Kubernetes Project 2 - Kubernetes multi-Tenant Project

Step 1: Check if Any Worker Node is Ready

Run the following command to check the status of worker nodes:

kubectl get nodes

```
master@master-vm:~/Desktop$ kubectl get nodes
NAME         STATUS   ROLES           AGE   VERSION
master-vm    Ready    control-plane   17d   v1.28.15
worker1-vm   Ready    <none>          17d   v1.28.15
worker2-vm   Ready    <none>          17d   v1.28.15
```

Step 2: Create Namespaces for Tenants

To isolate tenants, create separate namespaces:

kubectl create namespace tenant-a

kubectl create namespace tenant-b

Step 3: Create Folder Structure for YAML Files

Create the folder structure to organize YAML files for each tenant:

mkdir -p ~/k8s-multi-tenant/tenant-a

mkdir -p ~/k8s-multi-tenant/tenant-b

cd ~/k8s-multi-tenant

Step 4: Create Deployment and Service for Tenant A and Tenant B

```
master@master-vm:~/Desktop$ kubectl create namespace tenant-a
namespace/tenant-a created
master@master-vm:~/Desktop$ kubectl create namespace tenant-b
namespace/tenant-b created
master@master-vm:~/Desktop$ mkdir -p ~/k8s-multi-tenant/tenant-a
master@master-vm:~/Desktop$ mkdir -p ~/k8s-multi-tenant/tenant-b
master@master-vm:~/Desktop$ cd ~/k8s-multi-tenant
master@master-vm:~/k8s-multi-tenant$ nano tenant-a/tenant-a-app.yaml
master@master-vm:~/k8s-multi-tenant$
master@master-vm:~/k8s-multi-tenant$ kubectl apply -f tenant-a/tenant-a-app.yaml
deployment.apps/tenant-a-app created
service/tenant-a-service created
master@master-vm:~/k8s-multi-tenant$ nano tenant-a/tenant-a-restrict.yaml
master@master-vm:~/k8s-multi-tenant$ kubectl apply -f tenant-a/tenant-a-restrict.yaml
networkpolicy.networking.k8s.io/tenant-a-restrict created
master@master-vm:~/k8s-multi-tenant$ nano tenant-b/tenant-b-app.yaml
master@master-vm:~/k8s-multi-tenant$ kubectl apply -f tenant-b/tenant-b-app.yaml
deployment.apps/tenant-b-app created
service/tenant-b-service created
master@master-vm:~/k8s-multi-tenant$ kubectl get pods -n tenant-b
NAME                            READY   STATUS    RESTARTS   AGE
tenant-b-app-bbb987489-dxs7h    1/1     Running   0          16s
tenant-b-app-bbb987489-s4zkf    1/1     Running   0          16s
master@master-vm:~/k8s-multi-tenant$ kubectl get svc -n tenant-b
NAME               TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)   AGE
tenant-b-service   ClusterIP   10.104.119.15   <none>        80/TCP    16s
master@master-vm:~/k8s-multi-tenant$ nano tenant-b/tenant-b-restrict.yaml
master@master-vm:~/k8s-multi-tenant$ kubectl apply -f tenant-b/tenant-b-restrict.yaml
networkpolicy.networking.k8s.io/tenant-b-restrict created
```

Step 5: Restrict Network Access for Tenant A and Tenant B

```
master@master-vm:~/k8s-multi-tenant$ kubectl exec -it test-pod -n tenant-b -- wget --spider tenant-a-service.tenant-a
wget: bad address 'tenant-a-service.tenant-a'
command terminated with exit code 1
master@master-vm:~/k8s-multi-tenant$ kubectl get pods -A
NAMESPACE     NAME                                       READY   STATUS             RESTARTS        AGE
kube-system   calico-kube-controllers-658d97c59c-ncdhb   1/1     Running            3 (90m ago)     105m
kube-system   calico-node-4fkv6                          0/1     CrashLoopBackOff   33 (83s ago)    113m
kube-system   calico-node-fzz9n                          0/1     Running            27 (40s ago)    113m
kube-system   calico-node-wc74m                          0/1     Running            33 (8s ago)     113m
kube-system   coredns-5dd5756b68-6447t                   1/1     Running            0               104m
kube-system   coredns-5dd5756b68-pc8hx                   1/1     Running            0               104m
kube-system   etcd-master-vm                             1/1     Running            14 (159m ago)   17d
kube-system   kube-apiserver-master-vm                   1/1     Running            14 (159m ago)   17d
kube-system   kube-controller-manager-master-vm          1/1     Running            15 (159m ago)   17d
kube-system   kube-proxy-bqwv7                           1/1     Running            5 (103m ago)    17d
kube-system   kube-proxy-h6lcw                           1/1     Running            14 (159m ago)   17d
kube-system   kube-proxy-mnfmr                           1/1     Running            5 (100m ago)    17d
kube-system   kube-scheduler-master-vm                   1/1     Running            15 (159m ago)   17d
tenant-a      tenant-a-app-57856ccbdc-g2s8q              1/1     Running            0               4m15s
tenant-a      tenant-a-app-57856ccbdc-tpv7r              1/1     Running            0               4m15s
tenant-b      tenant-b-app-bbb987489-dxs7h               1/1     Running            0               2m40s
tenant-b      tenant-b-app-bbb987489-s4zkf               1/1     Running            0               2m40s
tenant-b      test-pod                                   1/1     Running            0               32s
```

Step 6: Verify Network Policy

Step 7: Test Tenant Isolation