KIND Cluster Setup

Install Docker:

sudo apt update -y

sudo apt install -y docker.io

sudo systemctl enable docker

sudo systemctl start docker

```
ubuntu@ip-172-31-34-15:~$ sudo docker --version
Docker version 26.1.3, build 26.1.3-0ubuntu1~24.04.1
ubuntu@ip-172-31-34-15:~$
```

Grant Docker Permissions to Current User:

```
ubuntu@ip-172-31-34-15:~$ sudo  usermod  -aG docker $USER && newgrp docker
ubuntu@ip-172-31-34-15:~$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
ubuntu@ip-172-31-34-15:~$ docker --version
Docker version 26.1.3, build 26.1.3-0ubuntu1~24.04.1
ubuntu@ip-172-31-34-15:~$
```

Install KIND and kubectl using script:

```
ubuntu@ip-172-31-34-15:~$ sudo vim kind-kubectl-installation.sh
ubuntu@ip-172-31-34-15:~$ chmod 777 kind-kubectl-installation.sh
chmod: changing permissions of 'kind-kubectl-installation.sh': Operation not permitted
ubuntu@ip-172-31-34-15:~$ sudo chmod 777 kind-kubectl-installation.sh
ubuntu@ip-172-31-34-15:~$ ./kind-kubectl-installation.sh
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100    97  100    97    0     0    209      0 --:--:-- --:--:-- --:--:--   209
  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0
100  9.9M  100  9.9M    0     0  3914k      0  0:00:02  0:00:02 --:--:-- 12.4M
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0    422      0 --:--:-- --:--:-- --:--:--   423
100 49.0M  100 49.0M    0     0  20.6M      0  0:00:02  0:00:02 --:--:-- 25.3M
Client Version: v1.30.0
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
kind & kubectl installation complete.
ubuntu@ip-172-31-34-15:~$
```

Check docker, Kind, kubectl versions:

```
ubuntu@ip-172-31-34-15:~$ docker --version
Docker version 26.1.3, build 26.1.3-0ubuntu1~24.04.1
ubuntu@ip-172-31-34-15:~$ kubectl version
Client Version: v1.30.0
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
The connection to the server localhost:8080 was refused - did you specify the right host or port?
ubuntu@ip-172-31-34-15:~$ kind --version
kind version 0.27.0
ubuntu@ip-172-31-34-15:~$
```

Create a cluster-config.yml file:

```
ubuntu@ip-172-31-34-15:~$ sudo chmod +x /usr/local/bin/kind
ubuntu@ip-172-31-34-15:~$ which kind
/usr/local/bin/kind
ubuntu@ip-172-31-34-15:~$ cat cluster-config.yml
kind: Cluster
apiVersion: kind.x-k8s.io/v1alpha4

nodes:
- role: control-plane
  image: kindest/node:v1.31.2
  extraPortMappings:
  - containerPort: 80
    hostPort: 80
    protocol: TCP

- role: worker
  image: kindest/node:v1.31.2

- role: worker
  image: kindest/node:v1.31.2

- role: worker
  image: kindest/node:v1.31.2
```

Create the cluster using the configuration file:

```
ubuntu@ip-172-31-34-15:~$ kind create cluster --name=prasad-cluster --config=cluster-config.yml
Creating cluster "prasad-cluster" ...
 ✓ Ensuring node image (kindest/node:v1.31.2) 🖼
 ✓ Preparing nodes 📦 📦 📦 📦
 ✓ Writing configuration 📜
 ✓ Starting control-plane 🕹
 ✓ Installing CNI 🔌
 ✓ Installing StorageClass 💾
 ✓ Joining worker nodes 🚜
Set kubectl context to "kind-prasad-cluster"
You can now use your cluster with:

kubectl cluster-info --context kind-prasad-cluster

Have a question, bug, or feature request? Let us know! https://kind.sigs.k8s.io/#community 😊
```

Verify the cluster:

```
ubuntu@ip-172-31-34-15:~$ kubectl cluster-info --context kind-prasad-cluster
Kubernetes control plane is running at https://127.0.0.1:34433
CoreDNS is running at https://127.0.0.1:34433/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
ubuntu@ip-172-31-34-15:~$ kubectl get nodes
NAME                          STATUS   ROLES           AGE     VERSION
prasad-cluster-control-plane  Ready    control-plane   3m33s   v1.31.2
prasad-cluster-worker         Ready    <none>          3m16s   v1.31.2
prasad-cluster-worker2        Ready    <none>          3m16s   v1.31.2
prasad-cluster-worker3        Ready    <none>          3m16s   v1.31.2
ubuntu@ip-172-31-34-15:~$
```

kubectl get nodes:

```
ubuntu@ip-172-31-34-15:~$ kubectl get nodes
NAME                          STATUS   ROLES           AGE     VERSION
prasad-cluster-control-plane  Ready    control-plane   3m33s   v1.31.2
prasad-cluster-worker         Ready    <none>          3m16s   v1.31.2
prasad-cluster-worker2        Ready    <none>          3m16s   v1.31.2
prasad-cluster-worker3        Ready    <none>          3m16s   v1.31.2
ubuntu@ip-172-31-34-15:~$
```

Accessing the Cluster:

```
ubuntu@ip-172-31-34-15:~$ kubectl cluster-info --context kind-prasad-cluster
Kubernetes control plane is running at https://127.0.0.1:34433
CoreDNS is running at https://127.0.0.1:34433/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
```

Setting Up the Kubernetes Dashboard: (Apply Kubernetes Dashboard manifest:)

```
ubuntu@ip-172-31-34-15:~$
kubectl apply -f https://raw.githubusercontent.com/kubernetes/dashboard/v2.7.0/aio/deploy/recommended.yaml
namespace/kubernetes-dashboard created
serviceaccount/kubernetes-dashboard created
service/kubernetes-dashboard created
secret/kubernetes-dashboard-certs created
secret/kubernetes-dashboard-csrf created
secret/kubernetes-dashboard-key-holder created
configmap/kubernetes-dashboard-settings created
role.rbac.authorization.k8s.io/kubernetes-dashboard created
clusterrole.rbac.authorization.k8s.io/kubernetes-dashboard created
rolebinding.rbac.authorization.k8s.io/kubernetes-dashboard created
clusterrolebinding.rbac.authorization.k8s.io/kubernetes-dashboard created
deployment.apps/kubernetes-dashboard created
service/dashboard-metrics-scraper created
deployment.apps/dashboard-metrics-scraper created
```

dashboard-admin-user.yml file:

```
ubuntu@ip-172-31-34-15:~$ sudo vim dashboard-admin-user.yml
ubuntu@ip-172-31-34-15:~$ cat dashboard-admin-user.yml
apiVersion: v1
kind: ServiceAccount
metadata:
  name: admin-user
  namespace: kubernetes-dashboard
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: admin-user
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: cluster-admin
subjects:
- kind: ServiceAccount
  name: admin-user
  namespace: kubernetes-dashboard
ubuntu@ip-172-31-34-15:~$
```

Apply the configuration:

```
ubuntu@ip-172-31-34-15:~$
kubectl apply -f dashboard-admin-user.yml
serviceaccount/admin-user created
clusterrolebinding.rbac.authorization.k8s.io/admin-user created
ubuntu@ip-172-31-34-15:~$
```

> ➢ **Get the Access Token:**
> ➢ ***Command***: kubectl -n kubernetes-dashboard create token admin-user

Start the Dashboard using kubectl proxy:

```
ubuntu@ip-172-31-34-15:~$ kubectl proxy --address='127.0.0.1' --port=8001 --disable-filter=true &
[4] 32621
```

> ➢ **SSH Port Forwarding on local:**
> ➢ **Command:** ssh -L 8001:127.0.0.1:8001 -i your-key.pem ubuntu@your-ec2-public-ip

```
PS C:\Users\pratik\Downloads> ssh -L 8001:127.0.0.1:8001 -i lab1.pem ubuntu@13.234.136.2
The authenticity of host '13.234.136.2 (13.234.136.2)' can't be established.
ED25519 key fingerprint is SHA256:TrSNLGTDZgqBvcmP06Iq5bB5iN2EcXn7ZPoHC4de+kM.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '13.234.136.2' (ED25519) to the list of known hosts.
Welcome to Ubuntu 24.04.1 LTS (GNU/Linux 6.8.0-1021-aws x86_64)
```

Open the Dashboard in browser and enter token:
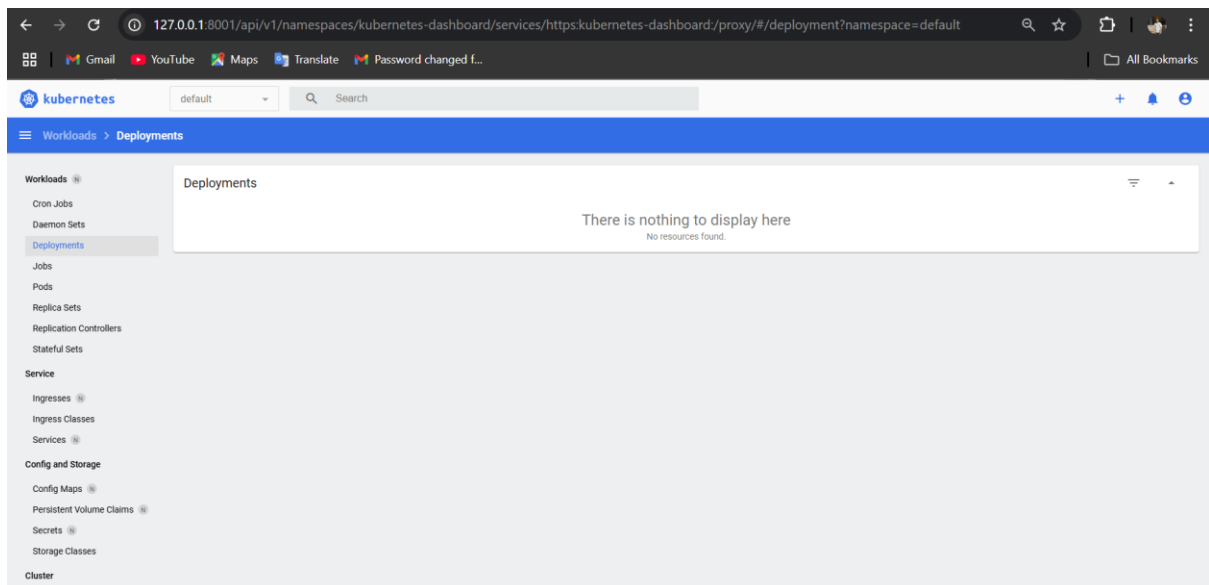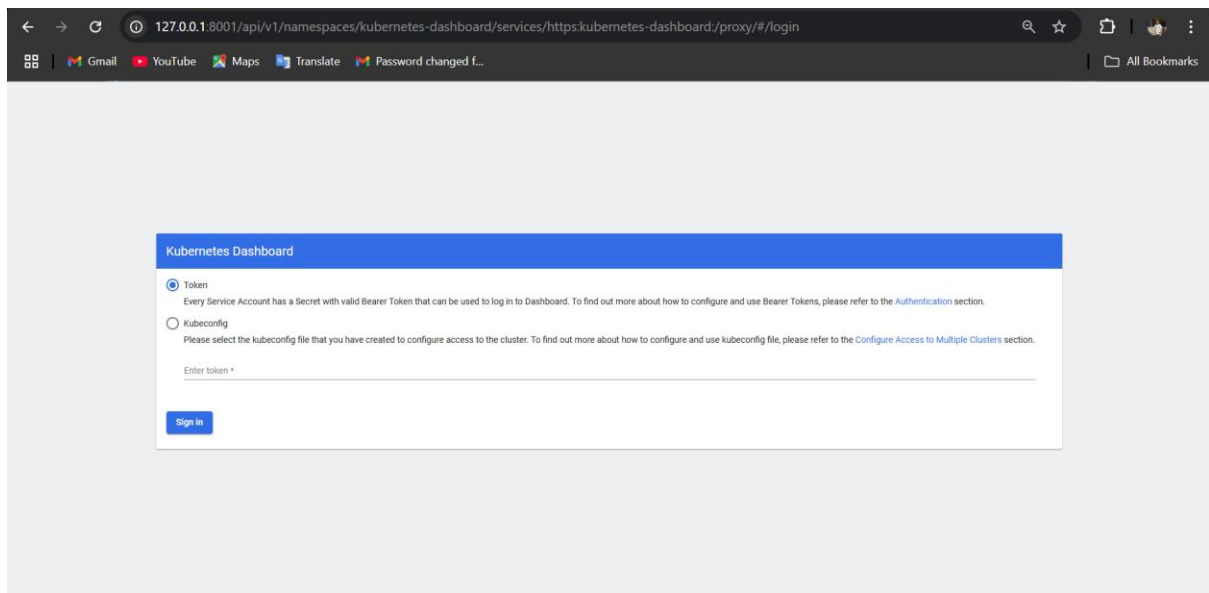
Deleting the Cluster:

```
ubuntu@ip-172-31-34-15:~$ kind get clusters
prasad-cluster
ubuntu@ip-172-31-34-15:~$ kind delete cluster --name prasad-cluster
Deleting cluster "prasad-cluster" ...
Deleted nodes: ["prasad-cluster-control-plane" "prasad-cluster-worker" "prasad-cluster-worker2" "prasad-cluster-worker3"]
ubuntu@ip-172-31-34-15:~$ kind get clusters
No kind clusters found.
ubuntu@ip-172-31-34-15:~$
```