Lesson 02 Demo 05

Launching the Kubernetes Dashboard

Objective: To deploy the Kubernetes dashboard to facilitate the management and troubleshooting of cluster resources and applications

Tools required: kubeadm, kubectl, kubelet, and containerd

Prerequisites: A Kubernetes cluster (refer to Demo 01 from Lesson 01 for setting up a cluster)

Steps to be followed:

1. Implement the dashboard deployment
2. Validate the pod, service, and deployment creation
3. Confirm the dashboard service type
4. Access the master node IP
5. Log in to the service dashboard
6. Access the Kubernetes dashboard

Step 1: Implement the dashboard deployment

1.1 Run the following command to deploy the dashboard user interface:
kubectl apply -f https://raw.githubusercontent.com/kubernetes/dashboard/v2.7.0/aio/deploy/recommended.yaml

```
labsuser@master:~$ 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
labsuser@master:~$
```

Step 2: Validate the pod, service, and deployment creation

2.1 Enter the following commands to verify if the pods, services, and deployments have been created:
kubectl get pods -n kubernetes-dashboard -o wide
kubectl get deployment -n kubernetes-dashboard -o wide
kubectl get svc -n kubernetes-dashboard -o wide

```
labsuser@master:~$ kubectl apply -f  https://raw.githubusercontent.com/kubernetes/dashboard/v2.5.0/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
labsuser@master:~$ kubectl get pods -n kubernetes-dashboard -o wide
NAME                                         READY   STATUS    RESTARTS   AGE    IP               NODE                      NOMINATED NODE   READINESS GATES
dashboard-metrics-scraper-6fdb9d6cdd-t46sd   1/1     Running   0          2m3s   192.168.47.132   worker-node-1.example.com   <none>           <none>
kubernetes-dashboard-6fffdf99c9-z5d74        1/1     Running   0          2m3s   192.168.47.131   worker-node-1.example.com   <none>           <none>
labsuser@master:~$ kubectl get deployment -n kubernetes-dashboard -o wide
NAME                        READY   UP-TO-DATE   AVAILABLE   AGE     CONTAINERS                  IMAGES                                SELECTOR
dashboard-metrics-scraper   1/1     1            1           2m10s   dashboard-metrics-scraper   kubernetesui/metrics-scraper:v1.0.7   k8s-app=dashboard-metrics-scra
per
kubernetes-dashboard        1/1     1            1           2m10s   kubernetes-dashboard        kubernetesui/dashboard:v2.5.0         k8s-app=kubernetes-dashboard
labsuser@master:~$ kubectl get svc -n kubernetes-dashboard -o wide
NAME                        TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)    AGE    SELECTOR
dashboard-metrics-scraper   ClusterIP   10.97.157.15    <none>        8000/TCP   2m16s  k8s-app=dashboard-metrics-scraper
kubernetes-dashboard        ClusterIP   10.98.79.9      <none>        443/TCP    2m16s  k8s-app=kubernetes-dashboard
labsuser@master:~$
```

2.2 Run the following command to access the service outside the cluster and edit the service type from **ClusterIP** to **NodePort**:
kubectl edit svc -n kubernetes-dashboard kubernetes-dashboard

```
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"v1","kind":"Service","metadata":{"annotations":{},"labels":{"k8s-app":"kubernetes-dashboard"},"name":"kubernetes-dashboard","namespace":"kuberne
tes-dashboard"},"spec":{"ports":[{"port":443,"targetPort":8443}],"selector":{"k8s-app":"kubernetes-dashboard"}}}
  creationTimestamp: "2023-10-06T10:51:08Z"
  labels:
    k8s-app: kubernetes-dashboard
  name: kubernetes-dashboard
  namespace: kubernetes-dashboard
  resourceVersion: "21868"
  uid: 71b48ff5-775a-4f64-9ce6-2f3444c7230d
spec:
  clusterIP: 10.98.79.9
  clusterIPs:
  - 10.98.79.9
  internalTrafficPolicy: Cluster
  ipFamilies:
  - IPv4
  ipFamilyPolicy: SingleStack
  ports:
  - port: 443
    protocol: TCP
    targetPort: 8443
  selector:
    k8s-app: kubernetes-dashboard
  sessionAffinity: None
  type: ClusterIP
status:
  loadbalancer: {}
-- INSERT --                                                                    33,18         Bot
```

```
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"v1","kind":"Service","metadata":{"annotations":{},"labels":{"k8s-app":"kubernetes-dashboard"},"name":"kubernetes-dashboard","namespace":"kubernetes-dashboard"},"spec":{"ports":[{"port":443,"targetPort":8443}],"selector":{"k8s-app":"kubernetes-dashboard"}}}
  creationTimestamp: "2023-10-06T10:51:08Z"
  labels:
    k8s-app: kubernetes-dashboard
  name: kubernetes-dashboard
  namespace: kubernetes-dashboard
  resourceVersion: "21868"
  uid: 71b48ff5-775a-4f64-9ce6-2f3444c7230d
spec:
  clusterIP: 10.98.79.9
  clusterIPs:
  - 10.98.79.9
  internalTrafficPolicy: Cluster
  ipFamilies:
  - IPv4
  ipFamilyPolicy: SingleStack
  ports:
  - port: 443
    protocol: TCP
    targetPort: 8443
  selector:
    k8s-app: kubernetes-dashboard
  sessionAffinity: None
  type: NodePort
status:
  loadbalancer: {}
```

```
labsuser@master:~$ kubectl edit svc -n kubernetes-dashboard kubernetes-dashboard
service/kubernetes-dashboard edited
labsuser@master:~$
```

Step 3: Confirm the dashboard service type

3.1 Run the following command to confirm that the service type has been changed to **NodePort**:
kubectl get svc -n kubernetes-dashboard -o wide

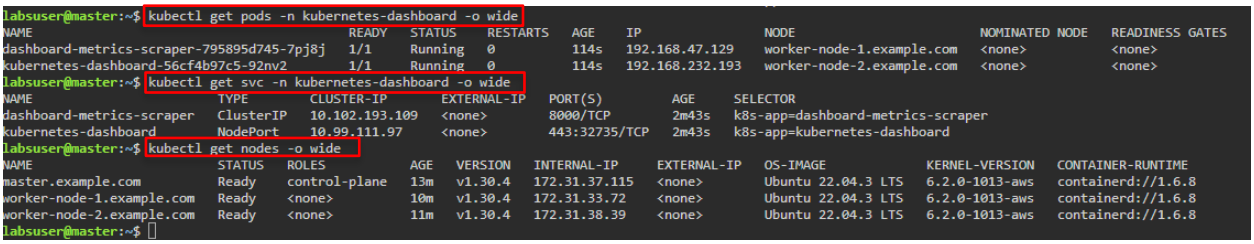
```
labsuser@master:~$ kubectl get svc -n kubernetes-dashboard -o wide
NAME                        TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)         AGE   SELECTOR
dashboard-metrics-scraper   ClusterIP   10.97.157.15    <none>        8000/TCP        17m   k8s-app=dashboard-metrics-scraper
kubernetes-dashboard        NodePort    10.98.79.9      <none>        443:30087/TCP   17m   k8s-app=kubernetes-dashboard
labsuser@master:~$
```

3.2 Run the following commands to determine the location of the pod:

kubectl get pods -n kubernetes-dashboard -o wide

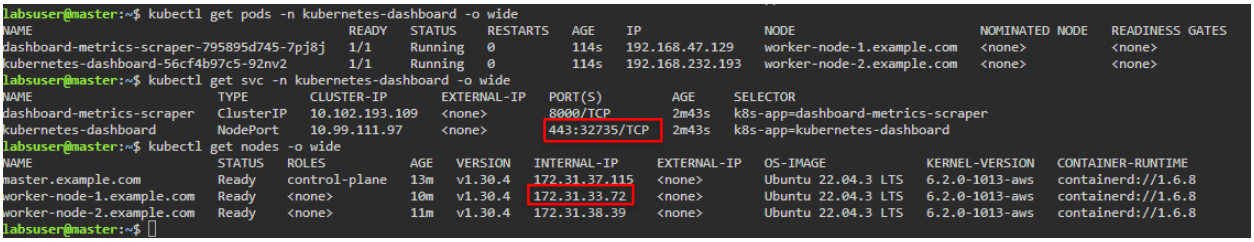
kubectl get svc -n kubernetes-dashboard -o wide

kubectl get nodes -o wide



Note: In this case, the pod is running on **worker-node1**. Note down the **IP** and **NodePort** of node1.

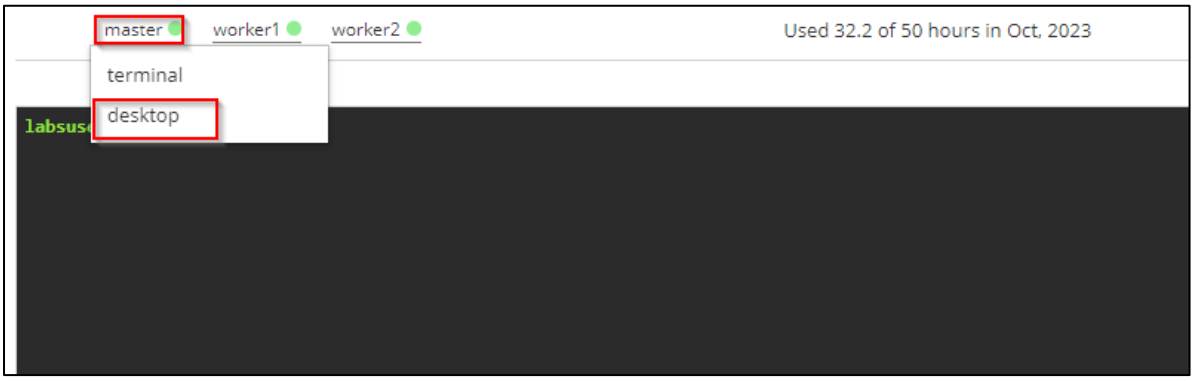
3.3 Use the **INTERNAL-IP** as **172.31.33.72** and PORT(S) as **32735** and copy the link: **https:// 172.31.33.72:32735**



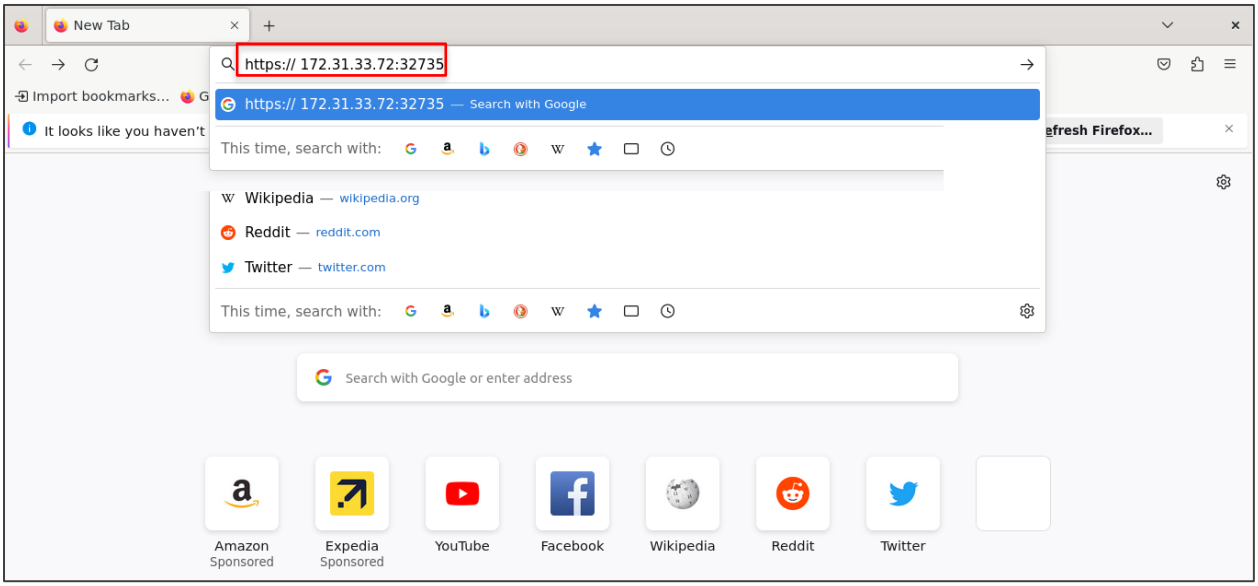
Note: In your case, the IP and NodePort will be different. Change the IP and NodePort accordingly:
https:// <<your worker-node-1>>:<<NodePort>>

Step 4: Access the master node IP

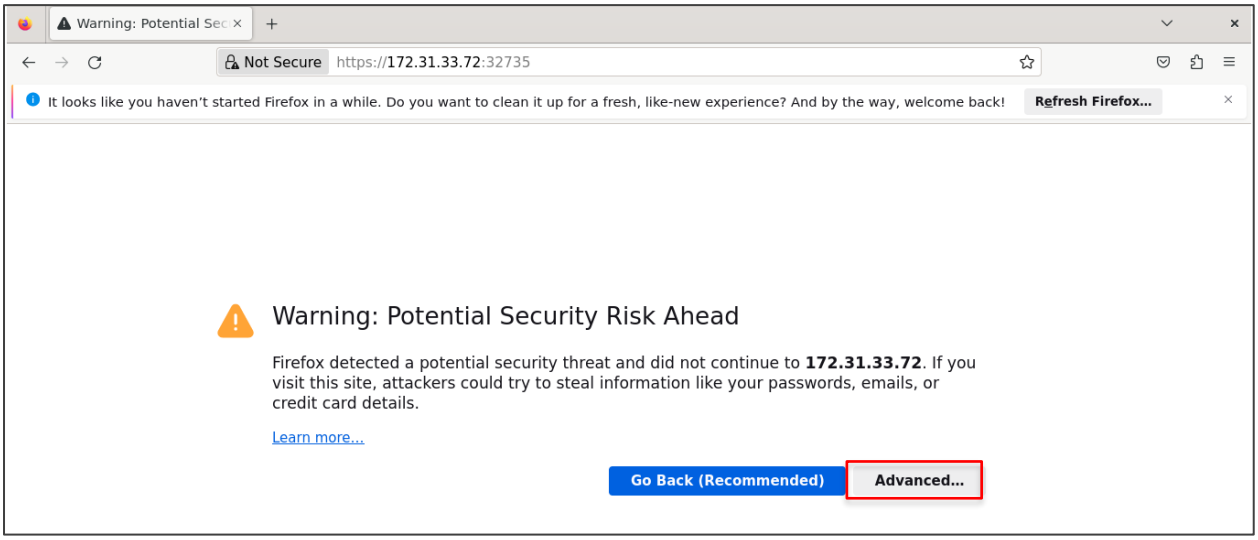
4.1 Navigate to the LMS dashboard, click on **master**, and then click on **desktop**



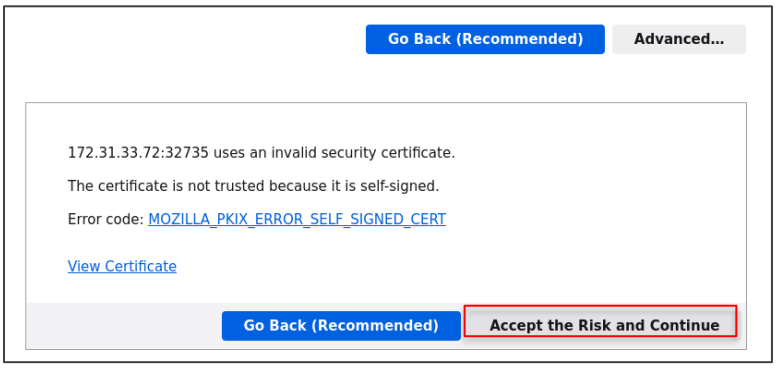
4.2 Open Firefox, paste the copied link from step 3.3 in to the search bar, and press Enter



4.3 Click on the **Advanced** button



4.4 Click on **Accept the Risk and Continue**



Step 5: Log in to the service dashboard

5.1 Create a service account by running the following command and then input the code in the master node:
vi ServiceAccount.yaml

```
labsuser@master:~$ vi ServiceAccount.yaml
labsuser@master:~$
```

apiVersion: v1
kind: ServiceAccount
metadata:
name: admin-user
namespace: kubernetes-dashboard

```
apiVersion: v1
kind: ServiceAccount
metadata:
  name: admin-user
  namespace: kubernetes-dashboard

~
~
~
~
```

5.2 Apply the YAML file with the command:
kubectl apply -f ServiceAccount.yaml

```
labsuser@master:~$ vi ServiceAccount.yaml
labsuser@master:~$ kubectl apply -f ServiceAccount.yaml
serviceaccount/admin-user created
labsuser@master:~$
```

5.3 Create a **yaml** file for cluster role binding using the below command and code:

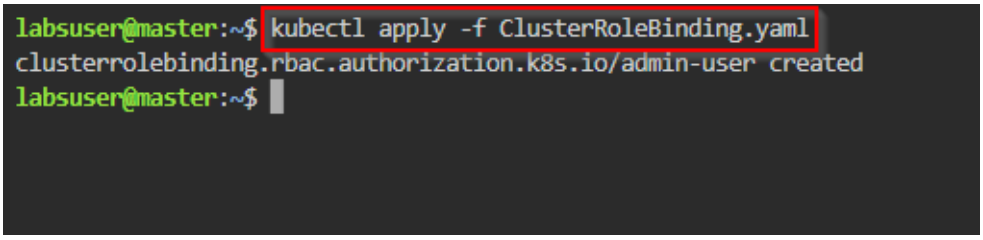
vi ClusterRoleBinding.yaml

```
labsuser@master:~$ vi ServiceAccount.yaml
labsuser@master:~$ kubectl apply -f ServiceAccount.yaml
serviceaccount/admin-user created
labsuser@master:~$ vi ClusterRoleBinding.yaml
labsuser@master:~$
```

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

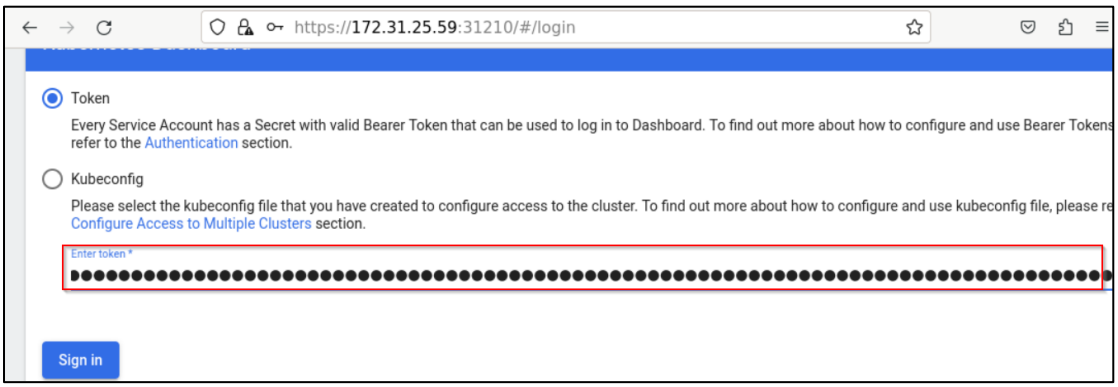
```
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: admin-user
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: cluster-admin
subjects:
- kind: ServiceAccount
  name: admin-user
  namespace: kubernetes-dashboard
```

5.4 Run the following command to create cluster role binding:
kubectl apply -f ClusterRoleBinding.yaml



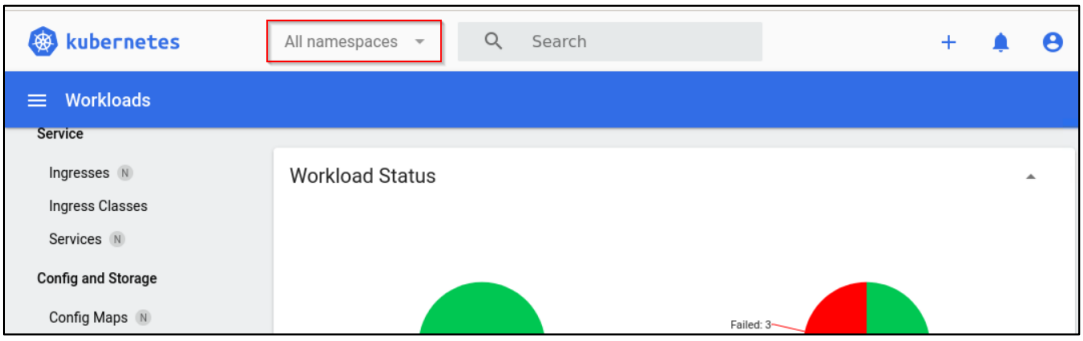
5.5 Retrieve the token to log in by running the following command:
kubectl -n kubernetes-dashboard create token admin-user

5.6 Copy the token and paste it in to the Kubernetes dashboard log in screen and then click on **Sign in**

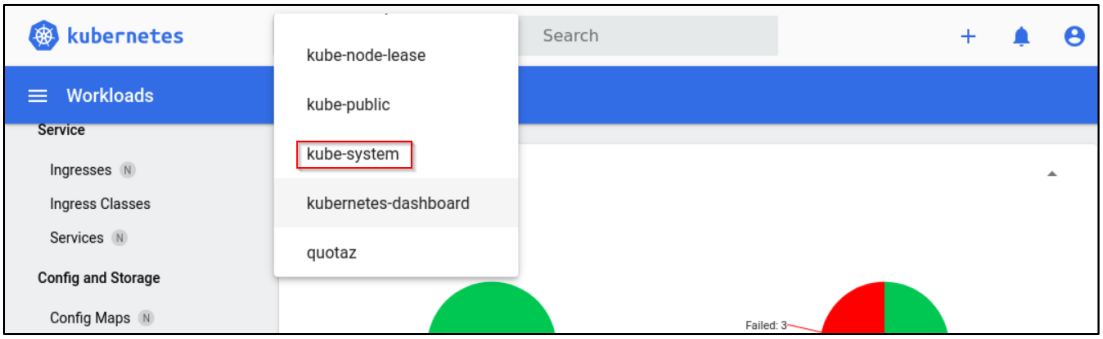


Step 6: Access the Kubernetes dashboard

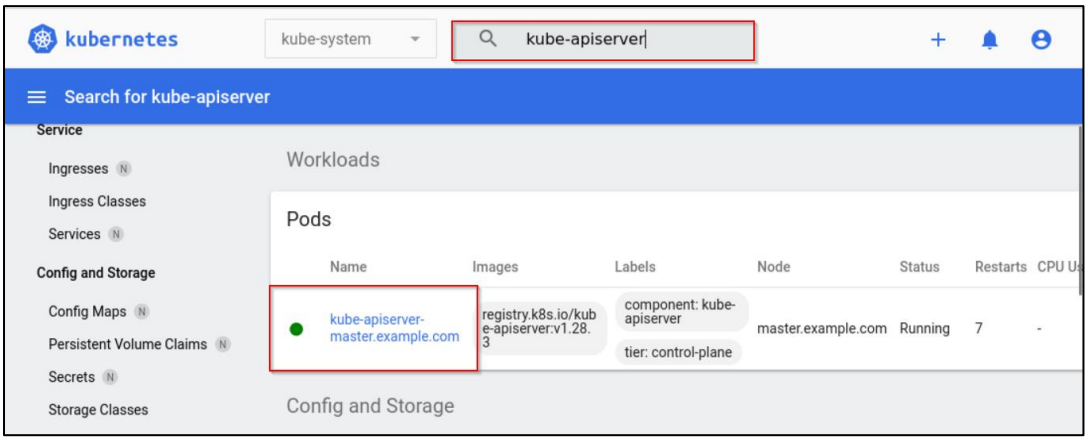
6.1 Click on the **All namespaces** drop-down menu



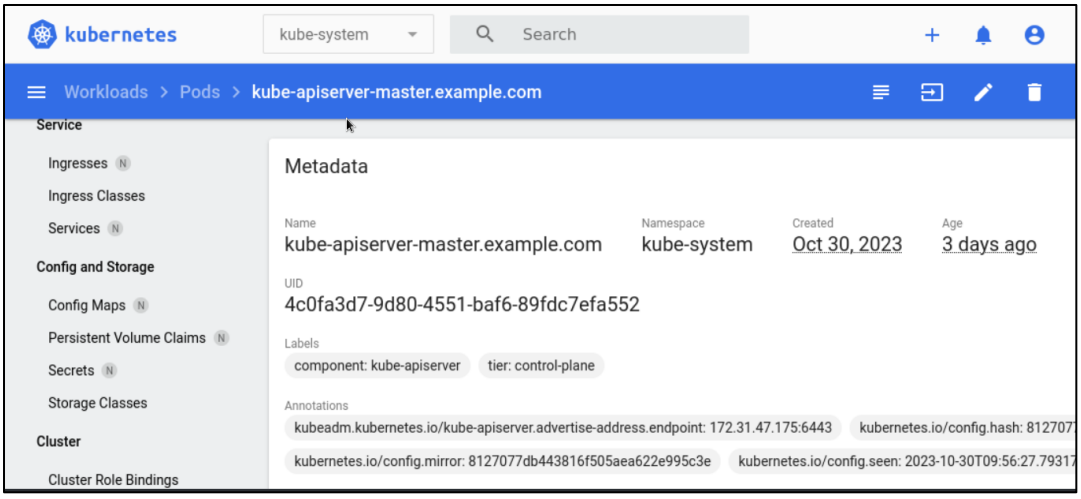
6.2 Select **kube-system**



6.3 Use the search bar to find and select **kube-apiserver**



View the logs of the kube-apiserver



6.4 [OPTIONAL] Cleanup: To delete the Kubernetes dashboard version 2.5, use the following command in the master node:
kubectl delete -f https://raw.githubusercontent.com/kubernetes/dashboard/v2.5.0/aio/deploy/recommended.yaml

```
labsuser@master:~$ kubectl apply -f ClusterRoleBinding.yaml
clusterrolebinding.rbac.authorization.k8s.io/admin-user created
labsuser@master:~$ kubectl -n kubernetes-dashboard create token admin-user
eyJhbGciOiJSUzI1NiIsImtpZCI6ImVuZVA5RlN4c1JkTjI5dE9GdngyakduNk1ib2Y2QU9aY3BDLTNLYlVqX0kifQ.eyJhdWQiOlsiaHR0cHM6Ly9rdWJlcm5ldGVzLmRlZmF1bHQuc3ZjLmNsdXN0ZXIubG9jYWwiXSwiZXhwIjoxNjk5MDA3Njk1LCJ
pYXQiOjE2OTkwMDQwOTUsImlzcyI6Imh0dHBzOi8va3ViZXJuZXRlcy5kZWZhdWx0LnN2Yy5jbHVzdGVyLmxvY2FsIiwia3ViZXJuZXRlcy5pbyI6eyJuYW1lc3BhY2UiOiJrdWJlcm5ldGVzLWRhc2hib2FyZCIsInNlcnZpY2VhY2NvdW50Ijp7Im5hb
WUiOiJhZG1pbi11c2VyIiwidWlkIjoiZjhlYTk5OWQtMTk0MC00NWZjLTljZmMtMWNmMzY2NGI4NWE1In19LCJuYmYiOjE2OTkwMDQwOTUsInN1YiI6InN5c3RlbTpzZXJ2aWNlYWNjb3VudDprdWJlcm5ldGVzLWRhc2hib2FyZDphZG1pbi11c2VyIn0
.GmBRqTboZBtzGz2d8djR4uaI7YS4HVhtDd5wJ_NYGKAVtpYOjJ5uzpUqW4dO4EppCVa0PQuyRPCrcmgGCYTTdebysDmEzq0i0p5NKTVALH0pF5L6Cs5KaN5UMtJAvijGpPXniDfzHdl4gBzvqmPVXLHKPxd9_pdW3Puaz_kQmNxZPlH5uT-NVdjPsYW5
SyzhL73cp6NO3WyqerSXUoVIOcyH6XEQlYLxwyfK5_cm7s07ASxY1fEf2BxygcM1LdGW1p7qtS_il0aWsecJixIWeP2OCQIaAz3S4lZ2mbhvt2-W3bff1p5ft7IHMeWb0O93wjNqmm_2DjZUT58Tj_aQ
labsuser@master:~$ kubectl delete -f  https://raw.githubusercontent.com/kubernetes/dashboard/v2.5.0/aio/deploy/recommended.yaml
namespace "kubernetes-dashboard" deleted
serviceaccount "kubernetes-dashboard" deleted
service "kubernetes-dashboard" deleted
secret "kubernetes-dashboard-certs" deleted
secret "kubernetes-dashboard-csrf" deleted
secret "kubernetes-dashboard-key-holder" deleted
configmap "kubernetes-dashboard-settings" deleted
role.rbac.authorization.k8s.io "kubernetes-dashboard" deleted
clusterrole.rbac.authorization.k8s.io "kubernetes-dashboard" deleted
rolebinding.rbac.authorization.k8s.io "kubernetes-dashboard" deleted
clusterrolebinding.rbac.authorization.k8s.io "kubernetes-dashboard" deleted
deployment.apps "kubernetes-dashboard" deleted
service "dashboard-metrics-scraper" deleted
deployment.apps "dashboard-metrics-scraper" deleted
```

By following these steps, you will be able to deploy the Kubernetes Dashboard, establish secure access, and navigate the interface to monitor and manage your Kubernetes cluster.