Rahul Siddharth D H – 22CSR158

III CSE C

DevOps Day 4 Task – Kubernetes, Namespace:

**Kubernetes (K8s)** 

Kubernetes is an open source container orchestration engine for automating deployment, scaling, and management of containerized applications. The open source project is hosted by the Cloud Native Computing Foundation (CNCF).

It provides a scalable and resilient framework for automating the deployment, scaling, and management of applications across clusters of servers.

## A SMALL HISTORY OF K8S:

- In the early 2000s, Google started developing a system called Borg to manage their internal containerized applications.
- Borg enabled Google to run applications at scale, providing features such as automatic scaling, service discovery, and fault tolerance.
- In 2014, Google open-sourced a version of Borg called Kubernetes.
- ☑ Kubernetes was donated to the Cloud Native Computing
  Foundation (CNCF), a neutral home for open-source cloud-native
  projects, in July 2015.

- Rubernetes 1.8 added significant enhancements for storage, security, and networking. Key features included the stable release of the stateful sets API, expanded support for volume plugins, and improvements in security policies.
- Check URL: https://kubernetes.io/releases/ for more release details.

## Control Plane / Master Node

The control plane's components make global decisions about the cluster (for example, scheduling), as well as detecting and responding to cluster events (for example, starting up a new pod when a deployment's replicas field is unsatisfied).

Control plane components can be run on any machine in the cluster. Do not run user containers on this machine.

Node Components / Worker Nodes

Node components run on every node, maintaining running pods and providing the Kubernetes runtime environment.

- 1. Master Node: The master node is responsible for managing the cluster and coordinating the overall state of the system. It includes the following components:
- a. API Server: The API server is the central control point for all interactions with the cluster. It exposes the Kubernetes API and handles requests from users and other components.

- b. Scheduler: The scheduler is responsible for assigning workloads (pods) to individual worker nodes based on resource requirements, constraints, and other policies.
- c. Controller Manager: The controller manager runs various controllers that monitor the cluster state and drive it towards the desired state. Examples include the replication controller, node controller, and service controller.
- d. etcd: etcd is a distributed key-value store used by Kubernetes to store cluster state and configuration data.
- 1. Pod: The basic building block of Kubernetes. A pod represents a single instance of a running process within the cluster. It can encapsulate one or more containers that share the same network and storage resource
- 1. Create a pod using run command

\$ kubectl run <pod-name> --image=<image-name> --port=<containerport>

\$ kubectl run my-pod --image=nginx --port=80

- 2. View all the pods
- (In default namespace)
- \$ kubectl get pods
- (In All namespace)
- \$ kubectl get pods -A
- # For a specific namespace
- \$ kubectl get pods -n kube-system
- # For a specific type
- \$ kubectl get pods <pod-name>
- \$ kubectl get pods <pod-name> -o wide
- \$ kubectl get pods <pod-name> -o yaml
- \$ kubectl get pods <pod-name> -o json
- 3. Describe a pod (View Pod details)
- \$ kubectl describe pod <pod-name>
- \$ kubectl describe pod my-pod
- 4. View Logs of a pod
- \$ kubectl logs <pod-name>
- \$ kubectl logs my-pod

- 5. Execute any command inside Pod (Inside Pod OS)
- \$ kubectl exec <pod-name> -- <command>

kubectl exec -it my-pod

[4:34 PM, 3/20/2025] +91 90928 13114: Namespace (short name = ns):

namespace is a virtual cluster or logical partition within a cluster that provides a way to organize and isolate resources. It allows multiple teams or projects to share the same physical cluster while maintaining resource separation and access control.

[4:34 PM, 3/20/2025] +91 90928 13114: # To create a namespace:

- \$ kubectl create namespace < namespace name >
- \$ kubectl create ns my-bank
- # To switch to a specific namespace: (make this as default type)
- \$ kubectl config set-context --current --namespace=<namespace-name>
- # To list all namespaces:
- \$ kubectl get namespaces
- # To get resources within a specific namespace:
- \$ kubectl get <resource-type> -n <namespace-name>
- \$ kubectl get deploy -n my-bank
- \$ kubectl get deploy --namespace my-bank

```
$ kubectl get all --namespace my-bank
# To delete a namespace and all associated resources:
$ kubectl delete namespace <namespace-name>
$ kubectl delete ns my-bank
Deployment.yml
apiVersion: apps/v1
kind: Deployment
metadata:
 name: my-deploy
 labels:
  name: my-deploy
spec:
 replicas: 1
selector:
  matchLabels:
   apptype: web-backend
 strategy:
```

```
type: RollingUpdate
 template:
  metadata:
   labels:
    apptype: web-backend
  spec:
   containers:
   - name: maven-web-app
    image: aswinprabusiva/webapp1:latest
    ports:
    - containerPort: 8000
apiVersion: v1
kind: Service
metadata:
 name: my-service
 labels:
  app: my-service
spec:
```

type: NodePort

ports:

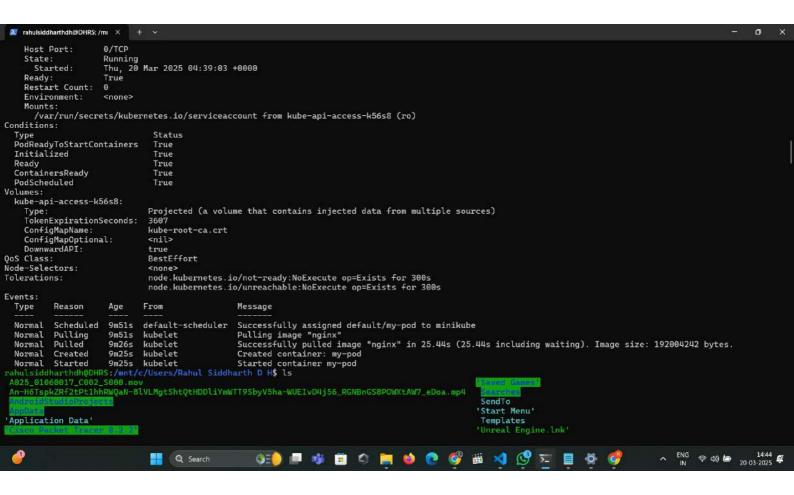
- port: 8000

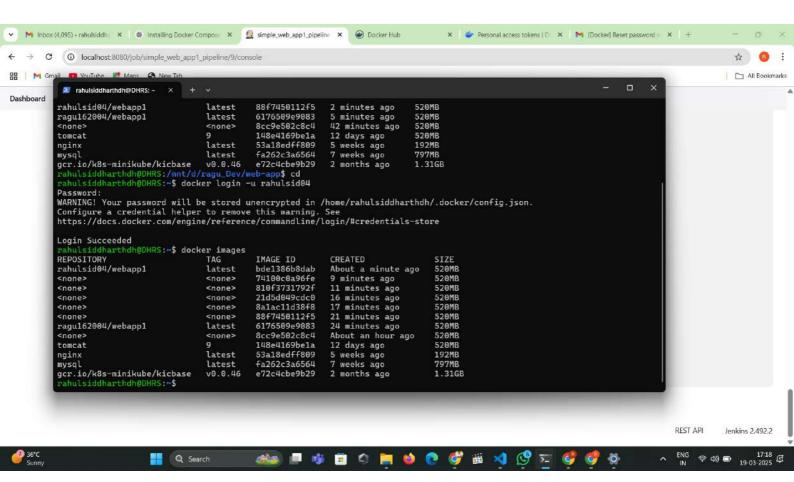
targetPort: 8080

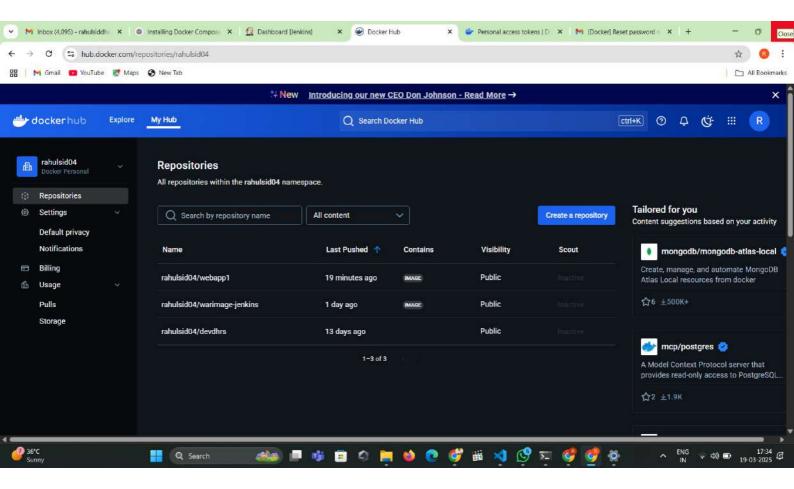
nodePort: 30007

0 QoS Class: BestEffort <none>
node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
node.kubernetes.io/unreachable:NoExecute op=Exists for 300s Node-Selectors: Tolerations: Events: Reason Туре Age Normal Scheduled 3m28s default-scheduler Suc Normal Pulling 21s (x5 over 3m28s) kubelet Pul Warning Failed 14s (x5 over 3m24s) kubelet Faisid04/webapp1:Dev4 not found: manifest unknown: manifest unknown Warning Failed 14s (x5 over 3m24s) kubelet Err Normal BackOff 1s (x11 over 3m23s) kubelet BackOff Warning Failed 1s (x11 over 3m23s) kubelet BackOff Is (x12 over 3m23s) kubelet BackOff Is default-scheduler kubelet Successfully assigned default/my-pod to minikube
kubelet Pulling image "rahulsid04/webapp1:Dev4": Error response from daemon: manifest for rahul Error: ErrImagePull Back-off pulling image "rahulsid04/webapp1:Dev4" Error: ImagePullBackOff warning Failed IS (XII over 3m23s) Rubetet Error: Imagerutte nulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H\$ kubectl get pod my-pod ME READY STATUS RESTARTS AGE -pod 0/1 ImagePullBackOff 0 3m53s nulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H\$ kubectl get pod my-pod my-pod NAME READY STATUS RESTARTS AGE ImagePullBackOff 0 10m my-pod 0/1 my-pou o/in-rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H\$ sudo nano pod.yml rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H\$ kubectl apply -f pod.yml pod/my-pod configured pod/my-pod configured
rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H\$ kubectl get pod my-pod

NAME READY STATUS RESTARTS AGE
my-pod 0/1 ImagePullBackOff 0 11m
rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H\$ docker pull rahulsid04/webapp1:Dev4 Error response from daemon: manifest for rahulsid04/webapp1:Dev4 not found: manifest unknown: manifest unknown rahulsiddharthdh0DHRS:/mmt/c/Users/Rahul Siddharth D H\$ docker pull rahulsid04/webapp1:latest Tahulsiddharthdh@UHRS:/mmt/c/Users/Rahul Siddharth D H\$ docker pull rahulsid04/welatest: Pulling from rahulsid04/webapp1
Digest: sha256:65234ac1858206e9dcb6e0lc3cf336e55bfaf518ad93c3d5c5886675e3d2d7f9
Status: Image is up to date for rahulsid04/webapp1:latest
docker.io/rahulsid04/webapp1:latest
rahulsiddharthdh@DHRS:/mmt/c/Users/Rahul Siddharth D H\$ sudo nano pod.yml
rahulsiddharthdh@DHRS:/mmt/c/Users/Rahul Siddharth D H\$ kubectl apply -f pod.yml pod/my-pod unchanged dharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H\$ kubectl get pod my-pod READY STATUS RESTARTS AGE 1/1 Running 0 15m NAME READY STATUS RESTARTS
my-pod 1/1 Running 0 15m
my-pod 1/1 Running 0 15m
rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H\$ kubectl get pod -o wide
rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H\$ kubectl get pod -o wide
rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H\$ kubectl get pod -o wide READINESS GATES ③王) 💷 咙 📋 🖒 📜 🔞 🤨 🤡 🔞 刘 🧐 🗺 🔰 🐧 💮 🖺 🙀 🛷 🔭 🔭 ^ ENG 🧇 Ф) 🗁 20-03-2025 주 Q Search







```
rahulsiddharthdh@DHRS: /mi X + ~
                                                                                                                                                                                                                                                                                                                                                                      0
error: no objects passed to scale deployments.apps "my-deploy" not found rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H$ kubectl get deployments kubectl get pods
NAME READY UP-TO-DATE AVAILABLE AGE
                                             UP-TO-DATE AVAILABLE
                                                                                                          AGE
71s
webnginx2 1/1
                                                                    READY
1/1
1/1
1/1
1/1
                                                                                                                                         AGE
177m
169m
169m
                                                                                                               RESTARTS
0
NAME
                                                                                        STATUS
NAME
my-replicaset-65mjx
my-replicaset-mjgk8
my-replicaset-nxmrx
my-replicaset-qm8md
my-replicaset-zjxdg
webnginx2-85b94F8d56-w8jh4
                                                                                        Running
                                                                                        Running
                                                                                        Running
                                                                                                                                          172m
                                                                                        Running
                                                                                                                                          177m
   vebnginx2-85b94f8d56-w8jh4 1/1 Running 0 /15
vahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H$ kubectl get pods
lAME READY STATUS RESTARTS AGE
ny-replicaset-65mjx 1/1 Running 0 177m
ny-replicaset-mjgk8 1/1 Running 0 169m
NAME
my-replicaset-65mjx
my-replicaset-mjgk8
my-replicaset-nxmrx
my-replicaset-qm8md
my-replicaset-zjxdg
webnginx2-85b94F8d56-w8jh4
                                                                                       Running
Running
Running
Running
                                                                     1/1
1/1
1/1
1/1
                                                                                                                                          169m
                                                                                                                                          172m
                                                                   1/1
                                                                                        Running
                                                                                                              0
                                                                                                                                          78s
                                                                                       Running
                                            HRS:/mnt/c/Users/Rahul Siddharth D H$ kubectl get deployments
UP-TO-DATE AVAILABLE AGE
rahulsiddharthdh@DHRS
NAME READY U
webnginx2 1/1 1 81s
rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H$ kubectl describe deployment my-deploy
Error from server (NotFound): deployments.apps "my-deploy" not found
rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H$ kubectl delete deployment my-deploy
Error from server (NotFound): deployments.apps "my-deploy" not found
webnginx2 1/1
 rahulsiddharthdh@DHRS:/mmt/c/Users/Rahul Siddharth D H$ sudo nano my-deploy.yml rahulsiddharthdh@DHRS:/mmt/c/Users/Rahul Siddharth D H$ kubectl scale deploy my-deploy --replicas=5
rahulsiddharthdh@UHRS:/mmt/c/Users/Rahul Siddharth D H$ sudo nano my-deploy my-deploy --rep error: no objects passed to scale deployments.apps "my-deploy" not found rahulsiddharthdh@DHRS:/mmt/c/Users/Rahul Siddharth D H$ sudo nano my-deploy.yml rahulsiddharthdh@DHRS:/mmt/c/Users/Rahul Siddharth D H$ kubectl apply -f my-deploy.yml The Deployment "webappl" is invalid: spec.template.spec.containers[0].image: Required value rahulsiddharthdh@DHRS:/mmt/c/Users/Rahul Siddharth D H$ sudo nano my-deploy.yml rahulsiddharthdh@DHRS:/mmt/c/Users/Rahul Siddharth D H$ kubectl apply -f my-deploy.yml
deployment.apps/my-deploy created
rahulsiddharthdh@DHRS:/mmt/c/Users/Rahul Siddharth D H$ kubectl get deployments

NAME READY UP-TO-DATE AVAILABLE AGE
my-deploy 4/4 4 4 40s
webnginx2 1/1 1 1 12m
 rahulsiddharthdh@DHRS:/mnt/c/Users/Rahul Siddharth D H$ |
```

Q Search

へ ENG 令句) to 14:44 ự