

SRN : PES1UG20CS825	NAME : PREM SAGAR J S	SEC : 'H'
---------------------	-----------------------	-----------

Lab Assignment - 2 b

Assignment 2b - KUBERNETES

1. Section 1: Installation

- Screenshot 1a – Minikube running successfully

```
PES1UG20CS825 (Cloud Computing) :#minikube start
* minikube v1.29.0 on Microsoft Windows 11 Home Single Language 10.0.22000.1574 Build 22000.1574
* Using the docker driver based on existing profile
* Starting control plane node minikube in cluster minikube
* Pulling base image ...
* Restarting existing docker container for "minikube" ...
! This container is having trouble accessing https://registry.k8s.io
* To pull new external images, you may need to configure a proxy: https://minikube.sigs.k8s.io/docs/reference/networking/proxy/
* Preparing Kubernetes v1.26.1 on Docker 20.10.23 ...
* Configuring bridge CNI (Container Networking Interface) ...
* Verifying Kubernetes components...
- Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Enabled addons: default-storageclass, storage-provisioner
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
```

2. Section 2: Creating pods and deployments, Editing them and observing Rollback:-

- Screenshot 2a – get nodes, pod and services command.

```
PES1UG20CS825 (Cloud Computing) :#kubectl get nodes
NAME        STATUS    ROLES    AGE   VERSION
minikube    Ready     control-plane  11h   v1.26.1

PES1UG20CS825 (Cloud Computing) :#kubectl get pod
No resources found in default namespace.

PES1UG20CS825 (Cloud Computing) :#kubectl get services
NAME         TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)    AGE
kubernetes   ClusterIP   10.96.0.1    <none>        443/TCP    11h
```

- Screenshot 2b– Deployment created.

```
PES1UG20CS825 (Cloud Computing) :#kubectl create deployment pes1ug20cs825 --image=nginx
deployment.apps/pes1ug20cs825 created
```

➤ Screenshot 2c- get deployment and pod command .

```
PES1UG20CS825 (Cloud Computing) :#kubectl get deployment
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
pes1ug20cs825       1/1     1             1           16s

PES1UG20CS825 (Cloud Computing) :# kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
pes1ug20cs825-67c9cc799f-lm5cn      1/1     Running   0           25s

PES1UG20CS825 (Cloud Computing) :#kubectl get replicaset
NAME                                DESIRED   CURRENT   READY   AGE
pes1ug20cs825-67c9cc799f           1         1         1       47s

PES1UG20CS825 (Cloud Computing) :#kubectl describe deployment pes1ug20cs825
Name:                             pes1ug20cs825
Namespace:                         default
CreationTimestamp:                 Fri, 24 Feb 2023 23:35:23 +0530
Labels:                            app=pes1ug20cs825
Annotations:                       deployment.kubernetes.io/revision: 1
Selector:                          app=pes1ug20cs825
Replicas:                          1 desired | 1 updated | 1 total | 1 available | 0 unavailable
StrategyType:                      RollingUpdate
MinReadySeconds:                   0
RollingUpdateStrategy:             25% max unavailable, 25% max surge
Pod Template:
  Labels:  app=pes1ug20cs825
  Containers:
    nginx:
      Image:          nginx
      Port:           <none>
      Host Port:      <none>
      Environment:    <none>
      Mounts:         <none>
  Volumes:           <none>
Conditions:
  Type           Status  Reason
  ----           -
  Available      True    MinimumReplicasAvailable
  Progressing    True    NewReplicaSetAvailable
OldReplicaSets:  <none>
```

➤ Screenshot 2d- editing ‘-image:nginx.’

```
metadata:
  creationTimestamp: null
  labels:
    app: pes1ug20cs825
spec:
  containers:
    - image: nginx:1.16
      imagePullPolicy: Always
      name: nginx
```

- Screenshot 2e- showing edited deployment.

```
PES1UG20CS825 (Cloud Computing) :#kubectl edit deployment pes1ug20cs825
deployment.apps/pes1ug20cs825 edited
```

- Screenshot 2f- deployment is rolled back.

```
PES1UG20CS825 (Cloud Computing) :#kubectl rollout undo deployment/pes1ug20cs825
deployment.apps/pes1ug20cs825 rolled back
```

- Screenshot 2g- showing original nginx image.

```
metadata:
  creationTimestamp: null
  labels:
    app: pes1ug20cs825
spec:
  containers:
    - image: nginx
      imagePullPolicy: Always
      name: nginx
      resources: {}
```

3. Section 3: Debugging Pods:-

- Screenshot 3a - Kubectl logs displayed.

```
PES1UG20CS825 (Cloud Computing) :#kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
pes1ug20cs825-67c9cc799f-nfj8x    1/1     Running   0           2m11s

PES1UG20CS825 (Cloud Computing) :#kubectl logs pes1ug20cs825-67c9cc799f-nfj8x
/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 18:12:42 [notice] 1#1: using the "epoll" event method
2023/02/24 18:12:42 [notice] 1#1: nginx/1.23.3
2023/02/24 18:12:42 [notice] 1#1: built by gcc 10.2.1 20210110 (Debian 10.2.1-6)
2023/02/24 18:12:42 [notice] 1#1: OS: Linux 5.10.16.3-microsoft-standard-WSL2
2023/02/24 18:12:42 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2023/02/24 18:12:42 [notice] 1#1: start worker processes
2023/02/24 18:12:42 [notice] 1#1: start worker process 29
2023/02/24 18:12:42 [notice] 1#1: start worker process 30
2023/02/24 18:12:42 [notice] 1#1: start worker process 31
2023/02/24 18:12:42 [notice] 1#1: start worker process 32
2023/02/24 18:12:42 [notice] 1#1: start worker process 33
2023/02/24 18:12:42 [notice] 1#1: start worker process 34
2023/02/24 18:12:42 [notice] 1#1: start worker process 35
2023/02/24 18:12:42 [notice] 1#1: start worker process 36
```


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

```
node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type     Reason            Age   From          Message
  ----     ------            -
  Normal   Scheduled         3m31s default-scheduler Successfully assigned default/pes1ug20cs825-67c9cc799f-nfj8x to minikube
  Normal   Pulling           3m31s kubelet        Pulling image "nginx"
  Normal   Pulled            3m27s kubelet        Successfully pulled image "nginx" in 4.121670379s (4.121724872s including waiting)
  Normal   Created           3m26s kubelet        Created container nginx
  Normal   Started           3m26s kubelet        Started container nginx
```

- Screenshot 3c - Create mongo deployment.

```
PES1UG20CS825 (Cloud Computing) :#kubectl create deployment pes1ug20cs825-mongo --image=mongo
deployment.apps/pes1ug20cs825-mongo created

PES1UG20CS825 (Cloud Computing) :#kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
pes1ug20cs825-67c9cc799f-nfj8x      1/1     Running   0           5m23s
pes1ug20cs825-mongo-759b8f4cf4-5f4jt 1/1     Running   0           33s

PES1UG20CS825 (Cloud Computing) :#kubectl exec -it pes1ug20cs825-mongo-759b8f4cf4-5f4jt -- bin/bash
root@pes1ug20cs825-mongo-759b8f4cf4-5f4jt:/# ls
bin boot data dev docker-entrypoint-initdb.d etc home js-yaml.js lib lib32 lib64 libx32 media mnt opt proc root run sbin srv sys tmp usr var
root@pes1ug20cs825-mongo-759b8f4cf4-5f4jt:/# exit
exit
```

- Screenshot 3d - Delete both requirements.

```
PES1UG20CS825 (Cloud Computing) :#kubectl get deployment
NAME                                READY   UP-TO-DATE   AVAILABLE   AGE
pes1ug20cs825                      1/1     1             1           14m
pes1ug20cs825-mongo                1/1     1             1           2m47s

PES1UG20CS825 (Cloud Computing) :#kubectl delete deployment pes1ug20cs825
deployment.apps "pes1ug20cs825" deleted

PES1UG20CS825 (Cloud Computing) :#kubectl delete deployment pes1ug20cs82-mongo
Error from server (NotFound): deployments.apps "pes1ug20cs82-mongo" not found

PES1UG20CS825 (Cloud Computing) :#kubectl delete deployment pes1ug20cs825-mongo
deployment.apps "pes1ug20cs825-mongo" deleted

PES1UG20CS825 (Cloud Computing) :#kubectl get deployment
No resources found in default namespace.
```

4. Section 4: Applying configuration files:-

- Screenshot 4a - Kubectl apply command on yaml file.

```
PES1UG20CS825 (Cloud Computing) :#kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment-pes1ug20cs825 created

PES1UG20CS825 (Cloud Computing) :#kubectl get deployment
NAME                                READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment-pes1ug20cs825      2/2     2             2           17s
```

```
PES1UG20CS825 (Cloud Computing) :#kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-pes1ug20cs825-8cf4bf97-4tvdx  1/1     Running   0           22s
nginx-deployment-pes1ug20cs825-8cf4bf97-qgnrn  1/1     Running   0           22s

PES1UG20CS825 (Cloud Computing) :#kubectl get replicaset
NAME                                DESIRED   CURRENT   READY   AGE
nginx-deployment-pes1ug20cs825-8cf4bf97  2         2         2       27s

PES1UG20CS825 (Cloud Computing) :#
```

➤ Screenshot 4b- Kubectl get on yaml file

```
PES1UG20CS825 (Cloud Computing) :#kubectl get deployment nginx-deployment-pes1ug20cs825 -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":"nginx"},"name":"nginx-deployment-pes1ug20cs825","namespace":"default"},"spec":{"replicas":2,"selector":{"matchLabels":{"app":"nginx"},"template":{"metadata":{"labels":{"app":"nginx"},"spec":{"containers":[{"image":"nginx:1.22","name":"nginx"},"ports":[{"containerPort":80}]]}}}}}
  creationTimestamp: "2023-02-24T18:22:44Z"
  generation: 1
  labels:
    app: nginx
    name: nginx-deployment-pes1ug20cs825
    namespace: default
    resourceVersion: "14974"
    uid: 1c74c042-e1b4-4965-81f5-9c4a3af2efbe
spec:
  progressDeadlineSeconds: 600
  replicas: 2
  revisionHistoryLimit: 10
  selector:
    matchLabels:
      app: nginx
  strategy:
    rollingUpdate:
      maxSurge: 25%
      maxUnavailable: 25%
    type: RollingUpdate
  template:
    metadata:
      creationTimestamp: null
    labels:
      app: nginx
    spec:
      containers:
      - image: nginx:1.22
        imagePullPolicy: IfNotPresent
        name: nginx
        ports:
        - containerPort: 80
status:
  availableReplicas: 2
  conditions:
  - lastTransitionTime: "2023-02-24T18:22:48Z"
    lastUpdateTime: "2023-02-24T18:22:48Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  - lastTransitionTime: "2023-02-24T18:22:44Z"
    lastUpdateTime: "2023-02-24T18:22:48Z"
    message: ReplicaSet "nginx-deployment-pes1ug20cs825-8cf4bf97" has successfully progressed.
    reason: NewReplicaSetAvailable
    status: "True"
    type: Progressing
  observedGeneration: 1
  readyReplicas: 2
  replicas: 2
  updatedReplicas: 2
```

After changing the replicaset to 3

```
PES1UG20CS825 (Cloud Computing) :#kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment-pes1ug20cs825 configured

PES1UG20CS825 (Cloud Computing) :#kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-pes1ug20cs825-8cf4bf97-4tvdx  1/1     Running   0          4m25s
nginx-deployment-pes1ug20cs825-8cf4bf97-qgnrn  1/1     Running   0          4m25s
nginx-deployment-pes1ug20cs825-8cf4bf97-vwphq  1/1     Running   0          14s
```



```
PES1UG20CS825 (Cloud Computing) :#kubectl get replicaset
NAME                                DESIRED    CURRENT    READY    AGE
nginx-deployment-pes1ug20cs825-8cf4bf97  3          3          3        4m50s

PES1UG20CS825 (Cloud Computing) :#
```

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

➤ Screenshot 5a – Deleted pod:-

```
PES1UG20CS825 (Cloud Computing) :#kubectl get pod
NAME                                READY    STATUS    RESTARTS    AGE
nginx-deployment-pes1ug20cs825-8cf4bf97-4tvdx  1/1      Running   0           5m44s
nginx-deployment-pes1ug20cs825-8cf4bf97-qgnrn  1/1      Running   0           5m44s
nginx-deployment-pes1ug20cs825-8cf4bf97-vwphq  1/1      Running   0           93s

PES1UG20CS825 (Cloud Computing) :#kubectl delete pod nginx-deployment-pes1ug20cs825-8cf4bf97-4tvdx
pod "nginx-deployment-pes1ug20cs825-8cf4bf97-4tvdx" deleted

PES1UG20CS825 (Cloud Computing) :#kubectl get pod
NAME                                READY    STATUS    RESTARTS    AGE
nginx-deployment-pes1ug20cs825-8cf4bf97-fjfs4  1/1      Running   0           4s
nginx-deployment-pes1ug20cs825-8cf4bf97-qgnrn  1/1      Running   0           6m7s
nginx-deployment-pes1ug20cs825-8cf4bf97-vwphq  1/1      Running   0           116s

PES1UG20CS825 (Cloud Computing) :#
```

6. Section 6 : Connecting Services to Deployments

➤ Screenshot 6a- Kubectl apply and get command.

```
PES1UG20CS825 (Cloud Computing) :#kubectl apply -f nginx-service.yaml
service/nginx-service-pes1ug20cs825 created

PES1UG20CS825 (Cloud Computing) :#kubectl get service
NAME                                TYPE        CLUSTER-IP    EXTERNAL-IP    PORT(S)    AGE
kubernetes                          ClusterIP    10.96.0.1     <none>         443/TCP    12h
nginx-service-pes1ug20cs825         ClusterIP    10.110.211.158 <none>         8080/TCP    17s
```

```
PES1UG20CS825 (Cloud Computing) :#kubectl describe service nginx-service
Name:                                nginx-service-pes1ug20cs825
Namespace:                            default
Labels:                                <none>
Annotations:                            <none>
Selector:                              app=nginx
Type:                                  ClusterIP
IP Family Policy:                      SingleStack
IP Families:                           IPv4
IP:                                    10.110.211.158
IPs:                                   10.110.211.158
```

```
Port: <unset> 8080/TCP
TargetPort: 80/TCP
Endpoints: 10.244.0.49:80,10.244.0.50:80,10.244.0.51:80
Session Affinity: None
Events: <none>
```

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

```
PES1UG20CS825 (Cloud Computing) :#kubectl get pod -o wide
NAME                                READY   STATUS    RESTARTS   AGE   IP            NODE       NOMINATED NODE   READINESS GATES
nginx-deployment-pes1ug20cs825-8cf4bf97-fjfs4  1/1     Running   0           3m7s  10.244.0.51   minikube   <none>           <none>
nginx-deployment-pes1ug20cs825-8cf4bf97-qgnrn  1/1     Running   0           9m10s  10.244.0.49   minikube   <none>           <none>
nginx-deployment-pes1ug20cs825-8cf4bf97-vwphq  1/1     Running   0           4m59s  10.244.0.50   minikube   <none>           <none>
PES1UG20CS825 (Cloud Computing) :#
```

7. Section 7: Port Forwarding:-

➤ Screenshot 7a -Kubectl port-forward command

```
PES1UG20CS825 (Cloud Computing) :#kubectl port-forward service/nginx-service-pes1ug20cs825 8080:8080
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

```
PES1UG20CS825 (Cloud Computing) :#kubectl delete deployment nginx-deployment-pes1ug20cs825
deployment.apps "nginx-deployment-pes1ug20cs825" deleted

PES1UG20CS825 (Cloud Computing) :#kubectl delete service nginx-service-pes1ug20cs825
service "nginx-service-pes1ug20cs825" deleted

PES1UG20CS825 (Cloud Computing) :#
```

```
PES1UG20CS825 (Cloud Computing) :#kubectl get pod
No resources found in default namespace.
```

➤ Screenshot 8b – stop minikube

```
PES1UG20CS825 (Cloud Computing) :#minikube stop
* Stopping node "minikube" ...
* Powering off "minikube" via SSH ...
* 1 node stopped.

PES1UG20CS825 (Cloud Computing) :#
```

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)

```
PES1UG20CS825 (Cloud Computing) :#kubectl create deployment nginx-pes1ug20cs825 --image=nginx
deployment.apps/nginx-pes1ug20cs825 created

PES1UG20CS825 (Cloud Computing) :#kubectl expose deployment nginx-pes1ug20cs825 --type=NodePort --port=80
service/nginx-pes1ug20cs825 exposed
```

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

```
PES1UG20CS825 (Cloud Computing) :#kubectl get service
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	12h
nginx-pes1ug20cs825	NodePort	10.96.139.39	<none>	80:30314/TCP	26s

➤ Screenshot 9c – minikube IP address

```
PES1UG20CS825 (Cloud Computing) :#minikube service nginx-pes1ug20cs825
```

NAMESPACE	NAME	TARGET PORT	URL
default	nginx-pes1ug20cs825	80	http://192.168.49.2:30314

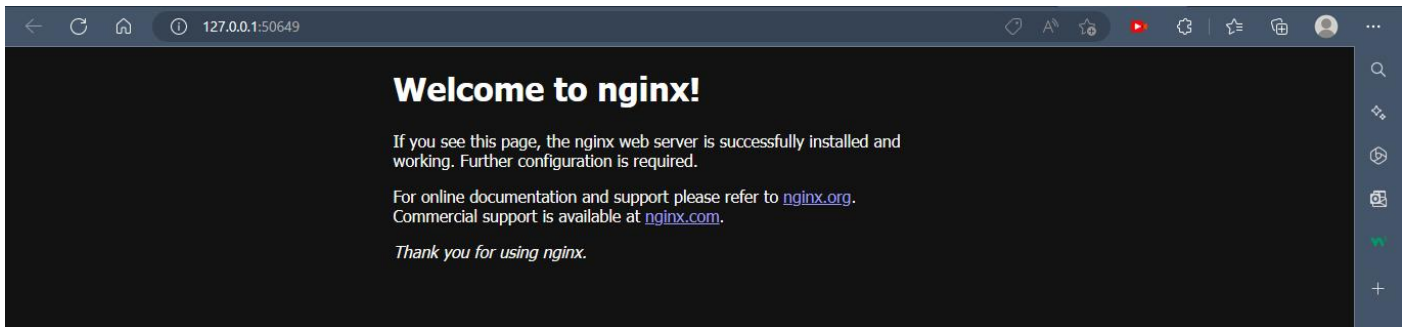
```
* Starting tunnel for service nginx-pes1ug20cs825.
```

NAMESPACE	NAME	TARGET PORT	URL
default	nginx-pes1ug20cs825		http://127.0.0.1:50649

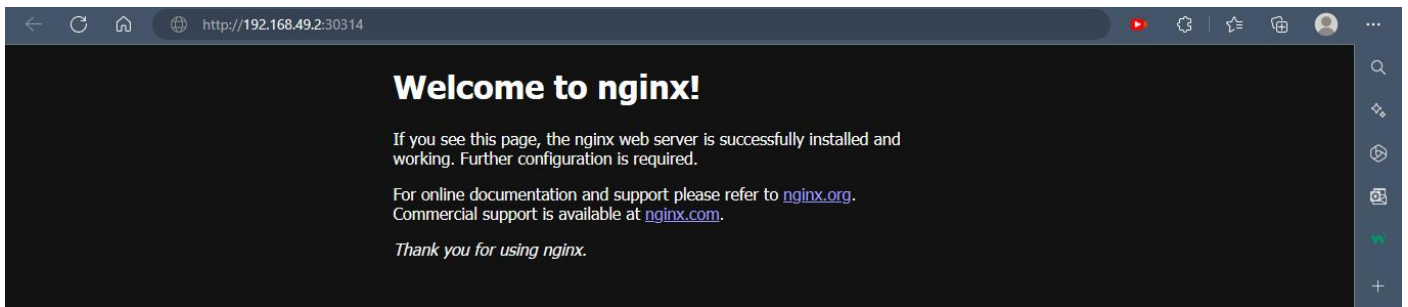
```
* Opening service default/nginx-pes1ug20cs825 in default browser...
! Because you are using a Docker driver on windows, the terminal needs to be open to run it.
```


➤ Screenshot 9d – the webpage with the IP Address visible.

■ Accessing via Internal IP



■ Accessing via External IP



=====*****=====