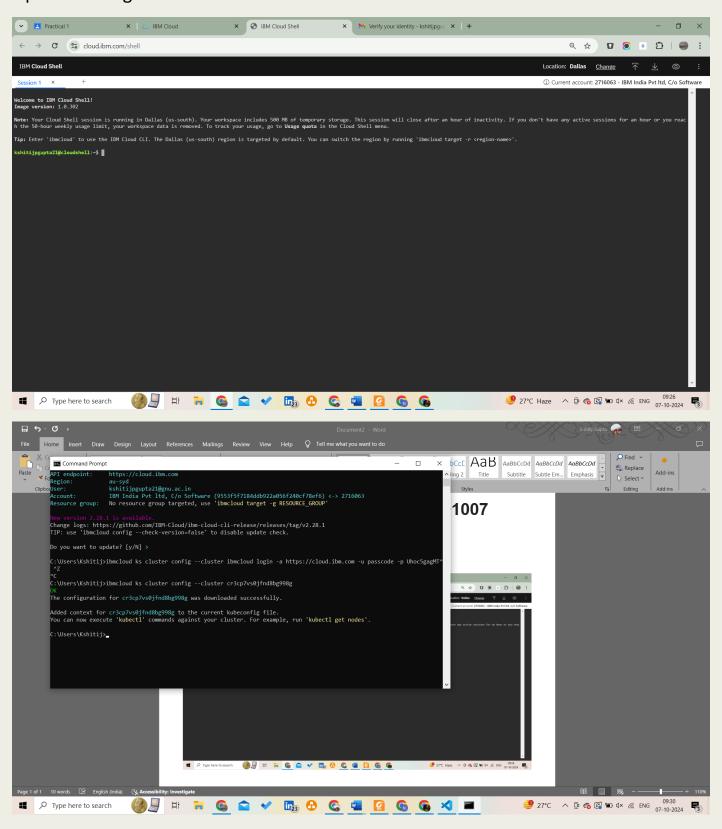
NAME: KSHITIJ GUPTA Enrolment Number: 21162101007 Sub: CS

Practical - 9[Batch-71]

Scenario: To restrict network access to an application deployed on Kubernetes, you can use Network Policies. A NetworkPolicy resource defines how groups of pods are allowed to communicate with each other and with other network endpoints. You can configure network policies to control both ingress and egress traffic, limiting access to your application only to the necessary services or pods. Tasks:

- Review any default network policies applied by Calico or Kubernetes that might affect traffic in your cluster.
- Add new network policies to meet the security requirements outlined above.
- After testing the policies, clean up any temporary or redundant policies that are no longer needed.

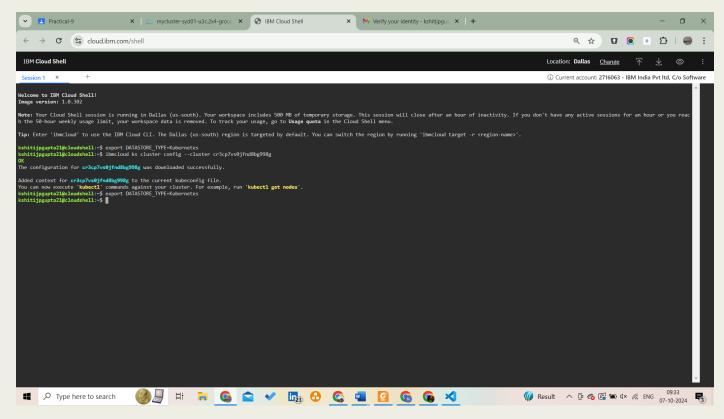
Open CLI using IBM cloud dashboard



Step-1: Configure k8s with admin access to network part also Set the DATASTORE_TYPE environment variable to Kubernetes

Command: export DATASTORE_TYPE=Kubernetes

Command: ibmcloud ks cluster config --cluster <cluster_name_or_ID> --admin --network



Move the Calico configuration file that you previously downloaded to the directory.

Command: cp /Users/<user>/.bluemix/plugins/container service/clusters/<cluster_name>-admin/calicoctl.cfg /etc/calico

```
You can now execute 'kubectl' commands against your cluster. For example, run 'kubectl get nodes'.
kshitijpgupta21@cloudshell:-$ export DATASTORE_TYPE=Kubernetes
kshitijpgupta21@cloudshell:-$ ibmcloud ks cluster config --cluster cr3cp7vs0jfnd8bg998g --admin --network

OK
The configuration for cr3cp7vs0jfnd8bg998g was downloaded successfully.

Network Config:

/tmp/ic/-1/.bluemix/plugins/container-service/clusters/mycluster-syd01-u3c.2x4-group2-cr3cp7vs0jfnd8bg998g-admin/calicoctl.cfg

Added context for cr3cp7vs0jfnd8bg998g to the current kubeconfig file.

You can now execute 'kubectl' commands against your cluster. For example, run 'kubectl get nodes'.

kshitijpgupta21@cloudshell:-$ cp /tmp/ic/-1/.bluemix/plugins/container-service/clusters/mycluster-syd01-u3c.2x4-group2-cr3cp7vs0jfnd8bg998g-admin/calicoctl.cfg

cp: missing destination file operand after '/tmp/ic/-1/.bluemix/plugins/container-service/clusters/mycluster-syd01-u3c.2x4-group2-cr3cp7vs0jfnd8bg998g-admin/calicoctl.cfg'

Try 'cp --help' for more information.
kshitijpgupta21@cloudshell:-$ cp /tmp/ic/-1/.bluemix/plugins/container-service/clusters/mycluster-syd01-u3c.2x4-group2-cr3cp7vs0jfnd8bg998g-admin/calicoctl.cfg /etc/calico
kshitijpgupta21@cloudshell:-$ cp /tmp/ic/-1/.bluemix/plugins/container-service/clusters/mycluster-syd01-u3c.2x4-group2-cr3cp7vs0jfnd8bg998g-admin/calico
```

Verify that the Calico configuration is working correctly. Using calicoctl get nodes

```
kshitijpgupta2l@cloudshell:~$ cp /tmp/ic/-1/.bluemix/plugins/container-service/clusters/mycluster-syd01-u3c.2x4-group2-cr3cp/vs0j+nd8bg998g-ackshitijpgupta2l@cloudshell:~$ calicoctl get nodes
Failed to get resources: Version mismatch.
Client Version: v3.24.5
Cluster Version: 3.27.4
Use --allow-version-mismatch to override.

kshitijpgupta2l@cloudshell:~$ calicoctl get nodes --allow-version-mismatch
NAME
10.210.8.251
kshitijpgupta2l@cloudshell:~$
```

Use alise to remove writing same code every time

```
kshitijpgupta21@cloudshell:~$ alias calicoctl='calicoctl --allow-version-mismatch'
kshitijpgupta21@cloudshell:~$ calicoctl get nodes
NAME
10.210.8.251
kshitijpgupta21@cloudshell:~$
```

Viewing network policies:

1. View the Calico host endpoint.

Command:

calicoctl get hostendpoint -o yaml

```
kshitjpupt2ikcloodshell:-f.calicott] get hostendpoint -o yaml
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```

Network policies are scoped to specific namespaces:

Command: calicoctl get NetworkPolicy --all-namespaces -o wide

```
kshitijpgupta21@cloudshell:~$ calicoctl get NetworkPolicy --all-namespaces -o wide
NAMESPACE NAME ORDER SELECTOR
kshitijpgupta21@cloudshell:~$
```

```
resourceVersion: "4770762"

kshitijpgupta21@cloudshell:~$ kubectl get networkpolicies --all-namespaces

NAMESPACE NAME POD-SELECTOR AGE

kube-system dashboard-metrics-scraper k8s-app=dashboard-metrics-scraper 45d

kube-system kubernetes-dashboard k8s-app=kubernetes-dashboard 45d

kshitijpgupta21@cloudshell:~$ calicoctl get NetworkPolicy --all-namespaces -o wide -v
```

View the details of all global network policies for the cluster.

Command: calicoctl get GlobalNetworkPolicy -o yaml

```
kshitijpgupta21@cloudshell:~$
kshitijpgupta21@cloudshell:~$ calicoctl get GlobalNetworkPolicy -o yaml
apiVersion: projectcalico.org/v3 items:
 apiVersion: projectcalico.org/v3
kind: GlobalNetworkPolicy
    creationTimestamp: "2024-08-22T05:37:54Z"
     name: allow-all-outbound resourceVersion: "662352"
     uid: 96fc725e-a625-48e6-93b8-a455857f8223
     egress:
       action: Allow
destination: {}
    order: 1900
     selector: ibm.role == 'worker_public'
  apiVersion: projectcalico.org/v3
kind: GlobalNetworkPolicy
  metadata:
    creationTimestamp: "2024-08-22T05:37:55Z"
    name: allow-all-private-default resourceVersion: "662360"
     uid: 885d6e54-3d82-4a95-ae57-c90ae0ddf6db
      action: Allow
       source: {}
     ingress:
      - action: Allow
destination: {}
    source: {}
order: 100000
```

Adding network policies

```
kshitijpgupta21@cloudshell:~$ kubectl create ns advanced-policy-kshitij
namespace/advanced-policy-kshitij created
kshitijpgupta21@cloudshell:~$ kubectl create deployment --namespace=advanced-policy-kshitij nginx --image=ngnix
deployment.apps/nginx created

kshitijpgupta21@cloudshell:~$ kubectl create deployment --namespace=advanced-policy-kshitij nginx --image=nginx
deployment.apps/nginx created
kshitijpgupta21@cloudshell:~$ kubectl expose --namespace=advanced-policy-demo deployment nginx --port=80
Error from server (NotFound): deployments.apps "nginx" not found
kshitijpgupta21@cloudshell:~$ 

kshit
```

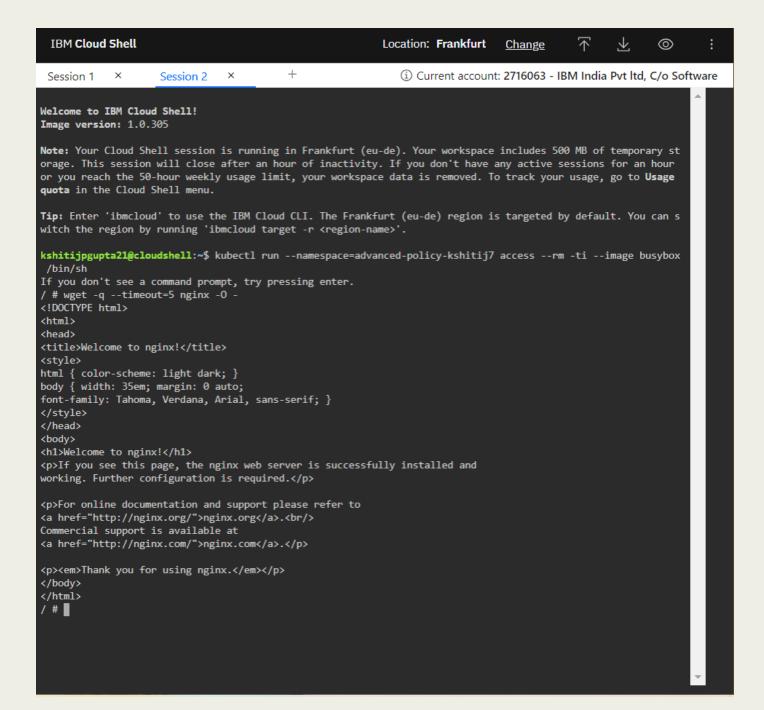
```
(i) Current account: 2716063 - IBM India Pvt ltd, C/o Software
 Session 1
                     Session 2
kshitijpgupta21@cloudshell:~$ kubectl create ns advanced-policy-kshitij7
namespace/advanced-policy-kshitij7 created
<mark>kshitijpgupta21@cloudshell:~$</mark> kubectl create deployment --namespace=advanced-policy-kshitij7 nginx --image=ngi
deployment.apps/nginx created
kshitijpgupta21@cloudshell:~$ kubectl expose --namespace=advanced-policy-kshitij7 deployment nginx --port = 80
strconv.Atoi: parsing "=": invalid syntax
Error from server (NotFound): deployments.apps "80" not found
k<mark>shitijpgupta21@cloudshell:~$</mark> kubectl expose --namespace=advanced-policy-kshitij7 deployment nginx --por =80
error: unknown flag: --por
See 'kubectl expose --help' for usage.
kshitijpgupta21@cloudshell:~$ kubectl expose --namespace=advanced-policy-kshitij7 deployment nginx --port=80
service/nginx exposed
kshitijpgupta21@cloudshell:~$
```

Verify access – allowed all ingress and egress

Command:

kubectl run --namespace=advanced-policy-demo access --rm -ti –image busybox /bin/sh

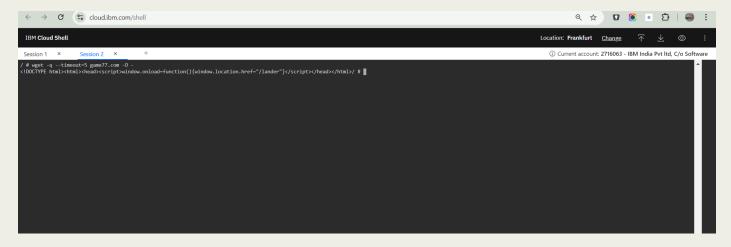
This will open the second shell session inside the busybox, where we can test our policies.



Command: wget -q --timeout=5 nginx -O -

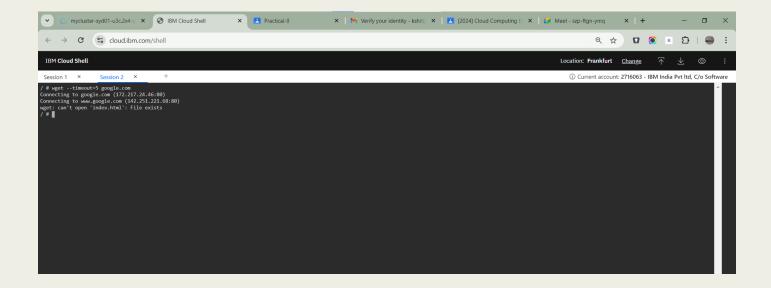
This would redirect to the HTML welcome page of nginx.

Now we add unknown address so file does not open and give the error

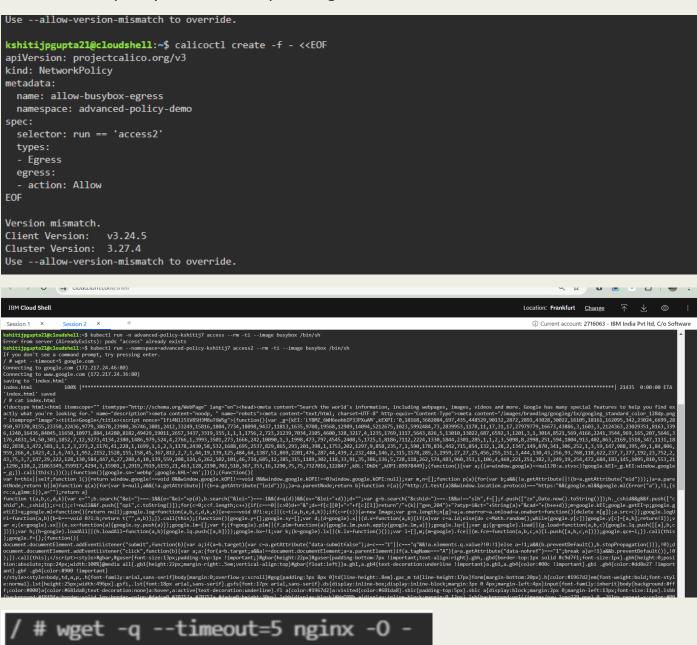


Now create global network policy to deny all traffic





Now create a policy to allow our pod's egress traffic

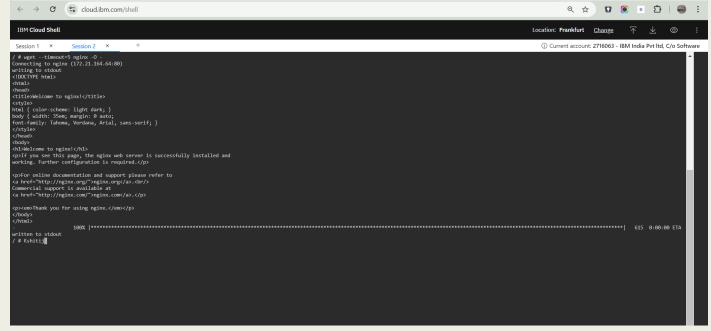


/ # wget -q --timeout=5 nginx -0 wget: download timed out

Ingress traffic is still blocked so create a new policy to allow communication

between these pods

```
kshitijpgupta21@cloudshell:~$ calicoctl create -f - <<EOF
> apiVersion: projectcalico.org/v3
> kind: NetworkPolicy
> metadata:
   name: allow-nginx-ingress
   namespace: advanced-policy-kshitij7
> spec:
   selector: app == "nginx"
  types:
   - Ingress
  ingress:
   - action: Allow
   source:
      selector: run == "access2"
> E0F
Version mismatch.
Client Version: v3.24.5
Cluster Version: 3.27.4
Use --allow-version-mismatch to override.
kshitijpgupta21@cloudshell:~$
```



Now delete everything created in this practical