

CLOUD COMPUTING-UE20CS351

Assignment 2b – KUBERNETES

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Section 1: Installation

Screenshot 1a:

minikube start

```
C:\Windows\System32>minikube start
* minikube v1.29.0 on Microsoft Windows 11 Home Single Language 10.0.22621.1265 Build 22621.1265
* Automatically selected the docker driver. Other choices: hyperv, virtualbox, ssh
* Using Docker Desktop driver with root privileges
* Starting control plane node minikube in cluster minikube
* Pulling base image ...
* Downloading Kubernetes v1.26.1 preload ...
  > gcr.io/k8s-minikube/kicbase...: 407.19 MiB / 407.19 MiB 100.00% 1.69 Mi
  > preloaded-images-k8s-v18-v1...: 397.05 MiB / 397.05 MiB 100.00% 1.63 Mi
* 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) ...
  - Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Verifying Kubernetes components...
* Enabled addons: storage-provisioner, default-storageclass
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
```

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

Screenshot 2a:

```
C:\Windows\System32>kubectl get nodes
NAME          STATUS    ROLES          AGE    VERSION
minikube      Ready     control-plane   29m    v1.26.1

C:\Windows\System32>kubectl get pod
No resources found in default namespace.

C:\Windows\System32>kubectl get services
NAME          TYPE        CLUSTER-IP    EXTERNAL-IP    PORT(S)    AGE
kubernetes    ClusterIP   10.96.0.1     <none>         443/TCP    30m

C:\Windows\System32>
```

Screenshot 2b:

```
C:\Windows\System32>kubectl create deployment pes2ug20cs045 --image=nginx
deployment.apps/pes2ug20cs045 created
```

Screenshot 2c:

```
C:\Windows\System32>kubectl get deployment
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
pes1ug20cs045        1/1     1             1           14m
pes2ug20cs045        1/1     1             1           95s

C:\Windows\System32>kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
pes1ug20cs045-5d7794dc5c-f2gxc     1/1     Running   0           14m
pes2ug20cs045-b6f88d4cd-wnnvp      1/1     Running   0           98s

C:\Windows\System32>kubectl get replicaset
NAME                                DESIRED   CURRENT   READY   AGE
pes1ug20cs045-5d7794dc5c            1         1         1       14m
pes2ug20cs045-b6f88d4cd             1         1         1       112s
```

```
C:\Windows\System32>kubectl describe deployment pes2ug20cs045
Name:                pes2ug20cs045
Namespace:           default
CreationTimestamp:    Sun, 26 Feb 2023 14:48:24 +0530
Labels:               app=pes2ug20cs045
Annotations:          deployment.kubernetes.io/revision: 1
Selector:             app=pes2ug20cs045
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=pes2ug20cs045
  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>
NewReplicaSet:     pes2ug20cs045-b6f88d4cd (1/1 replicas created)
Events:
  Type           Reason             Age   From              Message
  ----           -
  Normal         ScalingReplicaSet  3m16s deployment-controller Scaled up replica set pes2ug20cs045-b6f88d4cd to 1
```

Screenshot 2d:

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

Screenshot 2e:

```
C:\Windows\System32>kubectl edit deployment pes2ug20cs045
deployment.apps/pes2ug20cs045 edited
```

Screenshot 2f:

```
C:\Windows\System32>kubectl rollout undo deployment/pes2ug20cs045
deployment.apps/pes2ug20cs045 rolled back
```

Screenshot 2g:

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

Screenshot 3a:

```
C:\Windows\System32>kubectl logs pes2ug20cs045-b6f88d4cd-k4xvz
/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
2023/02/26 09:24:59 [notice] 1#1: using the "epoll" event method
2023/02/26 09:24:59 [notice] 1#1: nginx/1.23.3
2023/02/26 09:24:59 [notice] 1#1: built by gcc 10.2.1 20210110 (Debian 10.2.1-6)
2023/02/26 09:24:59 [notice] 1#1: OS: Linux 5.10.16.3-microsoft-standard-WSL2
2023/02/26 09:24:59 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2023/02/26 09:24:59 [notice] 1#1: start worker processes
2023/02/26 09:24:59 [notice] 1#1: start worker process 29
2023/02/26 09:24:59 [notice] 1#1: start worker process 30
2023/02/26 09:24:59 [notice] 1#1: start worker process 31
2023/02/26 09:24:59 [notice] 1#1: start worker process 32
2023/02/26 09:24:59 [notice] 1#1: start worker process 33
2023/02/26 09:24:59 [notice] 1#1: start worker process 34
2023/02/26 09:24:59 [notice] 1#1: start worker process 35
2023/02/26 09:24:59 [notice] 1#1: start worker process 36
2023/02/26 09:24:59 [notice] 1#1: start worker process 37
2023/02/26 09:24:59 [notice] 1#1: start worker process 38
2023/02/26 09:24:59 [notice] 1#1: start worker process 39
2023/02/26 09:24:59 [notice] 1#1: start worker process 40
```

Screenshot 3b: (Screenshot of the “Events” section)

```
node.kubernetes.io/unreachable:NoExecute op=Exists for 500s
Events:
  Type     Reason      Age    From          Message
  ----     -
Normal    Scheduled   4m26s  default-scheduler  Successfully assigned default/pes2ug20cs045-b6f88d4cd-k4xvz to minikube
Normal    Pulling     4m25s  kubelet        Pulling image "nginx"
Normal    Pulled      4m22s  kubelet        Successfully pulled image "nginx" in 3.10783528s (3.107844598s including waiting)
Normal    Created     4m22s  kubelet        Created container nginx
Normal    Started     4m22s  kubelet        Started container nginx
```

```
C:\Windows\System32>kubectl create deployment pes2ug20cs045-mongo --image=mongo
deployment.apps/pes2ug20cs045-mongo created
```

Screenshot 3c:

```
C:\Windows\System32\kubect1 exec -it pes22cs045-mongo-5cdf7545bc-v9hrc -- bin/bash
root@pes2ug20cs045-mongo-5cdf7545bc-v9hrc:/# 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@pes2ug20cs045-mongo-5cdf7545bc-v9hrc:/# exit
exit
```

Screenshot 3d:

```
C:\Windows\System32>kubectl delete deployment pes2ug20cs045
deployment.apps "pes2ug20cs045" deleted
```

```
C:\Windows\System32>kubectl delete deployment pes2ug20cs045-mongo
deployment.apps "pes2ug20cs045-mongo" deleted
```

Screenshot 4a:

```
C:\Users\anany>kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment-pes2ug20cs045 created
```

```
C:\Users\anany>kubectl get deployment
NAME                                READY    UP-TO-DATE    AVAILABLE    AGE
nginx-deployment-pes2ug20cs045     2/2      2              2            59s
pes1ug20cs045                      1/1      1              1            48m

C:\Users\anany>kubectl get pod
NAME                                READY    STATUS    RESTARTS    AGE
nginx-deployment-pes2ug20cs045-8cf4bf97-5rxtf  1/1      Running   0           68s
nginx-deployment-pes2ug20cs045-8cf4bf97-rt9fs  1/1      Running   0           68s
pes1ug20cs045-5d7794dc5c-f2gxc                1/1      Running   0           49m

C:\Users\anany>kubectl get replicaset
NAME                                DESIRED    CURRENT    READY    AGE
nginx-deployment-pes2ug20cs045-8cf4bf97      2          2          2        95s
pes1ug20cs045-5d7794dc5c                     1          1          1        49m
```

```
C:\Users\anany>kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment-pes2ug20cs045 configured
```

```
C:\Users\anany>kubectl get pod
```

NAME	READY	STATUS	RESTARTS	AGE
nginx-deployment-pes2ug20cs045-8cf4bf97-5rxtf	1/1	Running	0	6m43s
nginx-deployment-pes2ug20cs045-8cf4bf97-7qw82	1/1	Running	0	70s
nginx-deployment-pes2ug20cs045-8cf4bf97-rt9fs	1/1	Running	0	6m43s
pes1ug20cs045-5d7794dc5c-f2gxc	1/1	Running	0	54m

```
C:\Users\anany>kubectl get replicaset
```

NAME	DESIRED	CURRENT	READY	AGE
nginx-deployment-pes2ug20cs045-8cf4bf97	3	3	3	6m57s
pes1ug20cs045-5d7794dc5c	1	1	1	54m

Screenshot 4b:

```
C:\Users\anany>kubectl get deployment nginx-deployment-pes2ug20cs045 -o yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  annotations:
    deployment.kubernetes.io/revision: "1"
  kubectrl.kubernetes.io/last-applied-configuration: |
    {"apiVersion":"apps/v1","kind":"Deployment","metadata":{"annotations":{},"labels":{"app":"nginx"},"name":"nginx-deployment-pes2ug20cs045","namespace":"default"},"spec":{"replicas":3,"
  selector":{"matchLabels":{"app":"nginx"},"template":{"metadata":{"labels":{"app":"nginx"},"spec":{"containers":[{"image":"nginx:1.22","name":"nginx","ports":[{"containerPort":80}]}}}}}
  creationTimestamp: "2023-02-26T09:53:20Z"
  generation: 2
  labels:
    app: nginx
  name: nginx-deployment-pes2ug20cs045
  namespace: default
  resourceVersion: "4221"
  uid: 6e6eb5c9-fe6d-4a7c-9176-d71357eb031a
spec:
  progressDeadlineSeconds: 600
  replicas: 3
  revisionHistoryLimit: 10
  selector:
    matchLabels:
      app: nginx
  strategy:
    rollingUpdate:
      maxSurge: 25%
      maxUnavailable: 25%
    type: RollingUpdate
  template:
    metadata:
      creationTimestamp: null
    spec:
      containers:
      - image: nginx:1.22
        imagePullPolicy: IfNotPresent
        name: nginx
        ports:
        - containerPort: 80
          protocol: TCP
        resources: {}
        terminationMessagePath: /dev/termination-log
        terminationMessagePolicy: File
      dnsPolicy: ClusterFirst
      restartPolicy: Always
      schedulerName: default-scheduler
      securityContext: {}
      terminationGracePeriodSeconds: 30
status:
  availableReplicas: 3
  conditions:
  - lastTransitionTime: "2023-02-26T09:53:20Z"
    lastUpdateTime: "2023-02-26T09:53:42Z"
    message: ReplicaSet "nginx-deployment-pes2ug20cs045-8cf4bf97" has successfully
      progressed.
    reason: NewReplicaSetAvailable
    status: "True"
    type: Progressing
  - lastTransitionTime: "2023-02-26T09:58:56Z"
    lastUpdateTime: "2023-02-26T09:58:56Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  observedGeneration: 2
  readyReplicas: 3
  replicas: 3
  updatedReplicas: 3
```

Screenshot 5a: (Should contain the list of pods before deleting, deletion command and list of pods after deletion)

```
C:\Users\anany>kubectl delete pod nginx-deployment-pes2ug20cs045-8cf4bf97-rt9fs
pod "nginx-deployment-pes2ug20cs045-8cf4bf97-rt9fs" deleted

C:\Users\anany>kubectl get pod
```

NAME	READY	STATUS	RESTARTS	AGE
nginx-deployment-pes2ug20cs045-8cf4bf97-5rxtf	1/1	Running	0	12m
nginx-deployment-pes2ug20cs045-8cf4bf97-7qw82	1/1	Running	0	7m5s
nginx-deployment-pes2ug20cs045-8cf4bf97-8f6kj	1/1	Running	0	19s
pes1ug20cs045-5d7794dc5c-f2gxc	1/1	Running	0	60m

Screenshot 6a:

```
C:\Users\anany>kubectl apply -f nginx-service.yaml
service/nginx-service-pes2ug20cs045 created

C:\Users\anany>kubectl get service
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	102m
nginx-service-pes2ug20cs045	ClusterIP	10.106.180.248	<none>	8080/TCP	13s

```
C:\Users\anany>kubectl describe service nginx-service
Name: nginx-service-pes2ug20cs045
Namespace: default
Labels: <none>
Annotations: <none>
Selector: app=nginx
Type: ClusterIP
IP Family Policy: SingleStack
IP Families: IPv4
IP: 10.106.180.248
IPs: 10.106.180.248
Port: <unset> 8080/TCP
TargetPort: 80/TCP
Endpoints: 10.244.0.10:80,10.244.0.11:80,10.244.0.8:80
Session Affinity: None
Events: <none>
```

Screenshot 6b:

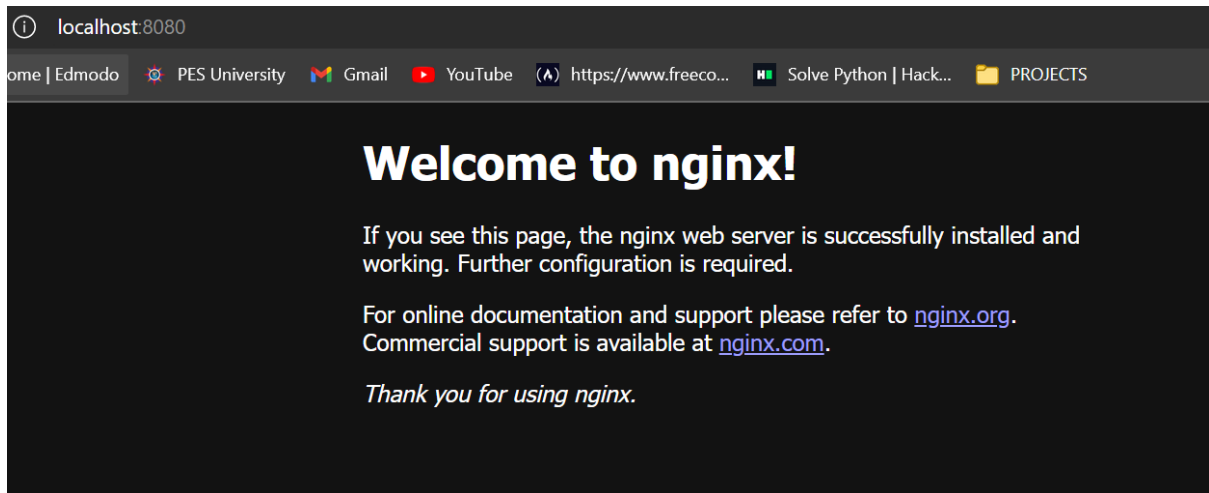
```
C:\Users\anany>kubectl get pod -o wide
```

NAME	NODE	NOMINATED NODE	READINESS GATES	READY	STATUS	RESTARTS	AGE	IP
nginx-deployment-pes2ug20cs045-8cf4bf97-5rxtf	8 minikube	<none>	<none>	1/1	Running	0	19m	10.244.0.10
nginx-deployment-pes2ug20cs045-8cf4bf97-7qw82	10 minikube	<none>	<none>	1/1	Running	0	13m	10.244.0.11
nginx-deployment-pes2ug20cs045-8cf4bf97-8f6kj	11 minikube	<none>	<none>	1/1	Running	0	7m3s	10.244.0.13
pes1ug20cs045-5d7794dc5c-f2gxc	3 minikube	<none>	<none>	1/1	Running	0	67m	10.244.0.3

Screenshot 7a:

```
C:\Users\anany>kubectl port-forward service/nginx-service-pes2ug20cs045 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:



Screenshot 8a:

```
C:\Users\anany>kubectl delete deployment nginx-deployment-pes2ug20cs045
deployment.apps "nginx-deployment-pes2ug20cs045" deleted

C:\Users\anany>kubectl delete service nginx-service-pes2ug20cs045
service "nginx-service-pes2ug20cs045" deleted
```

Screenshot 8b:

```
C:\Users\anany>minikube stop
* Stopping node "minikube" ...
* Powering off "minikube" via SSH ...
* 1 node stopped.
```

Screenshot 9a:

```
C:\Users\anany>kubectl create deployment nginx-pes2ug20cs045 --image=nginx --port=8080
deployment.apps/nginx-pes2ug20cs045 created

C:\Users\anany>kubectl expose deployment nginx-pes2ug20cs045 --type=NodePort
service/nginx-pes2ug20cs045 exposed
```

Screenshot 9b:

```
C:\Users\anany>minikube service nginx-pes2ug20cs045 --url
```

Screenshot 9c:

```
C:\Users\anany>minikube service nginx-pes2ug20cs045 --url  
http://127.0.0.1:51758  
! Because you are using a Docker driver on windows, the terminal needs to be open to run it.
```

Screenshot 9d:

