Lesson 05 Demo 03

Configuring EndpointSlice

Objective: To configure EndpointSlice to track network endpoints within a cluster

Tools required: kubeadm, kubectl, kubelet, and containerd

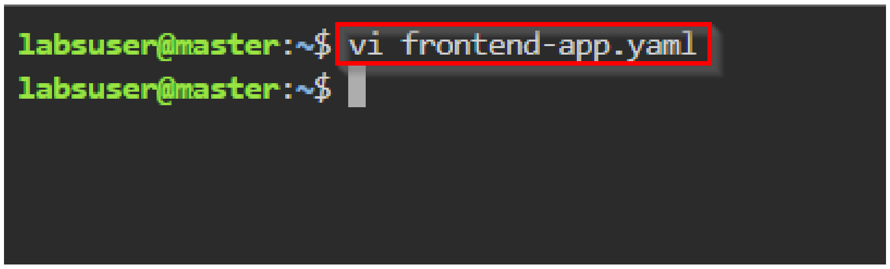
Prerequisites: A Kubernetes cluster (refer to Demo 01 from Lesson 01 for setting up a cluster)

Steps to be followed:

1. Create a deployment and identify its EndpointSlice
2. Create a YAML file for a custom EndpointSlice configuration
3. Create a resource for the custom EndpointSlice configuration

Step 1: Create a deployment and identify its EnpointSlice

1.1 Run the following command to create a **frontend-app.yaml** file:
vi frontend-app.yaml

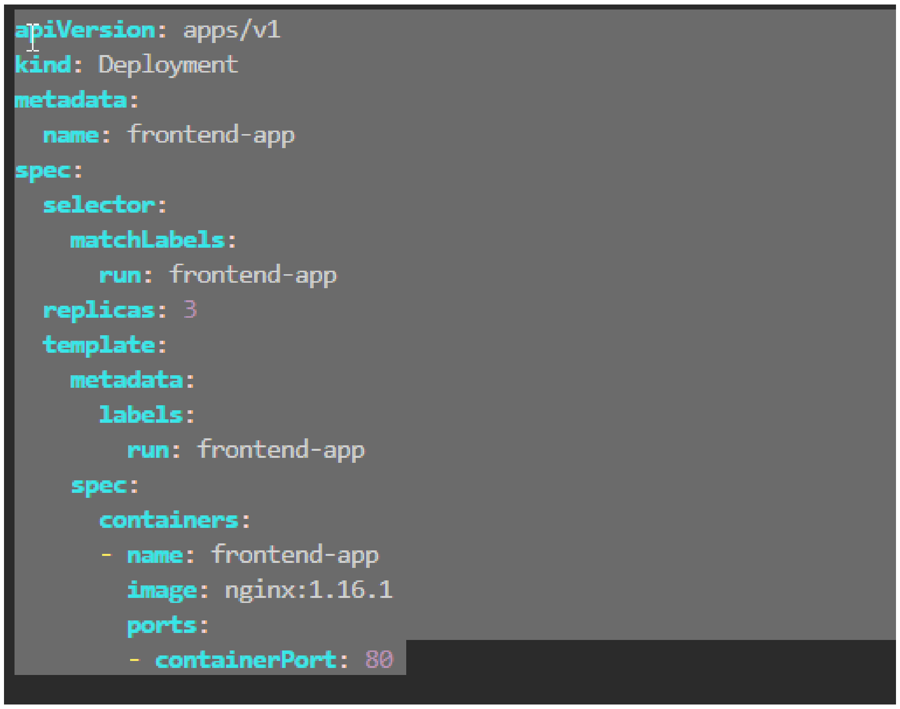


```
labsuser@master:~$ vi frontend-app.yaml
labsuser@master:~$
```

1.2 Add the following YAML script in the **frontend-app.yaml** file to define a deployment for a frontend application with 3 replicas using Nginx:

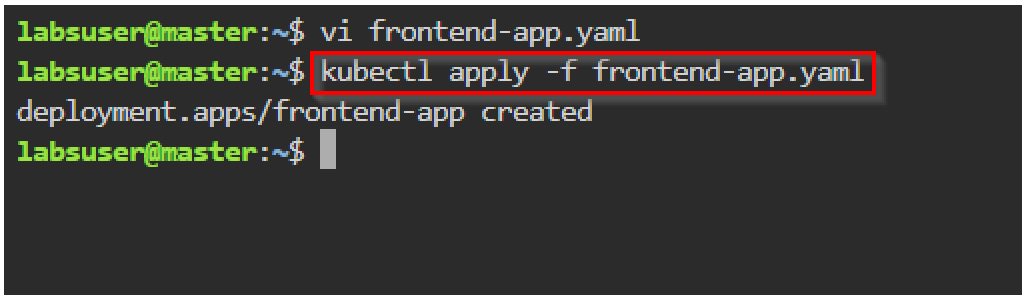
```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: frontend-app
spec:
  selector:
    matchLabels:
      run: frontend-app
```

```
replicas: 3
template:
  metadata:
    labels:
      run: frontend-app
  spec:
    containers:
    - name: frontend-app
      image: nginx:1.16.1
      ports:
      - containerPort: 80
```



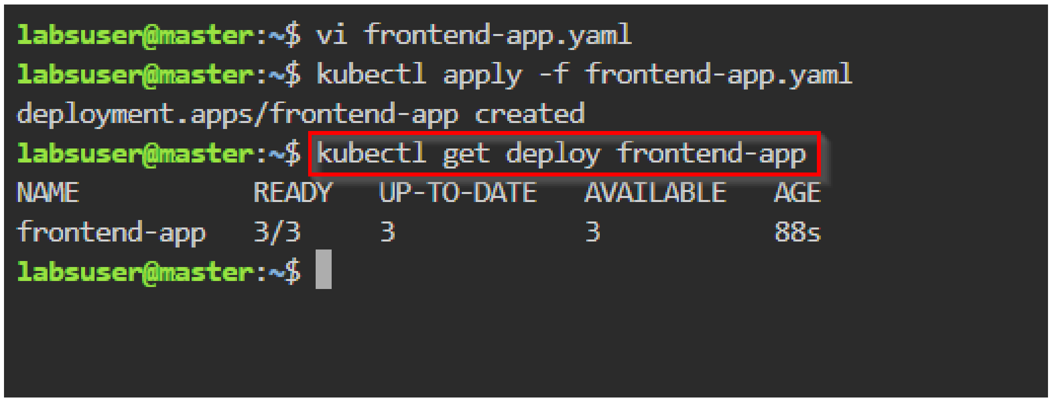
```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: frontend-app
spec:
  selector:
    matchLabels:
      run: frontend-app
  replicas: 3
  template:
    metadata:
      labels:
        run: frontend-app
    spec:
      containers:
      - name: frontend-app
        image: nginx:1.16.1
        ports:
        - containerPort: 80
```

1.3 Run the following command to apply the deployment configurations of the **frontend-app.yaml** file:
kubectl apply -f frontend-app.yaml



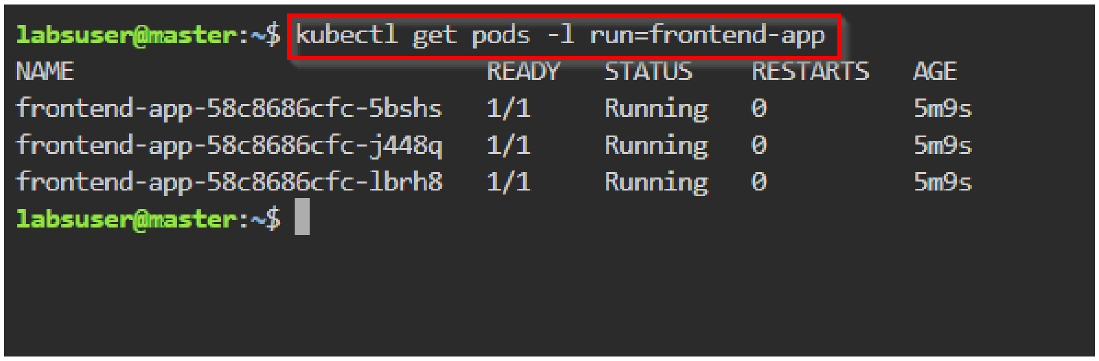
```
labsuser@master:~$ vi frontend-app.yaml
labsuser@master:~$ kubectl apply -f frontend-app.yaml
deployment.apps/frontend-app created
labsuser@master:~$ 
```

1.4 Enter the following command to retrieve the status and details of the **frontend-app** deployment:
kubectl get deploy frontend-app



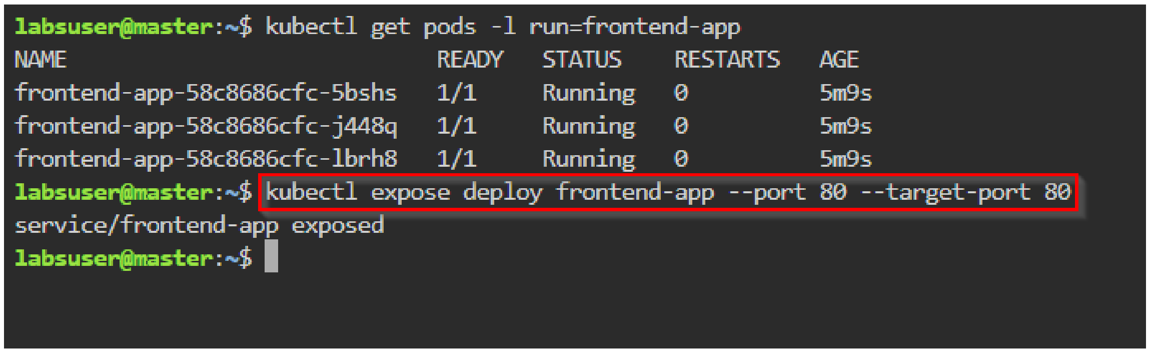
```
labsuser@master:~$ vi frontend-app.yaml
labsuser@master:~$ kubectl apply -f frontend-app.yaml
deployment.apps/frontend-app created
labsuser@master:~$ kubectl get deploy frontend-app
NAME           READY   UP-TO-DATE   AVAILABLE   AGE
frontend-app   3/3     3            3           88s
labsuser@master:~$
```

1.5 Run the following command to get the status pods:
kubectl get pods -l run=frontend-app



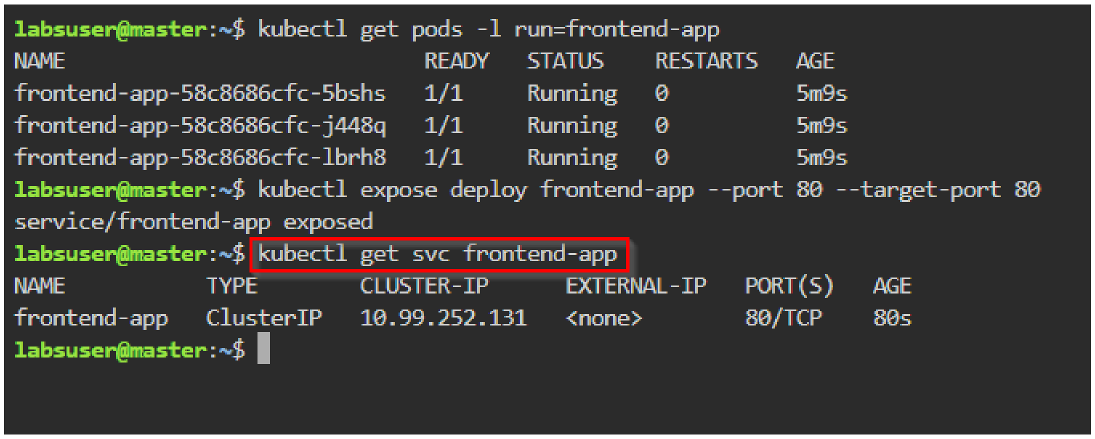
```
labsuser@master:~$ kubectl get pods -l run=frontend-app
NAME                            READY   STATUS    RESTARTS   AGE
frontend-app-58c8686cfc-5bshs   1/1     Running   0          5m9s
frontend-app-58c8686cfc-j448q   1/1     Running   0          5m9s
frontend-app-58c8686cfc-lbrh8   1/1     Running   0          5m9s
labsuser@master:~$
```

1.6 Enter the following command to create a service for exposing the **frontend-app** deployment on port 80:
kubectl expose deploy frontend-app --port 80 --target-port 80



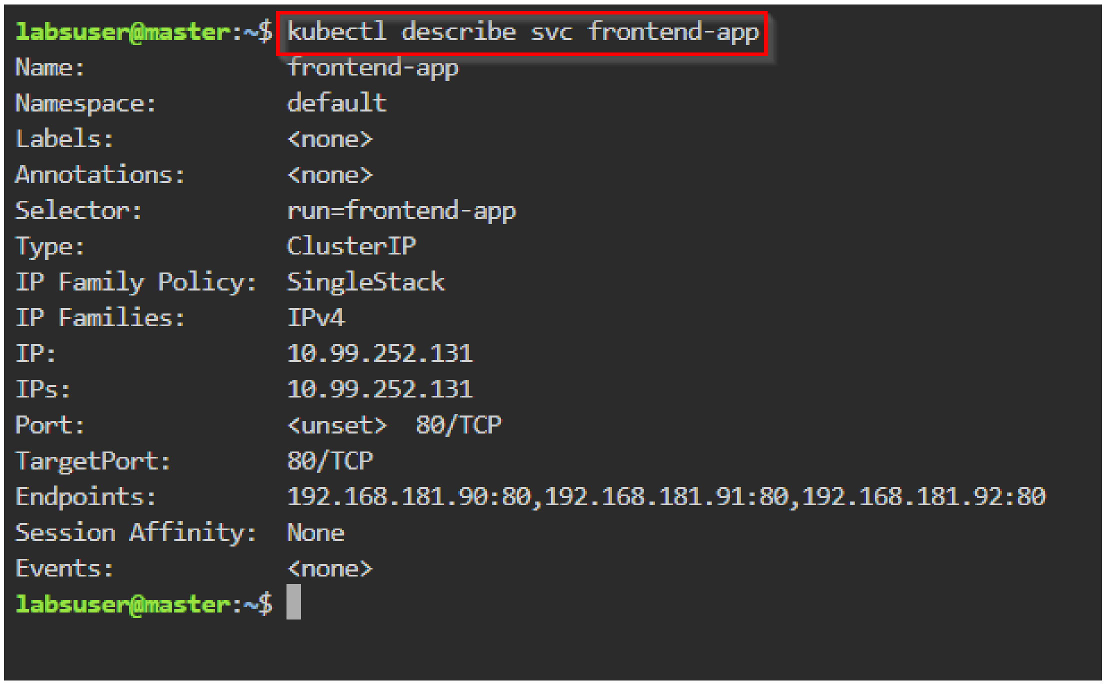
```
labsuser@master:~$ kubectl get pods -l run=frontend-app
NAME                            READY   STATUS    RESTARTS   AGE
frontend-app-58c8686cfc-5bshs   1/1     Running   0          5m9s
frontend-app-58c8686cfc-j448q   1/1     Running   0          5m9s
frontend-app-58c8686cfc-lbrh8   1/1     Running   0          5m9s
labsuser@master:~$ kubectl expose deploy frontend-app --port 80 --target-port 80
service/frontend-app exposed
labsuser@master:~$
```

1.7 Run the following command to get the cluster IP information:
kubectl get svc frontend-app



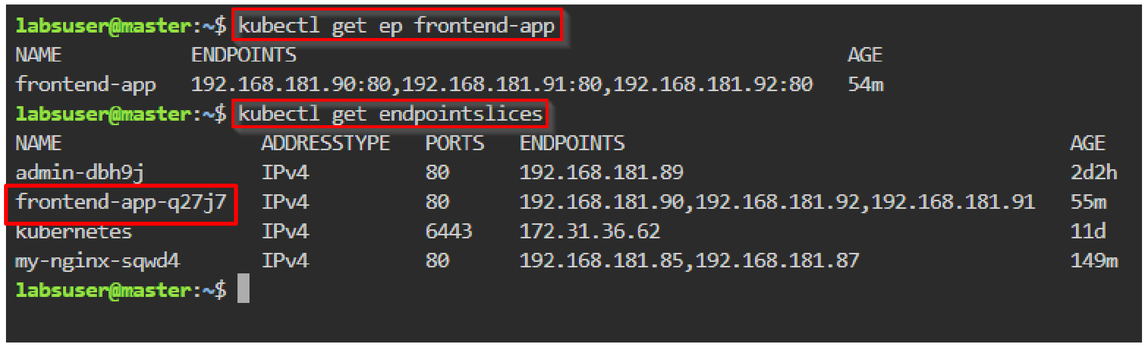
```
labsuser@master:~$ kubectl get pods -l run=frontend-app
NAME                            READY   STATUS    RESTARTS   AGE
frontend-app-58c8686cfc-5bshs   1/1     Running   0          5m9s
frontend-app-58c8686cfc-j448q   1/1     Running   0          5m9s
frontend-app-58c8686cfc-lbrh8   1/1     Running   0          5m9s
labsuser@master:~$ kubectl expose deploy frontend-app --port 80 --target-port 80
service/frontend-app exposed
labsuser@master:~$ kubectl get svc frontend-app
NAME           TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)   AGE
frontend-app   ClusterIP   10.99.252.131  <none>        80/TCP    80s
labsuser@master:~$
```

1.8 Run the following command to display detailed information about the **frontend-app** service:
kubectl describe svc frontend-app



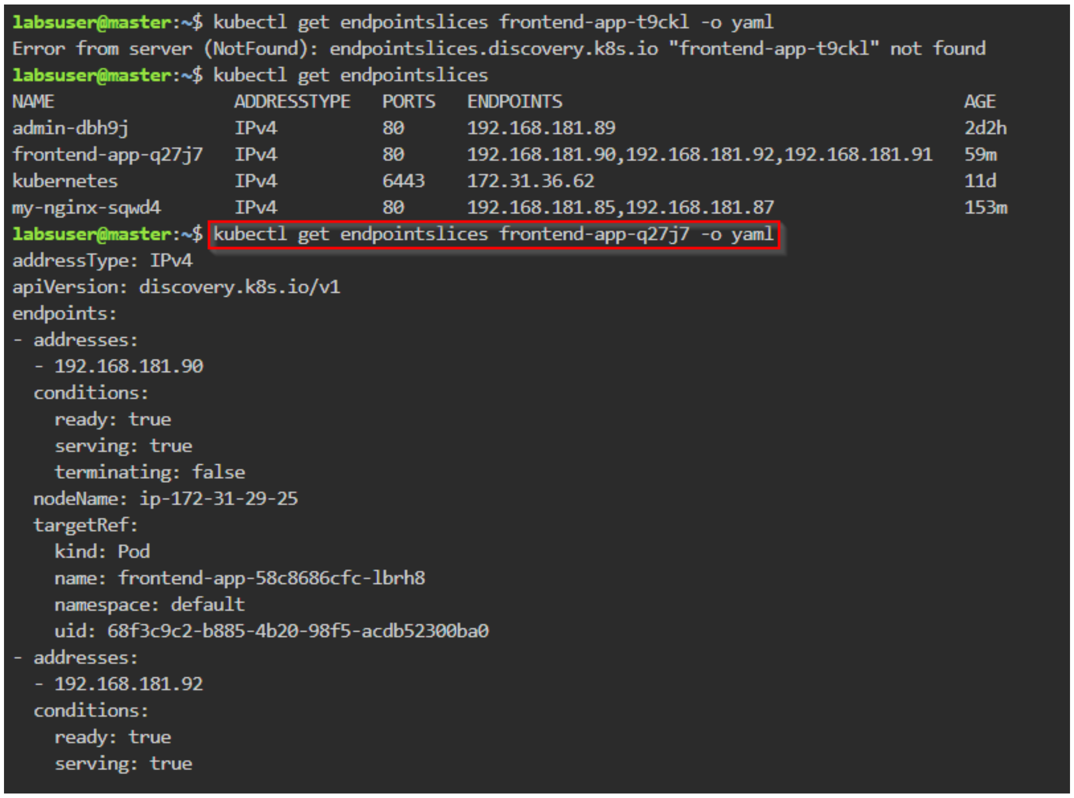
```
labsuser@master:~$ kubectl describe svc frontend-app
Name:              frontend-app
Namespace:         default
Labels:            <none>
Annotations:       <none>
Selector:          run=frontend-app
Type:              ClusterIP
IP Family Policy:  SingleStack
IP Families:       IPv4
IP:                10.99.252.131
IPs:               10.99.252.131
Port:              <unset>  80/TCP
TargetPort:        80/TCP
Endpoints:         192.168.181.90:80,192.168.181.91:80,192.168.181.92:80
Session Affinity:  None
Events:            <none>
labsuser@master:~$
```

1.9 Enter the following command to identify the service EndpointSlice:
kubectl get ep frontend-app
kubectl get endpointslices

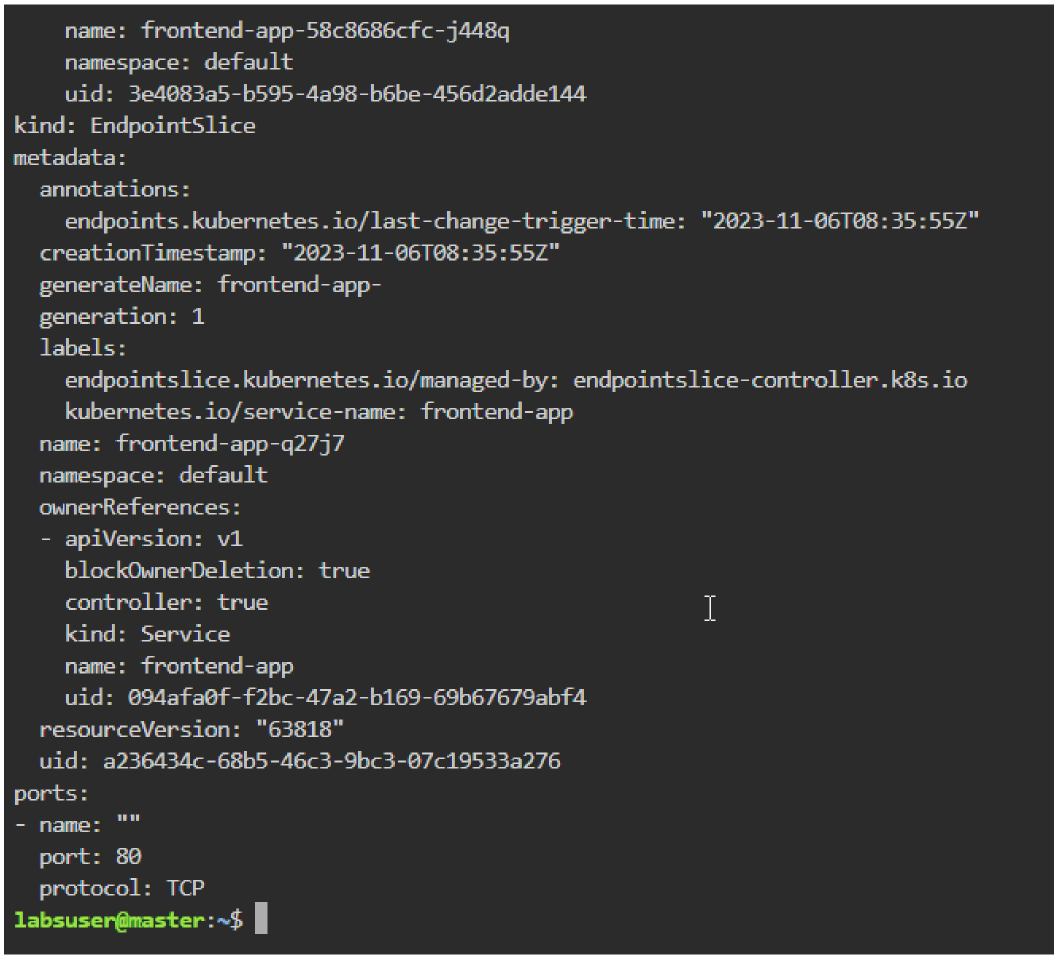


```
labsuser@master:~$ kubectl get ep frontend-app
NAME           ENDPOINTS                                                   AGE
frontend-app   192.168.181.90:80,192.168.181.91:80,192.168.181.92:80      54m
labsuser@master:~$ kubectl get endpointslices
NAME                 ADDRESSTYPE   PORTS   ENDPOINTS                                      AGE
admin-dbh9j          IPv4          80      192.168.181.89                                 2d2h
frontend-app-q27j7   IPv4          80      192.168.181.90,192.168.181.92,192.168.181.91   55m
kubernetes           IPv4          6443    172.31.36.62                                   11d
my-nginx-sqwd4       IPv4          80      192.168.181.85,192.168.181.87                  149m
labsuser@master:~$
```

1.10 Run the following command to display the YAML configuration of EndpointSlice for the **frontend-app** service:
kubectl get endpointslices frontend-app-q27j7 -o yaml

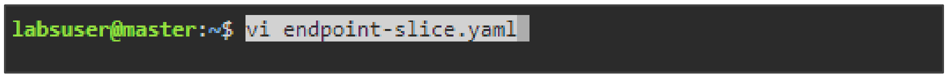


```
labsuser@master:~$ kubectl get endpointslices frontend-app-t9ckl -o yaml
Error from server (NotFound): endpointslices.discovery.k8s.io "frontend-app-t9ckl" not found
labsuser@master:~$ kubectl get endpointslices
NAME                 ADDRESSTYPE   PORTS   ENDPOINTS                                      AGE
admin-dbh9j          IPv4          80      192.168.181.89                                 2d2h
frontend-app-q27j7   IPv4          80      192.168.181.90,192.168.181.92,192.168.181.91   59m
kubernetes           IPv4          6443    172.31.36.62                                   11d
my-nginx-sqwd4       IPv4          80      192.168.181.85,192.168.181.87                  153m
labsuser@master:~$ kubectl get endpointslices frontend-app-q27j7 -o yaml
addressType: IPv4
apiVersion: discovery.k8s.io/v1
endpoints:
- addresses:
  - 192.168.181.90
  conditions:
    ready: true
    serving: true
    terminating: false
  nodeName: ip-172-31-29-25
  targetRef:
    kind: Pod
    name: frontend-app-58c8686cfc-lbrh8
    namespace: default
    uid: 68f3c9c2-b885-4b20-98f5-acdb52300ba0
- addresses:
  - 192.168.181.92
  conditions:
    ready: true
    serving: true
```


```
    name: frontend-app-58c8686cfc-j448q
    namespace: default
    uid: 3e4083a5-b595-4a98-b6be-456d2adde144
kind: EndpointSlice
metadata:
  annotations:
    endpoints.kubernetes.io/last-change-trigger-time: "2023-11-06T08:35:55Z"
  creationTimestamp: "2023-11-06T08:35:55Z"
  generateName: frontend-app-
  generation: 1
  labels:
    endpointslice.kubernetes.io/managed-by: endpointslice-controller.k8s.io
    kubernetes.io/service-name: frontend-app
  name: frontend-app-q27j7
  namespace: default
  ownerReferences:
  - apiVersion: v1
    blockOwnerDeletion: true
    controller: true
    kind: Service
    name: frontend-app
    uid: 094afa0f-f2bc-47a2-b169-69b67679abf4
  resourceVersion: "63818"
  uid: a236434c-68b5-46c3-9bc3-07c19533a276
ports:
- name: ""
  port: 80
  protocol: TCP
labsuser@master:~$
```

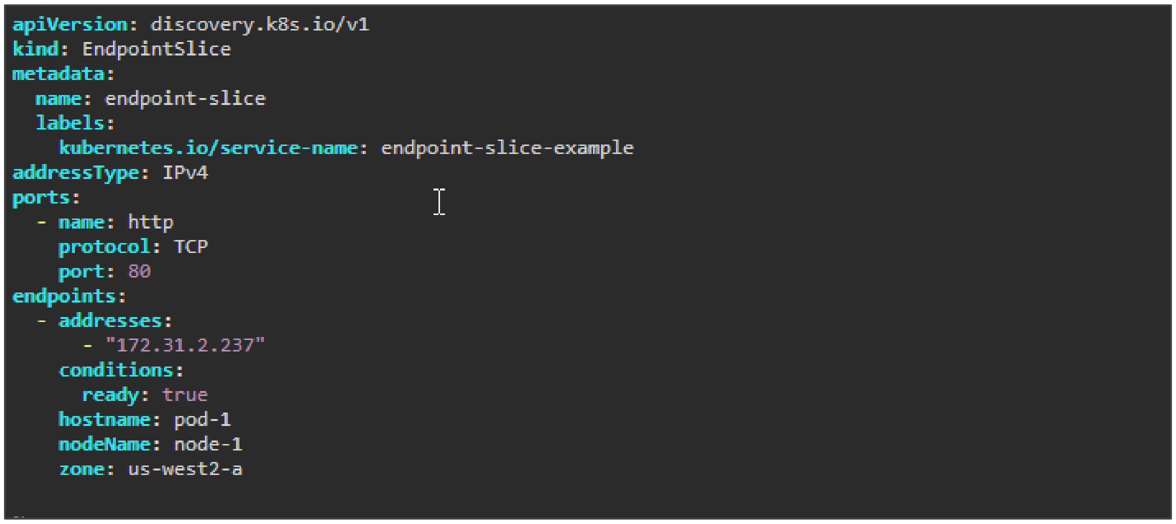
Step 2: Create a YAML file for a custom EndpointSlice configuration

2.1 In the master node, create a configuration file for EndpointSlice using the following command:
vi endpoint-slice.yaml


```
labsuser@master:~$ vi endpoint-slice.yaml
```

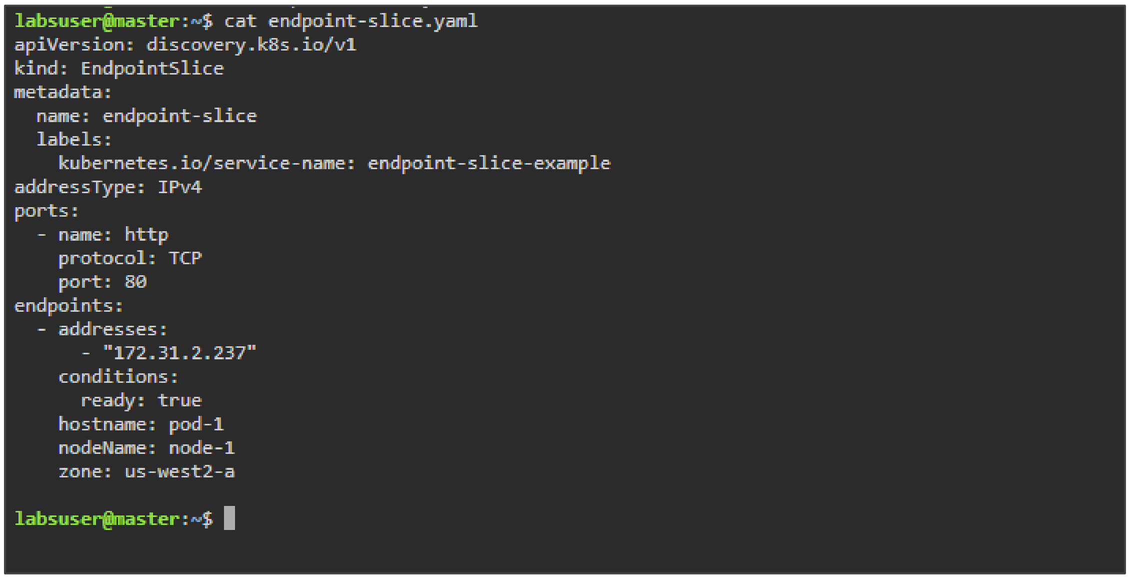
2.2 Add the following code to the configuration file:

```
apiVersion: discovery.k8s.io/v1
kind: EndpointSlice
metadata:
  name: endpoint-slice
  labels:
    kubernetes.io/service-name: endpoint-slice-example
addressType: IPv4
ports:
  - name: http
    protocol: TCP
    port: 80
endpoints:
  - addresses:
      - "172.31.2.237"
    conditions:
      ready: true
    hostname: pod-1
    nodeName: node-1
    zone: us-west2-a
```



```
apiVersion: discovery.k8s.io/v1
kind: EndpointSlice
metadata:
  name: endpoint-slice
  labels:
    kubernetes.io/service-name: endpoint-slice-example
addressType: IPv4
ports:
  - name: http
    protocol: TCP
    port: 80
endpoints:
  - addresses:
      - "172.31.2.237"
    conditions:
      ready: true
    hostname: pod-1
    nodeName: node-1
    zone: us-west2-a
```

2.3 View the content of the **endpoint-slice.yaml** file using the following command:
cat endpoint-slice.yaml

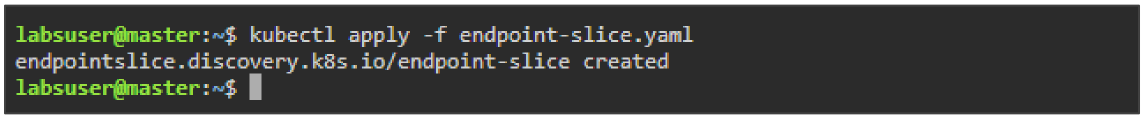


```
labsuser@master:~$ cat endpoint-slice.yaml
apiVersion: discovery.k8s.io/v1
kind: EndpointSlice
metadata:
  name: endpoint-slice
  labels:
    kubernetes.io/service-name: endpoint-slice-example
addressType: IPv4
ports:
  - name: http
    protocol: TCP
    port: 80
endpoints:
  - addresses:
      - "172.31.2.237"
    conditions:
      ready: true
    hostname: pod-1
    nodeName: node-1
    zone: us-west2-a

labsuser@master:~$
```

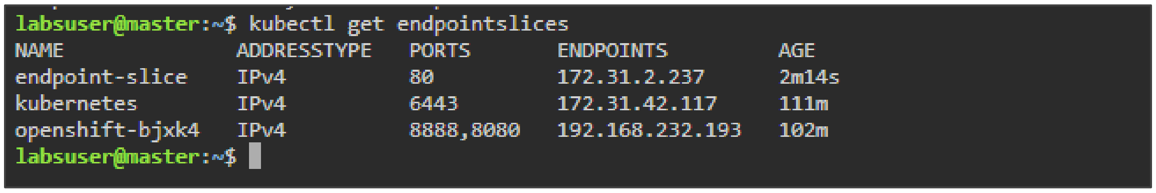
Step 3: Create a resource for the custom EndpointSlice configuration

3.1 Create a resource for EndpointSlice using the following command:
kubectl apply -f endpoint-slice.yaml



```
labsuser@master:~$ kubectl apply -f endpoint-slice.yaml
endpointslice.discovery.k8s.io/endpoint-slice created
labsuser@master:~$
```

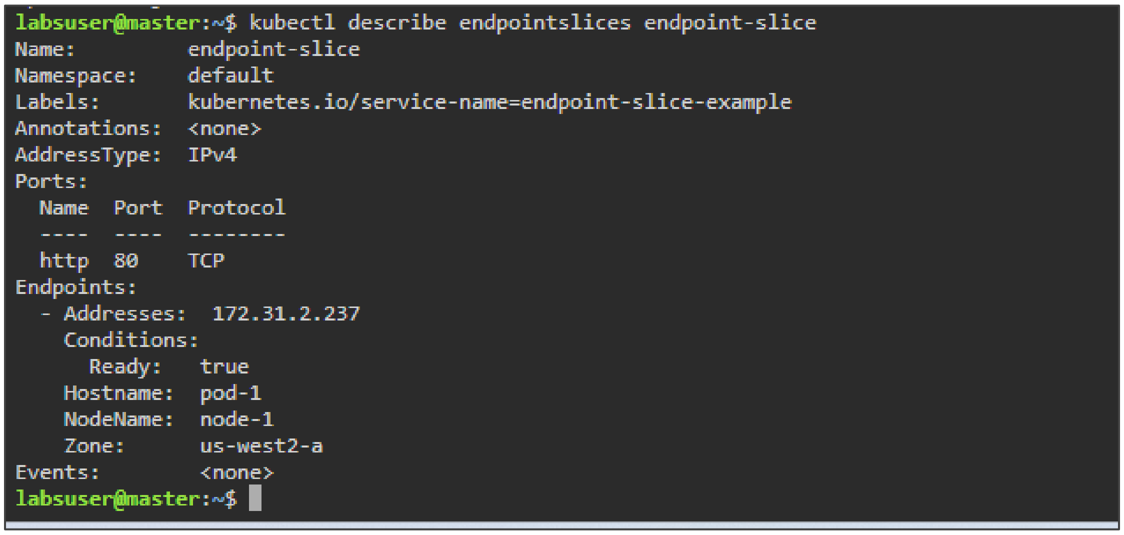
3.2 Check the created resource using the following command:
kubectl get endpointslices



```
labsuser@master:~$ kubectl get endpointslices
NAME              ADDRESSTYPE   PORTS       ENDPOINTS         AGE
endpoint-slice    IPv4          80          172.31.2.237      2m14s
kubernetes        IPv4          6443        172.31.42.117     111m
openshift-bjxk4   IPv4          8888,8080   192.168.232.193   102m
labsuser@master:~$
```

3.3 View the details of the created resource for EndpointSlice using the following command:

kubectl describe endpointslices endpoint-slice



```
labsuser@master:~$ kubectl describe endpointslices endpoint-slice
Name:         endpoint-slice
Namespace:    default
Labels:       kubernetes.io/service-name=endpoint-slice-example
Annotations:  <none>
AddressType:  IPv4
Ports:
  Name  Port  Protocol
  ----  ----  --------
  http  80    TCP
Endpoints:
  - Addresses:  172.31.2.237
    Conditions:
      Ready:   true
    Hostname:  pod-1
    NodeName:  node-1
    Zone:      us-west2-a
Events:        <none>
labsuser@master:~$
```

By following the above steps, you have successfully configured an EndpointSlice file to track the network endpoints within a cluster.