023/11/13 12:45:39 [notice] 1#1: start worker processes
2023/11/13 12:45:39 [notice] 1#1: start worker process 29
2023/11/13 12:45:39 [notice] 1#1: start worker process 30
2023/11/13 12:45:39 [notice] 1#1: start worker process 31
2023/11/13 12:45:39 [notice] 1#1: start worker process 32
2023/11/13 12:45:39 [notice] 1#1: start worker process 33
2023/11/13 12:45:39 [notice] 1#1: start worker process 34
2023/11/13 12:45:39 [notice] 1#1: start worker process 35
2023/11/13 12:45:39 [notice] 1#1: start worker process 36
127.0.0.1 - - [13/Nov/2023:12:51:15 +0000] "GET / HTTP/1.1" 200 615 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/119.0.0.0 Safari/537.36" "-"
127.0.0.1 - - [13/Nov/2023:12:51:15 +0000] "GET /favicon.ico HTTP/1.1" 404 555 "http://localhost:8081/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/119.0.0.0 Safari/537.36" "-"
2023/11/13 12:51:15 [error] 30#30: *1 open() "/usr/share/nginx/html/favicon.ico" failed (2: No such file or directory), client: 127.0.0.1, server: localhost, request: "GET /favicon.ico HTTP/1.1", host: "localhost:8081", referrer: "http://localhost:8081/"
```

Task 5: Deleting the Pod

- Delete the Pod using the following command:

  " kubectl delete pod my-nginx-pod "

```
91983@DELL MINGW64 ~/OneDrive/Desktop/SEM5/Kubernetes (main)
$ kubectl delete pod my-nginx-pod
pod "my-nginx-pod" deleted
```

- Verify that the Pod has been deleted by running the **"kubectl get pods"** command.

```
91983@DELL MINGW64 ~/OneDrive/Desktop/SEM5/Kubernetes (main)
$ kubectl get pods
No resources found in default namespace.
```

Task 6: Advanced Pod Configuration

- Experiment with advanced Pod configuration options such as environment variables, volume mounts, resource limits, and labels.
- Update the Pod manifest file and apply the changes to the Kubernetes cluster.

Task 7: Cleanup

Delete any remaining Pods, services, and deployments created during the exercise using the appropriate kubectl delete commands.

Task 8: Documentation and Best Practices

Document your findings and the best practices for creating and managing Pods in Kubernetes.

Through this exercise, you'll gain a better understanding of how to create, manage, and interact with Pods in Kubernetes. Adjust the exercise based on your specific use case and requirements.