1- How many static pods exist in this cluster in all namespaces?
4 static pods

2-On which nodes are the static pods created currently?
Minikube, because it's the only node that exists and it's the master node.

3- What is the path of the directory holding the static pod definition files?
/etc/kubernetes/manifests/

4- Create a static pod named `static-busybox` that uses the `busybox` image and the command `sleep 1000`

```
docker@minikube:~$ docker ps
CONTAINER ID   IMAGE                  COMMAND                  CREATED              STATUS              PORTS     NAMES
9adf1f021b9d   6e38f40d628d           "/storage-provisioner"   32 seconds ago       Up 29 seconds               k8s_storage-provisioner_storage-provisioner_kube-system_8439cdc6-a94d-406f-9f25-1147121d6343_17
42e59dc8aa80   a4ca41631cc7           "/coredns -conf /etc…"   About a minute ago   Up About a minute           k8s_coredns_coredns-6d4b75cb6d-kch7v_kube-system_530a8e7b-b5f3-4ded-84d2-1f17fbccb658_8
278fa85ec325   beb86f5d8e6c           "/usr/local/bin/kube…"   About a minute ago   Up About a minute           k8s_kube-proxy_kube-proxy-rc296_kube-system_58f53e6c-86c2-4e32-9499-c8f867d4a3cf_8
eb27e3c38f56   k8s.gcr.io/pause:3.6   "/pause"                 About a minute ago   Up About a minute           k8s_POD_coredns-6d4b75cb6d-kch7v_kube-system_530a8e7b-b5f3-4ded-84d2-1f17fbccb658_8
d733b7ed743a   k8s.gcr.io/pause:3.6   "/pause"                 About a minute ago   Up About a minute           k8s_POD_storage-provisioner_kube-system_8439cdc6-a94d-406f-9f25-1147121d6343_8
638847e6bb79   k8s.gcr.io/pause:3.6   "/pause"                 About a minute ago   Up About a minute           k8s_POD_kube-proxy-rc296_kube-system_58f53e6c-86c2-4e32-9499-c8f867d4a3cf_8
acdb5e3d5236   busybox                "sleep 1000"             About a minute ago   Up About a minute           k8s_static-busybox-container_static-busybox-minikube_default_6dd800ec4748ca1dc78be4e13438dfae_0
527a7fa8452c   e9f4b425f919           "kube-apiserver --ad…"   About a minute ago   Up About a minute           k8s_kube-apiserver_kube-apiserver-minikube_kube-system_6580cebb2d04c6c59385cf58e278b0a6_8
a144b353e749   18688a72645c           "kube-scheduler --au…"   About a minute ago   Up About a minute           k8s_kube-scheduler_kube-scheduler-minikube_kube-system_bab0508344d11c6fdb45b1f91c440ff5_8
```

```
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get po
NAME                     READY   STATUS    RESTARTS   AGE
static-busybox-minikube  1/1     Running   0          2m51s
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$
```

5- Edit the image on the static pod to use `busybox:1.28.4`

```
9683c62c3f35   k8s.gcr.io/pause:3.6   "/pause"   About a minute ago   Up About a minute   k8s_POD_kube-scheduler-minikube_kube-system_bab0508344d11c6fdb45b1f91c440ff5_9
111cf3088386   k8s.gcr.io/pause:3.6   "/pause"   About a minute ago   Up About a minute   k8s_POD_kube-apiserver-minikube_kube-system_6580cebb2d04c6c59385cf58e278b0a6_9
0ca440fb1891   k8s.gcr.io/pause:3.6   "/pause"   About a minute ago   Up About a minute   k8s_POD_static-busybox-minikube_default_70d8f2311a7a4f63904f39c640e00832_0
6a034e967259   k8s.gcr.io/pause:3.6   "/pause"   About a minute ago   Up About a minute   k8s_POD_kube-controller-manager-minikube_kube-system_b4f7419eaf4a6f0ee6121d47723a0c8d_9
docker@minikube:~$
```

```
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get po
NAME                     READY   STATUS    RESTARTS   AGE
static-busybox-minikube  1/1     Running   0          99s
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$
```

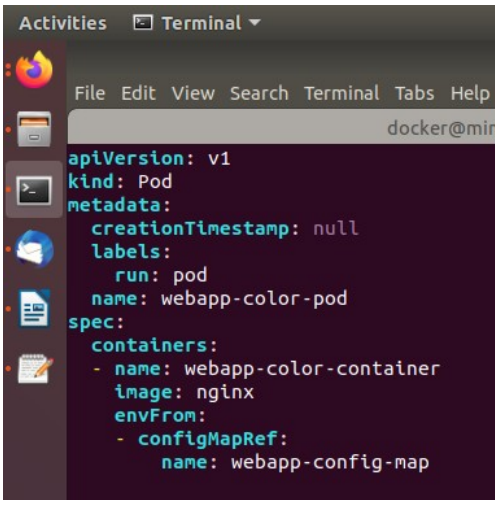
6- How many `ConfigMaps` exist in the environment?
1 config map.

```
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get configmaps
NAME               DATA   AGE
kube-root-ca.crt   1      21d
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$
```

7- Create a new ConfigMap Use the spec given below.
ConfigName Name: webapp-config-map
Data: APP_COLOR=darkblue

```
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl create configmap webapp-config-map --from-literal=APP_COLOR=dark
blue --dry-run=client -o yaml > configmap.yaml
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ ls
configmap.yaml  lab3.docx  lab3.odt  static-busybox.yaml
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ cat configmap.yaml
apiVersion: v1
data:
  APP_COLOR: darkblue
kind: ConfigMap
metadata:
  creationTimestamp: null
  name: webapp-config-map
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$
```

8- Create a webapp-color POD with nginx image and use the created ConfigMap




```
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl describe po webapp-color-pod
Name:         webapp-color-pod
Namespace:    default
Priority:     0
Node:         minikube/192.168.49.2
Start Time:   Wed, 10 Aug 2022 16:19:19 +0300
Labels:       run=pod
Annotations:  <none>
Status:       Running
IP:           172.17.0.4
IPs:
  IP:  172.17.0.4
Containers:
  webapp-color-container:
    Container ID:   docker://442bd891b2d2c0093ad1eec9f3c5ef9ec0e4268387b586376a46eda56d2f53c2
    Image:          nginx
    Image ID:       docker-pullable://nginx@sha256:790711e34858c9b0741edffef6ed3d8199d8faa33f2870dea5db70f16384df79
    Port:           <none>
    Host Port:      <none>
    State:          Running
      Started:      Wed, 10 Aug 2022 16:20:36 +0300
    Ready:          True
    Restart Count:  0
    Environment Variables from:
      webapp-config-map  ConfigMap  Optional: false
    Environment:        <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-jgtfd (ro)
```

9- How many `Secrets` exist on the system?

None.

10- How many secrets are defined in the `default-token` secret?

11- create a POD called db-pod with the image mysql:5.7 then check the POD status

```yaml
apiVersion: v1
kind: Pod
metadata:
  labels:
    run: pod
  name: db-pod
spec:
  containers:
  - name: db-pod-container
    image: mysql:5.7
```

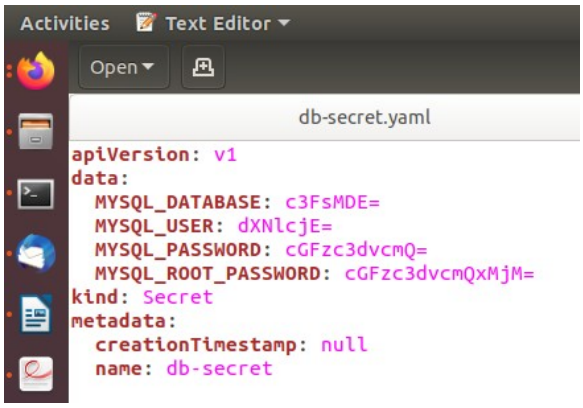
12- why the db-pod status not ready

`CrashLoopBackOff`

13- Create a new secret named `db-secret` with the data given below.

Secret Name: db-secret

- Secret 1: `MYSQL_DATABASE`=sql01
- Secret 2: `MYSQL_USER`=user1
- Secret3: `MYSQL_PASSWORD`=password
- Secret 4: `MYSQL_ROOT_PASSWORD`=password123



14- Configure `db-pod` to load environment variables from the newly created secret. Delete and recreate the pod if required.

```yaml
apiVersion: v1
kind: Pod
metadata:
  labels:
    run: pod
  name: db-pod
spec:
  containers:
  - name: db-pod-container
    image: mysql:5.7
    envFrom:
      - secretRef:
          name: db-secret
```

```
  Type    Reason     Age   From               Message
  ----    ------     ----  ----               -------
  Normal  Scheduled  29s   default-scheduler  Successfully assigned default/db-pod to minikube
  Normal  Pulled     25s   kubelet            Container image "mysql:5.7" already present on machine
  Normal  Created    23s   kubelet            Created container db-pod-container
  Normal  Started    23s   kubelet            Started container db-pod-container
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get po
NAME     READY   STATUS    RESTARTS   AGE
db-pod   1/1     Running   0          39s
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$
```

15- Create a multi-container pod with 2 containers.

- Name: yellow
- Container 1 Name: lemon
- Container 1 Image: busybox
- Container 2 Name: gold
- Container 2 Image: redis

```yaml
apiVersion: v1
kind: Pod
metadata:
  labels:
    run: pod
  name: yellow-pod
spec:
  containers:
  - name: lemon
    image: busybox
    command: ["sleep"]
    args: ["1000"]

  - name: gold
    image: redis
```

```
Events:
  Type    Reason     Age   From               Message
  ----    ------     ----  ----               -------
  Normal  Scheduled  23s   default-scheduler  Successfully assigned default/yellow-pod to minikube
  Normal  Pulling    20s   kubelet            Pulling image "busybox"
  Normal  Pulled     15s   kubelet            Successfully pulled image "busybox" in 4.767891399s
  Normal  Created    14s   kubelet            Created container lemon
  Normal  Started    13s   kubelet            Started container lemon
  Normal  Pulling    13s   kubelet            Pulling image "redis"
  Normal  Pulled     8s    kubelet            Successfully pulled image "redis" in 5.223273106s
  Normal  Created    6s    kubelet            Created container gold
  Normal  Started    6s    kubelet            Started container gold
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get po
NAME         READY   STATUS    RESTARTS   AGE
yellow-pod   2/2     Running   0          91s
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$
```

16- Create a pod `red` with `redis` image and use an `initContainer` that uses the `busybox` image and `sleeps` for `20` seconds

```yaml
apiVersion: v1
kind: Pod
metadata:
  labels:
    run: pod
  name: red-pod
spec:
  containers:
  - name: red
    image: redis

  initContainers:
  - name: init-container
    image: busybox
    command: ["sleep"]
    args: ["20"]
```

```
Events:
  Type    Reason     Age   From               Message
  ----    ------     ----  ----               -------
  Normal  Scheduled  53s   default-scheduler  Successfully assigned default/red-pod to minikube
  Normal  Pulling    49s   kubelet            Pulling image "busybox"
  Normal  Pulled     45s   kubelet            Successfully pulled image "busybox" in 3.967381021s
  Normal  Created    44s   kubelet            Created container init-container
  Normal  Started    43s   kubelet            Started container init-container
  Normal  Pulling    22s   kubelet            Pulling image "redis"
  Normal  Pulled     19s   kubelet            Successfully pulled image "redis" in 3.096909145s
  Normal  Created    18s   kubelet            Created container red
  Normal  Started    17s   kubelet            Started container red
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get po
NAME         READY   STATUS    RESTARTS   AGE
red-pod      1/1     Running   0          55s
yellow-pod   2/2     Running   0          12m
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$
```

17- Create a `Persistent Volume` with the given specification.

- Volume Name: pv-log
- Storage: 100Mi
- Access Modes: ReadWriteMany
- Host Path: /pv/log

Activities Text Editor

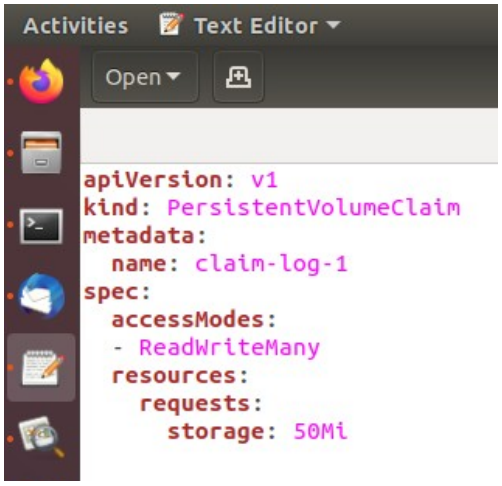
Open

```yaml
apiVersion: v1
kind: PersistentVolume
metadata:
  name: pv-log
spec:
  capacity:
    storage: 100Mi
  volumeMode: Filesystem
  accessModes:
  - ReadWriteMany
  storageClassName: local-storage
  local:
    path: /pv/log
  nodeAffinity:
    required:
      nodeSelectorTerms:
      - matchExpressions:
        - key: color
          operator: In
          values:
          - blue

```

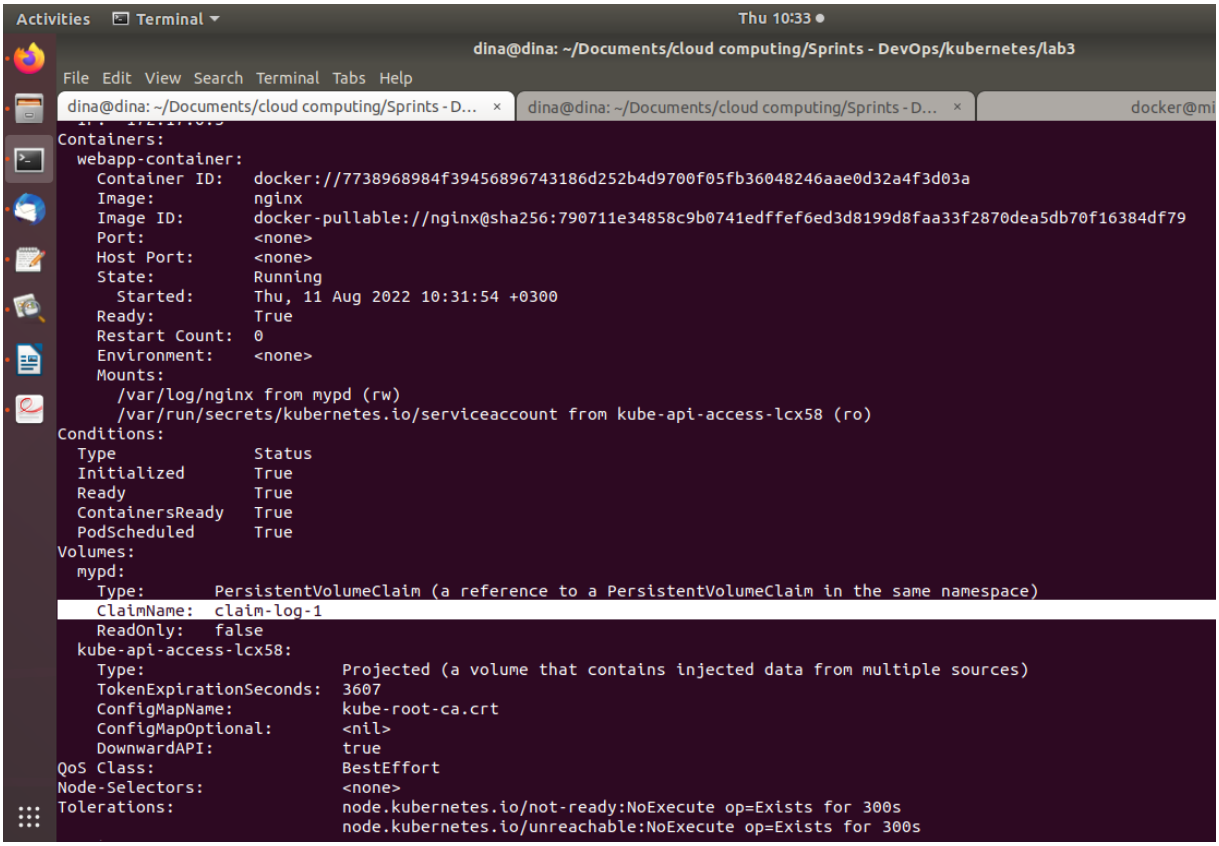
18- Create a `Persistent Volume Claim` with the given specification.

- Volume Name: claim-log-1
- Storage Request: 50Mi
- Access Modes: ReadWriteMany



19- Create a `webapp` pod to use the persistent volume claim as its storage.

- Name: webapp
- Image Name: nginx
- Volume: PersistentVolumeClaim=claim-log-1
- Volume Mount: /var/log/nginx



20- Create a pod named volume-share-datacenter.

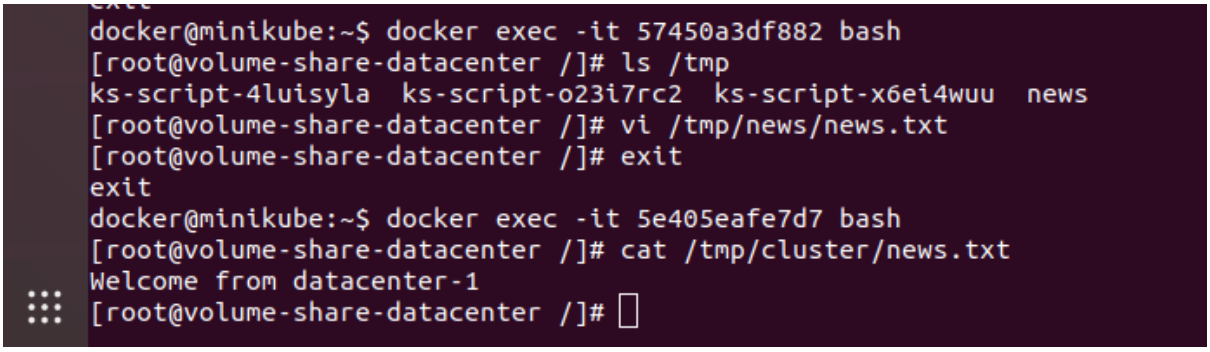
For first container, use image centos:latest, container should be named as volume-container-datacenter-1, and run a command '/bin/bash', '-c' and 'sleep 10000'. Volume volume-share should be mounted at path /tmp/news.

For second container, use image centos:latest, container should be named as volume-container-datacenter-2, and run a command '/bin/bash', '-c' and 'sleep 10000'. Volume volume-share should be mounted at path /tmp/cluster.

Volumes to be named as volume-share and use emptyDir: { }.

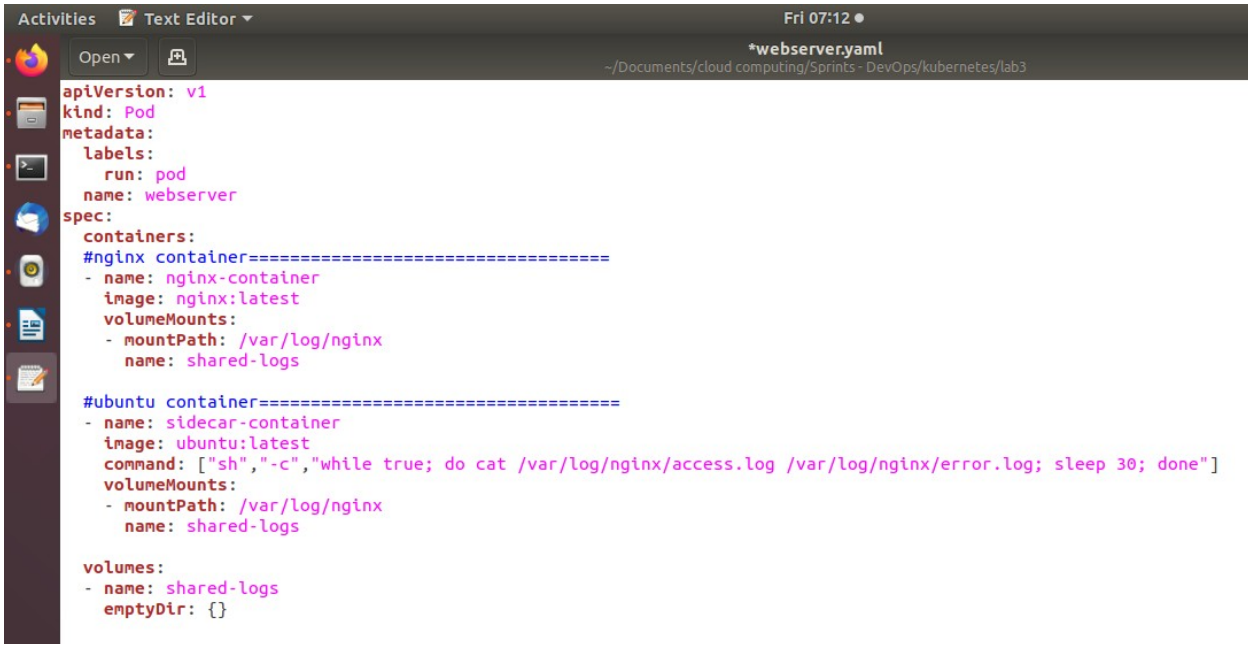
After creating the pod, exec into the first container volume-container-datacenter-1, and create a file news.txt with content Welcome from datacenter-1! under the mount path of first container /tmp/news.

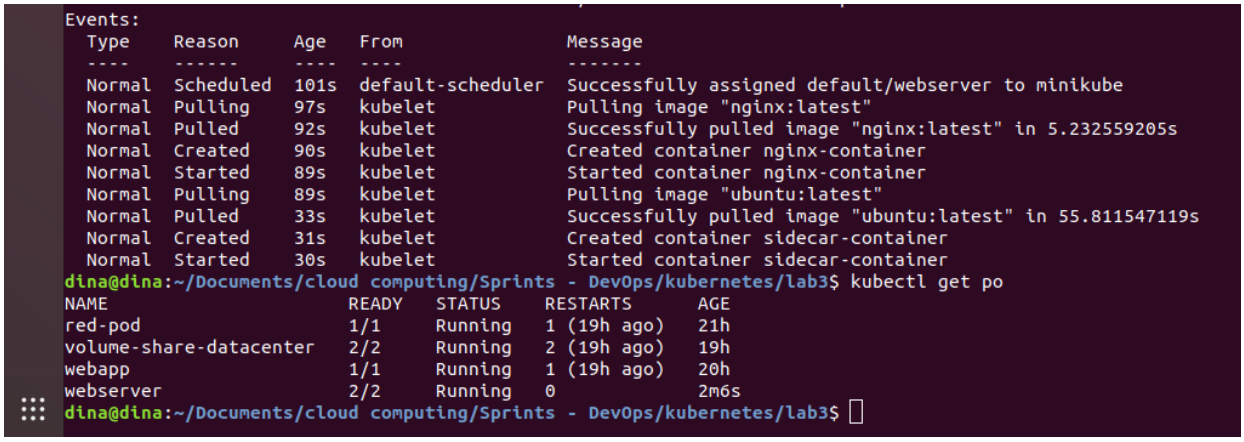
The file news.txt should be present under the mounted path /tmp/cluster of second container volume-container-datacenter-2 as they are using shared volumes.

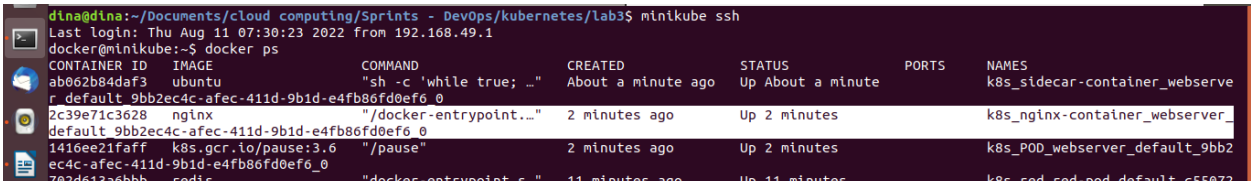


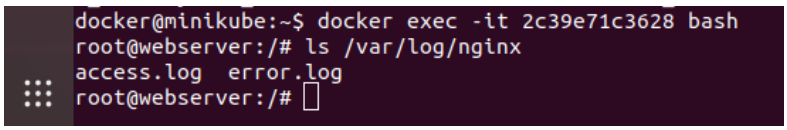
21- Create a pod named webserver.

- Create an emptyDir volume name: shared-logs.
- Create two containers from nginx and ubuntu images with latest tag only and remember to mention tag i.e nginx:latest.
- nginx container name should be nginx-container.
- ubuntu container name should be sidecar-container on webserver pod.
- Add command on sidecar-container "sh","-c","while true; do cat /var/log/nginx/access.log /var/log/nginx/error.log; sleep 30; done"
- Mount volume /var/log/nginx on both containers, all containers should be up and running.


Activities
Text Editor
Fri 07:12
Open
*webserver.yaml
~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3
apiVersion: v1
kind: Pod
metadata:
labels:
run: pod
name: webserver
spec:
containers:
#nginx container==================================
- name: nginx-container
image: nginx:latest
volumeMounts:
- mountPath: /var/log/nginx
name: shared-logs
#ubuntu container==================================
- name: sidecar-container
image: ubuntu:latest
command: ["sh","-c","while true; do cat /var/log/nginx/access.log /var/log/nginx/error.log; sleep 30; done"]
volumeMounts:
- mountPath: /var/log/nginx
name: shared-logs
volumes:
- name: shared-logs
emptyDir: {}


Events:
Type Reason Age From Message
Normal Scheduled 101s default-scheduler Successfully assigned default/webserver to minikube
Normal Pulling 97s kubelet Pulling image "nginx:latest"
Normal Pulled 92s kubelet Successfully pulled image "nginx:latest" in 5.232559205s
Normal Created 90s kubelet Created container nginx-container
Normal Started 89s kubelet Started container nginx-container
Normal Pulling 89s kubelet Pulling image "ubuntu:latest"
Normal Pulled 33s kubelet Successfully pulled image "ubuntu:latest" in 55.811547119s
Normal Created 31s kubelet Created container sidecar-container
Normal Started 30s kubelet Started container sidecar-container
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get po
NAME READY STATUS RESTARTS AGE
red-pod 1/1 Running 1 (19h ago) 21h
volume-share-datacenter 2/2 Running 2 (19h ago) 19h
webapp 1/1 Running 1 (19h ago) 20h
webserver 2/2 Running 0 2m6s
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$


dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ minikube ssh
Last login: Thu Aug 11 07:30:23 2022 from 192.168.49.1
docker@minikube:~$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
ab062b84daf3 ubuntu "sh -c 'while true; …" About a minute ago Up About a minute k8s_sidecar-container_webserver_default_9bb2ec4c-afec-411d-9b1d-e4fb86fd0ef6_0
2c39e71c3628 nginx "/docker-entrypoint.…" 2 minutes ago Up 2 minutes k8s_nginx-container_webserver_default_9bb2ec4c-afec-411d-9b1d-e4fb86fd0ef6_0
1416ee21faff k8s.gcr.io/pause:3.6 "/pause" 2 minutes ago Up 2 minutes k8s_POD_webserver_default_9bb2ec4c-afec-411d-9b1d-e4fb86fd0ef6_0

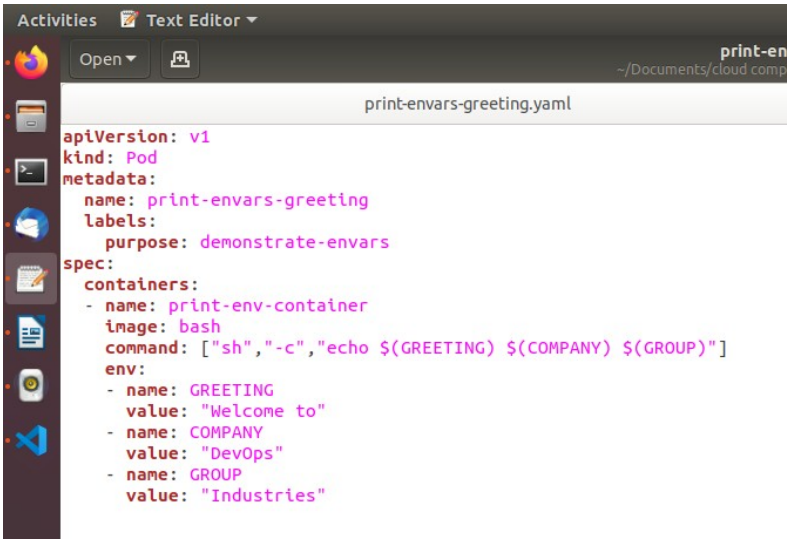

docker@minikube:~$ docker exec -it 2c39e71c3628 bash
root@webserver:/# ls /var/log/nginx
access.log error.log
root@webserver:/#

22- Create a new service account with the name `pvviewer`. Grant this Service account access to `list` all PersistentVolumes in the cluster by creating an appropriate cluster role called `pvviewer-role` and ClusterRoleBinding called `pvviewer-role-binding`.

```
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get serviceaccount
NAME       SECRETS   AGE
default    0         24h
pvviewer   0         55m
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get clusterrole | grep pvviwer
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get serviceaccount
NAME       SECRETS   AGE
default    0         24h
pvviewer   0         56m
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get clusterrole | grep pvviewer
pvviewer-role                                                2022-08-12T05:24:22Z
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl get clusterrolebinding | grep pvviewer
pvviewer-role-binding                                ClusterRole/pvviewer-role
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$
```

23- Create a `pod` named `print-envars-greeting`.

1. Configure spec as, the container name should be `print-env-container` and use `bash` image.
2. Create three environment variables:
   a. `GREETING` and its value should be `Welcome to`
   b. `COMPANY` and its value should be `DevOps`
   c. `GROUP` and its value should be `Industries`
3. Use command to echo `["$(GREETING) $(COMPANY) $(GROUP)"]` message.
4. You can check the output using `<kubectl logs -f print-envars-greeting>` command.




```
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$ kubectl logs -f print-envars-greeting
Welcome to DevOps Industries
dina@dina:~/Documents/cloud computing/Sprints - DevOps/kubernetes/lab3$
```