Assignment 2b - KUBERNETES

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Section: D

1. Section 1: Installation
    - Screenshot 1a - Minikube running successfully

```
pes2ug20cs216@pop-os:~$ minikube start
😄  minikube v1.29.0 on Debian bookworm/sid
✨  Automatically selected the docker driver. Other choices: ssh, none
📌  Using Docker driver with root privileges
👍  Starting control plane node minikube in cluster minikube
🚜  Pulling base image ...
💾  Downloading Kubernetes v1.26.1 preload ...
    > preloaded-images-k8s-v18-v1...:  397.05 MiB / 397.05 MiB  100.00% 331.34 c
    > gcr.io/k8s-minikube/kicbase...:  407.19 MiB / 407.19 MiB  100.00% 316.48
🔥  Creating docker container (CPUs=2, Memory=2200MB) ...
🐳  Preparing Kubernetes v1.26.1 on Docker 20.10.23 ...
    ▪ Generating certificates and keys ...
    ▪ Booting up control plane ...
    ▪ Configuring RBAC rules ...
🔗  Configuring bridge CNI (Container Networking Interface) ...
🔎  Verifying Kubernetes components...
    ▪ Using image gcr.io/k8s-minikube/storage-provisioner:v5
🌟  Enabled addons: storage-provisioner, default-storageclass
🏄  Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
pes2ug20cs216@pop-os:~$
```

2. Section 2: Creating pods and deployments, Editing them and observing Rollback:-
    - Screenshot 2a - get nodes, pod and services command.

```
pes2ug20cs216@pop-os:~$ kubectl get nodes
NAME       STATUS   ROLES           AGE     VERSION
minikube   Ready    control-plane   9m33s   v1.26.1
pes2ug20cs216@pop-os:~$ kubectl get pod
No resources found in default namespace.
pes2ug20cs216@pop-os:~$ kubectl get services
NAME         TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
kubernetes   ClusterIP   10.96.0.1    <none>        443/TCP   9m50s
pes2ug20cs216@pop-os:~$
```

    - Screenshot 2b- Deployment created.

```
pes2ug20cs216@pop-os:~$ kubectl create deployment pes2ug20cs216 --image=nginx
deployment.apps/pes2ug20cs216 created
pes2ug20cs216@pop-os:~$
```

- Screenshot 2c- get deployment and pod command .

```
pes2ug20cs216@pop-os:~$ kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
pes2ug20cs216-5fc5b459fb-nxwx9   1/1     Running   0          2m42s
pes2ug20cs216@pop-os:~$ kubectl get deployment
NAME            READY   UP-TO-DATE   AVAILABLE   AGE
pes2ug20cs216   1/1     1            1           3m4s
```

- Screenshot 2d- editing '-image:nginx.'

```
      containers:
      - image: nginx:1.16
        imagePullPolicy: Always
```

- Screenshot 2e- showing edited deployment.

```
pes2ug20cs216@pop-os:~$ export EDITOR=nvim && kubectl edit deployment pes2ug20cs216
deployment.apps/pes2ug20cs216 edited
pes2ug20cs216@pop-os:~$
```

- Screenshot 2f- deployment is rolled back.

```
pes2ug20cs216@pop-os:~$ kubectl rollout undo deployment pes2ug20cs216
deployment.apps/pes2ug20cs216 rolled back
pes2ug20cs216@pop-os:~$
```

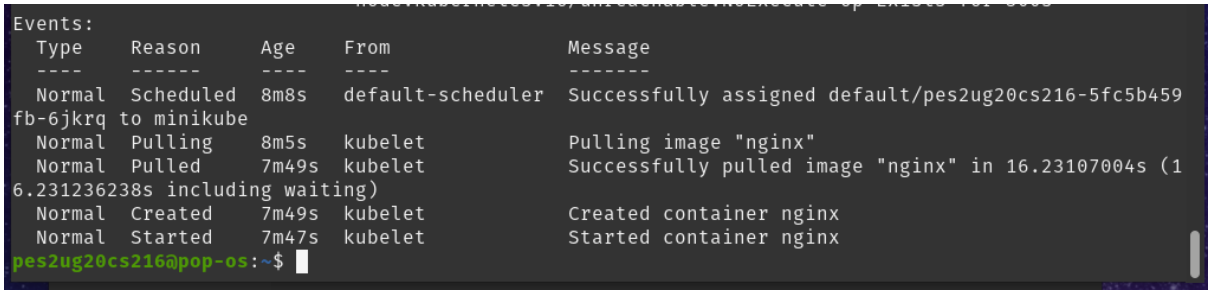
- Screenshot 2g- showing original nginx image.

```
      containers:
      - image: nginx
        imagePullPolicy: Always
```

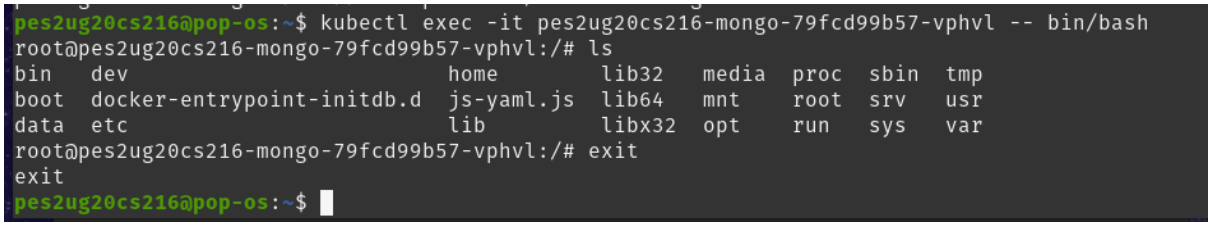
3. Section 3:Debugging Pods:-
   - Screenshot 3a - Kubectl logs displayed.

```
pes2ug20cs216@pop-os:~$ kubectl logs pes2ug20cs216-5fc5b459fb-6jkrq
/docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
/docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
/docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
/docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
/docker-entrypoint.sh: Configuration complete; ready for start up
2023/02/24 08:06:24 [notice] 1#1: using the "epoll" event method
2023/02/24 08:06:24 [notice] 1#1: nginx/1.23.3
2023/02/24 08:06:24 [notice] 1#1: built by gcc 10.2.1 20210110 (Debian 10.2.1-6)
2023/02/24 08:06:24 [notice] 1#1: OS: Linux 6.0.12-76060006-generic
2023/02/24 08:06:24 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2023/02/24 08:06:24 [notice] 1#1: start worker processes
2023/02/24 08:06:24 [notice] 1#1: start worker process 28
2023/02/24 08:06:24 [notice] 1#1: start worker process 29
2023/02/24 08:06:24 [notice] 1#1: start worker process 30
2023/02/24 08:06:24 [notice] 1#1: start worker process 31
pes2ug20cs216@pop-os:~$
```

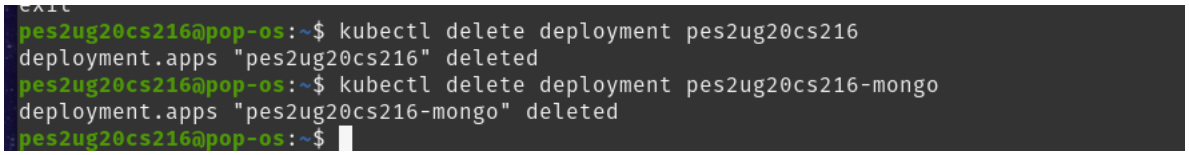
- Screenshot 3b- Kubectl ‘describe pod ‘ command.



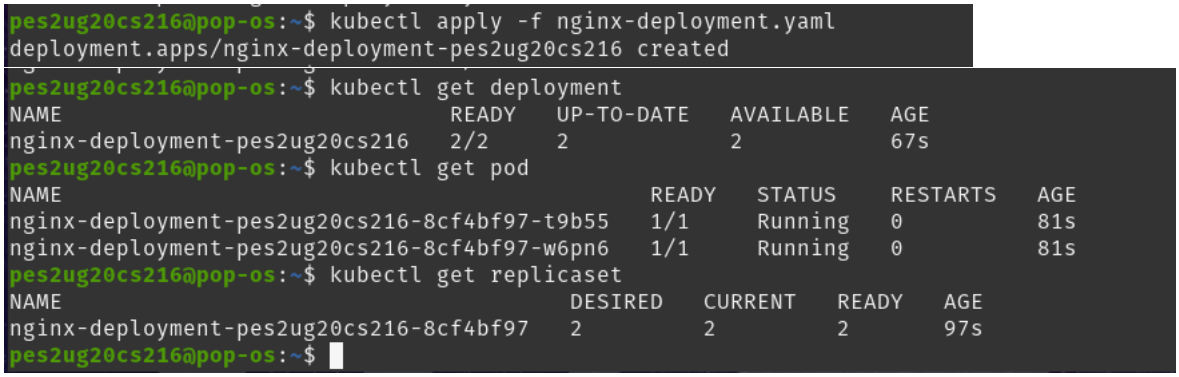
- Screenshot 3c - Create mongo deployment.



- Screenshot 3d - Delete both requirements.



4. Section 4: Applying configuration files:-
   - Screenshot 4a - Kubectl apply command on yaml file.



```
pes2ug20cs216@pop-os:~$ kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment-pes2ug20cs216 configured
pes2ug20cs216@pop-os:~$ kubectl get pod
NAME                                            READY   STATUS    RESTARTS   AGE
nginx-deployment-pes2ug20cs216-8cf4bf97-97zkx   1/1     Running   0          7s
nginx-deployment-pes2ug20cs216-8cf4bf97-t9b55   1/1     Running   0          3m41s
nginx-deployment-pes2ug20cs216-8cf4bf97-w6pn6   1/1     Running   0          3m41s
pes2ug20cs216@pop-os:~$ kubectl get replicaset
NAME                                      DESIRED   CURRENT   READY   AGE
nginx-deployment-pes2ug20cs216-8cf4bf97   3         3         3       4m1s
pes2ug20cs216@pop-os:~$
```

- Screenshot 4b- Kubectl get on yaml file

```
pes2ug20cs216@pop-os:~$ kubectl get deployment nginx-deployment-pes2ug20cs216 -o yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  annotations:
    deployment.kubernetes.io/revision: "1"
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"apps/v1","kind":"Deployment","metadata":{"annotations":{},"labels":{"app":"ngi
nx"},"name":"nginx-deployment-pes2ug20cs216","namespace":"default"},"spec":{"replicas":3,"selector"
:{"matchLabels":{"app":"nginx"}},"template":{"metadata":{"labels":{"app":"nginx"}},"spec":{"contain
ers":[{"image":"nginx:1.22","name":"nginx","ports":[{"containerPort":80}]}]}}}}
  creationTimestamp: "2023-02-24T08:43:13Z"
  generation: 2
  labels:
    app: nginx
  name: nginx-deployment-pes2ug20cs216
  namespace: default
  resourceVersion: "6134"
  uid: a2f1f7bf-c199-40ca-9a1e-335d6e1cd2b3
spec:
  progressDeadlineSeconds: 600
  replicas: 3
status:
  availableReplicas: 3
  conditions:
  - lastTransitionTime: "2023-02-24T08:43:14Z"
    lastUpdateTime: "2023-02-24T08:44:04Z"
    message: ReplicaSet "nginx-deployment-pes2ug20cs216-8cf4bf97" has successfully
      progressed.
    reason: NewReplicaSetAvailable
    status: "True"
    type: Progressing
  - lastTransitionTime: "2023-02-24T08:46:54Z"
    lastUpdateTime: "2023-02-24T08:46:54Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  observedGeneration: 2
  readyReplicas: 3
  replicas: 3
  updatedReplicas: 3
pes2ug20cs216@pop-os:~$
```

5. Section 5: Delete a pod to observe the self-healing feature.
    - Screenshot 5a - Deleted pod:-

```
pes2ug20cs216@pop-os:~$ kubectl get pod
NAME                                              READY   STATUS    RESTARTS   AGE
nginx-deployment-pes2ug20cs216-8cf4bf97-97zkx     1/1     Running   0          5m59s
nginx-deployment-pes2ug20cs216-8cf4bf97-t9b55     1/1     Running   0          9m33s
nginx-deployment-pes2ug20cs216-8cf4bf97-w6pn6     1/1     Running   0          9m33s
pes2ug20cs216@pop-os:~$ kubectl get deployments
NAME                             READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment-pes2ug20cs216   3/3     3            3           10m
pes2ug20cs216@pop-os:~$ ^C
pes2ug20cs216@pop-os:~$ kubectl delete pod nginx-deployment-pes2ug20cs216-8cf4bf97-w6pn6
pod "nginx-deployment-pes2ug20cs216-8cf4bf97-w6pn6" deleted
pes2ug20cs216@pop-os:~$ kubectl get pod
NAME                                              READY   STATUS    RESTARTS   AGE
nginx-deployment-pes2ug20cs216-8cf4bf97-97zkx     1/1     Running   0          7m27s
nginx-deployment-pes2ug20cs216-8cf4bf97-kp4tv     1/1     Running   0          19s
nginx-deployment-pes2ug20cs216-8cf4bf97-t9b55     1/1     Running   0          11m
pes2ug20cs216@pop-os:~$
```

6. Section 6 : Connecting Services to Deployments
    - Screenshot 6a- Kubectl apply and get command.

```
pes2ug20cs216@pop-os:~$ kubectl apply -f nginx-service.yaml
service/nginx-service-pes2ug20cs216 created
pes2ug20cs216@pop-os:~$ kubectl get service
NAME                          TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)    AGE
kubernetes                    ClusterIP   10.96.0.1       <none>        443/TCP    7d1h
nginx-service-pes2ug20cs216   ClusterIP   10.96.239.103   <none>        8080/TCP   17s
pes2ug20cs216@pop-os:~$
```

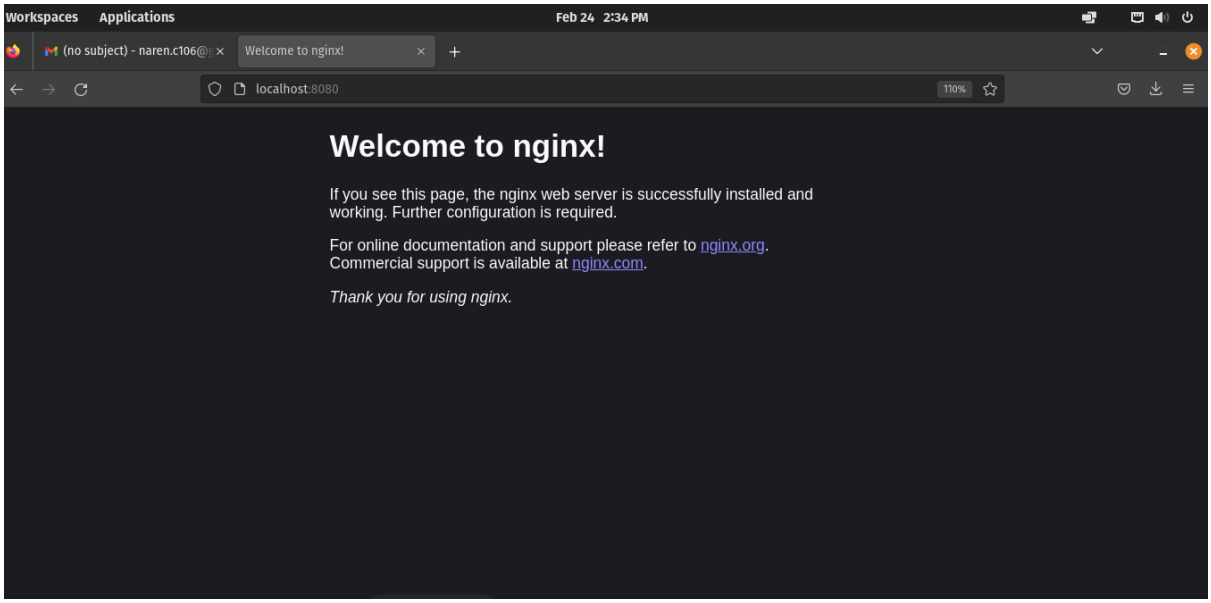
    - Screenshot 6b-kubectl get pod -o wide command

```
pes2ug20cs216@pop-os:~$ kubectl get pod -o wide
NAME                                              READY   STATUS    RESTARTS   AGE     IP            NODE       NOMINATED NODE   RE
ADINESS GATES
nginx-deployment-pes2ug20cs216-8cf4bf97-97zkx     1/1     Running   0          13m     10.244.0.22   minikube   <none>           <n
one>
nginx-deployment-pes2ug20cs216-8cf4bf97-kp4tv     1/1     Running   0          6m27s   10.244.0.23   minikube   <none>           <n
one>
nginx-deployment-pes2ug20cs216-8cf4bf97-t9b55     1/1     Running   0          17m     10.244.0.19   minikube   <none>           <n
one>
pes2ug20cs216@pop-os:~$
```

7. Section 7: Port Forwarding:-
    - Screenshot 7a -Kubectl port-forward command

```
pes2ug20cs216@pop-os:~$ kubectl port-forward service/nginx-service-pes2ug20cs216 8
080:8080
Forwarding from 127.0.0.1:8080 -> 80
Forwarding from [::1]:8080 -> 80
Handling connection for 8080
Handling connection for 8080
```

- Screenshot 7b- Display welcome to nginx on web page



8. Section 8: Deleting service/deployment and Cleanup

- Screenshot 8a - Delete nginx deployments

```
^Cpes2ug20cs216@pop-os:~$ kubectl delete deployment nginx-deployment-pes2ug20cs216
deployment.apps "nginx-deployment-pes2ug20cs216" deleted
pes2ug20cs216@pop-os:~$ kubectl delete service nginx-service-pes2ug20cs216
service "nginx-service-pes2ug20cs216" deleted
```

- Screenshot 8b - stop minikube

```
pes2ug20cs216@pop-os:~$ minikube stop
✋  Stopping node "minikube"  ...
🛑  Powering off "minikube" via SSH ...
🛑  1 node stopped.
```

9. Section 9: Expose an external IP address to access an Application in a cluster

- Screenshot 9a- the command which exposes specifies the type of service (NodePort)

```
pes2ug20cs216@pop-os:~$ kubectl create deployment nginx-pes2ug20cs216 --image=ngin
x
deployment.apps/nginx-pes2ug20cs216 created
pes2ug20cs216@pop-os:~$ kubectl expose deployment nginx-pes2ug20cs216 --type=NodeP
ort --port=80
service/nginx-pes2ug20cs216 exposed
```

- Screenshot 9b - kubectl get service command which displays the node port

- Screenshot 9c - minikube IP address

- Screenshot 9d - the webpage with the IP Address visible. (If the IP Address is not visible in the screenshot, you will lose significant portion of marks w.r.t. Section 9)