

Cloud Computing: UE20CS352

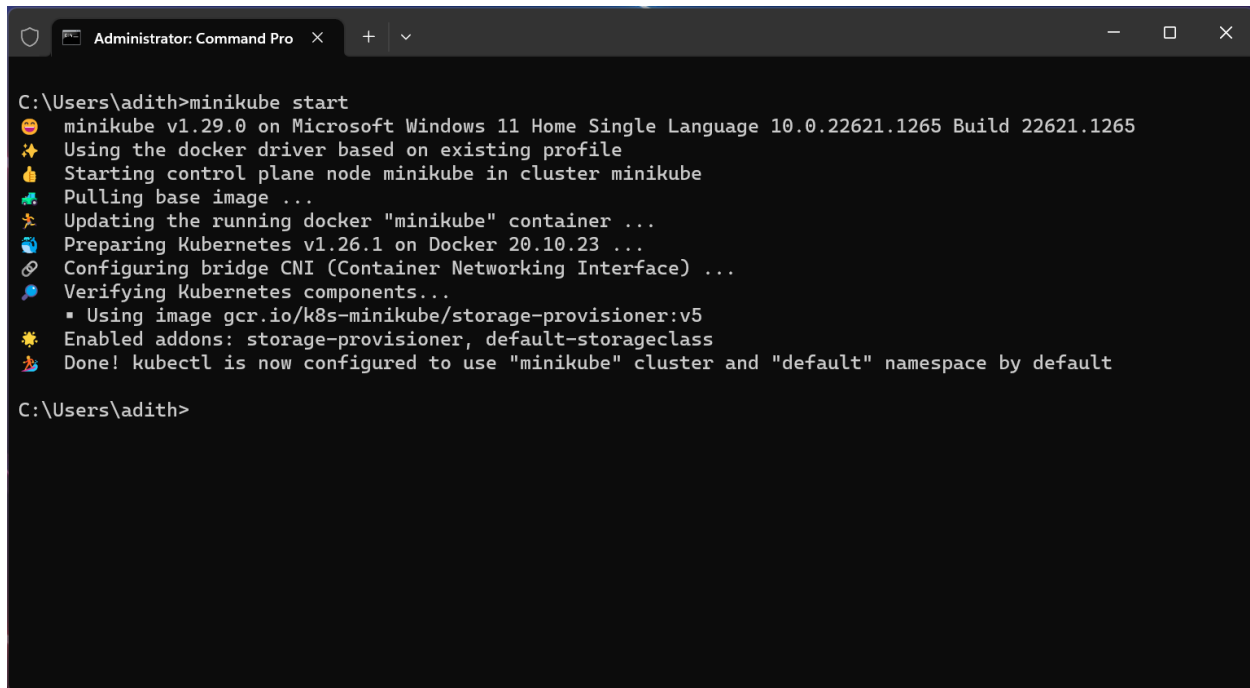
Assignment 2b KUBERNETES

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-PES1UG20CS621

1. Section 1: Installation

Screenshot 1a - Minikube running successfully



```
C:\Users\adith>minikube start
🐳 minikube v1.29.0 on Microsoft Windows 11 Home Single Language 10.0.22621.1265 Build 22621.1265
🌟 Using the docker driver based on existing profile
👉 Starting control plane node minikube in cluster minikube
🔄 Pulling base image ...
🔧 Updating the running docker "minikube" container ...
🌐 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: storage-provisioner, default-storageclass
🎉 Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default

C:\Users\adith>
```

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

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

```
Administrator: Command Pro x + v - □ ×
C:\Users\adith>minikube start
🌟 minikube v1.29.0 on Microsoft Windows 11 Home Single Language 10.0.22621.1265 Build 22621.1265
🌟 Using the docker driver based on existing profile
👉 Starting control plane node minikube in cluster minikube
🔄 Pulling base image ...
🌟 Updating the running docker "minikube" container ...
🌐 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: storage-provisioner, default-storageclass
👉 Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default

C:\Users\adith>kubectl get nodes
NAME        STATUS    ROLES    AGE   VERSION
minikube    Ready     control-plane 6m19s v1.26.1

C:\Users\adith>kubectl get pod
No resources found in default namespace.

C:\Users\adith>kubectl get services
NAME         TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)    AGE
kubernetes   ClusterIP   10.96.0.1    <none>        443/TCP    6m38s

C:\Users\adith>
```

● Screenshot 2b- Deployment created.

```
Administrator: Command Pro x + v - □
The template format is golang templates
[http://golang.org/pkg/text/template/#pkg-overview].

--validate='strict':
  Must be one of: strict (or true), warn, ignore (or false).           "true" or "strict" will
se a
  schema to validate the input and fail the request if invalid. It will perform server side
  validation if ServerSideFieldValidation is enabled on the api-server, but will fall back
  to less reliable client-side validation if not.                       "warn" will warn about unknown
  duplicate fields without blocking the request if server-side field validation is enabled
  on the API server, and behave as "ignore" otherwise.                 "false" or "ignore" will not
  perform any schema validation, silently dropping any unknown or duplicate fields.

--windows-line-endings=true:
  Only relevant if --edit=true. Defaults to the line ending native to your platform.

Usage:
  kubectl create -f FILENAME [options]

Use "kubectl <command> --help" for more information about a given command.
Use "kubectl options" for a list of global command-line options (applies to all commands).

C:\Users\adith>kubectl create deployment peslug20cs621 --image=nginx
deployment.apps/peslug20cs621 created

C:\Users\adith>
```

● Screenshot 2c- get deployment and pod command .

```
Administrator: Command Pro
C:\Users\adith>kubectl get deployment
NAME          READY    UP-TO-DATE    AVAILABLE    AGE
peslug20cs621 0/1      1             0            41s

C:\Users\adith>kubectl get pod
NAME          READY    STATUS             RESTARTS    AGE
peslug20cs621-6c66bb7bfc-v6nhp 0/1      ContainerCreating  0           47s

C:\Users\adith>
```

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

```
kubectrl-edit-3182046310 - Notepad
File Edit View
matchLabels:
  app: peslug20cs621
strategy:
  rollingUpdate:
    maxSurge: 25%
    maxUnavailable: 25%
    type: RollingUpdate
template:
  metadata:
    creationTimestamp: null
    labels:
      app: peslug20cs621
  spec:
    containers:
    - image: nginx:1.16
      imagePullPolicy: Always
      name: nginx
      resources: {}
      terminationMessagePath: /dev/termination-log
      terminationMessagePolicy: File
    dnsPolicy: ClusterFirst
    restartPolicy: Always
    schedulerName: default-scheduler
    securityContext: {}
    terminationGracePeriodSeconds: 30
status:
  availableReplicas: 1
  conditions:
  - lastTransitionTime: "2023-02-24T06:05:24Z"
    lastUpdateTime: "2023-02-24T06:05:24Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  - lastTransitionTime: "2023-02-24T06:04:08Z"
    lastUpdateTime: "2023-02-24T06:05:24Z"
    message: ReplicaSet "peslug20cs621-6c66bb7bfc" has successfully progressed.
    reason: NewReplicaSetAvailable
    status: "True"
    type: Progressing
Ln 37, Col 26 | 100% | Windows (CRLF) | UTF-8
```

- Screenshot 2e- showing edited deployment.

```
C:\Users\adith>kubectrl edit deployment peslug20cs621
deployment.apps/peslug20cs621 edited

C:\Users\adith>
```

- Screenshot 2f- deployment is rolled back.

```
C:\Users\adith>kubectrl rollout undo deployment/peslug20cs621
deployment.apps/peslug20cs621 rolled back

C:\Users\adith>
```

- Screenshot 2g- showing original nginx image.

```

labels:
  app: peslug20cs621
spec:
  containers:
  - image: nginx
    imagePullPolicy: Always
    name: nginx
    resources: {}
    terminationMessagePath: /dev/termination-log
    terminationMessagePolicy: File
  dnsPolicy: ClusterFirst
  restartPolicy: Always
  schedulerName: default-scheduler
  securityContext: {}
  terminationGracePeriodSeconds: 30
status:

```

3. Section 3: Debugging Pods:-

- Screenshot 3a - Kubectl logs displayed.

```

Administrator: Command Prompt
C:\Users\adith>kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
peslug20cs621-6c66bb7bfc-v6nhp     1/1     Running   0           4m57s

C:\Users\adith>kubectl logs peslug20cs621-6c66bb7bfc-v6nhp
/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 06:05:23 [notice] 1#1: using the "epoll" event method
2023/02/24 06:05:23 [notice] 1#1: nginx/1.23.3
2023/02/24 06:05:23 [notice] 1#1: built by gcc 10.2.1 20210110 (Debian 10.2.1-6)
2023/02/24 06:05:23 [notice] 1#1: OS: Linux 5.10.16.3-microsoft-standard-WSL2
2023/02/24 06:05:23 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2023/02/24 06:05:23 [notice] 1#1: start worker processes
2023/02/24 06:05:23 [notice] 1#1: start worker process 29
2023/02/24 06:05:23 [notice] 1#1: start worker process 30
2023/02/24 06:05:23 [notice] 1#1: start worker process 31
2023/02/24 06:05:23 [notice] 1#1: start worker process 32
2023/02/24 06:05:23 [notice] 1#1: start worker process 33
2023/02/24 06:05:23 [notice] 1#1: start worker process 34
2023/02/24 06:05:23 [notice] 1#1: start worker process 35

```

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

Events:				
Type	Reason	Age	From	Message
Normal	Scheduled	8m2s	default-scheduler	Successfully assigned default/peslug20cs621-6c66bb7bfc-v6nhp to minikube
Normal	Pulling	8m2s	kubelet	Pulling image "nginx"
Normal	Pulled	6m48s	kubelet	Successfully pulled image "nginx" in 1m14.376831258s (1m14.376848942s including waiting)
Normal	Created	6m48s	kubelet	Created container nginx
Normal	Started	6m48s	kubelet	Started container nginx

- Screenshot 3c - Create mongo deployment.

```
C:\Users\adith>kubectl exec -it peslug20cs621-mongo-57c5495884-x494n -- bin/bash
root@peslug20cs621-mongo-57c5495884-x494n:/# ls
bin  data  docker-entrypoint-initdb.d  home      lib      lib64    media  opt    root  sbin  sys  usr
boot  dev  etc                js-yaml.js  lib32    libx32  mnt    proc   run   srv   tmp  var
root@peslug20cs621-mongo-57c5495884-x494n:/# exit
exit
C:\Users\adith>
```

- Screenshot 3d - Delete both requirements.

```
C:\Users\adith>kubectl delete deployment peslug20cs621
deployment.apps "peslug20cs621" deleted

C:\Users\adith>kubectl delete deployment peslug20cs621-mongo
deployment.apps "peslug20cs621-mongo" deleted

C:\Users\adith>kubectl get pod
No resources found in default namespace.

C:\Users\adith>
```

4. Section 4: Applying configuration files:-

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

```
C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectl apply -f "nginx-deployment.yaml"
deployment.apps/nginx-deployment-peslug20cs621 created

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>
```

- Screenshot 4b- Kubectl get on yaml file

```
C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectl get deployment nginx-deployment-peslug20cs621 -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":{"app":"nginx"},"labels":{"app":"nginx"},"name":"nginx-deployment-peslug20cs621","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: "2023-02-24T06:21:24Z"
  generation: 1
  labels:
    app: nginx
  name: nginx-deployment-peslug20cs621
  namespace: default
  resourceVersion: "1818"
  uid: d7b65fae-a2c0-4520-b672-bdc137168196
spec:
```

```

status:
  availableReplicas: 2
  conditions:
  - lastTransitionTime: "2023-02-24T06:22:06Z"
    lastUpdateTime: "2023-02-24T06:22:06Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  - lastTransitionTime: "2023-02-24T06:21:24Z"
    lastUpdateTime: "2023-02-24T06:22:06Z"
    message: ReplicaSet "nginx-deployment-peslug20cs621-8cf4bf97" has successfully
      progressed.
    reason: NewReplicaSetAvailable
    status: "True"
    type: Progressing
  observedGeneration: 1
  readyReplicas: 2
  replicas: 2
  updatedReplicas: 2

```

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

- Screenshot 5a - Deleted pod:-

```

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectrl get pod
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-peslug20cs621-8cf4bf97-rvgxv   1/1     Running   0           3m5s
nginx-deployment-peslug20cs621-8cf4bf97-tkxst   1/1     Running   0           3m5s

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectrl delete pod nginx-dep
loyment-peslug20cs621-8cf4bf97-rvgxv
pod "nginx-deployment-peslug20cs621-8cf4bf97-rvgxv" deleted

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectrl get pod
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-peslug20cs621-8cf4bf97-ss7hf   1/1     Running   0           7s
nginx-deployment-peslug20cs621-8cf4bf97-tkxst   1/1     Running   0          3m42s

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>|

```

6. Section 6 : Connecting Services to Deployments

- Screenshot 6a- Kubectrl apply and get command.

```

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectrl apply -f "nginx-serv
ice.yaml"
service/nginx-service-peslug20cs621 created

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectrl get service
NAME                                TYPE           CLUSTER-IP   EXTERNAL-IP   PORT(S)    AGE
kubernetes                          ClusterIP      10.96.0.1    <none>         443/TCP    30m
nginx-service-peslug20cs621         ClusterIP      10.96.170.56 <none>         8080/TCP    8s

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>|

```

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

```

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectrl get pod -o wide
NAME                                READY   STATUS    RESTARTS   AGE   IP              NODE       NOMINATED NODE   READINESS G
ATES
nginx-deployment-peslug20cs621-8cf4bf97-ss7hf   1/1     Running   0           2m56s   10.244.0.11    minikube   <none>           <none>
nginx-deployment-peslug20cs621-8cf4bf97-tkxst   1/1     Running   0           6m31s   10.244.0.9     minikube   <none>           <none>

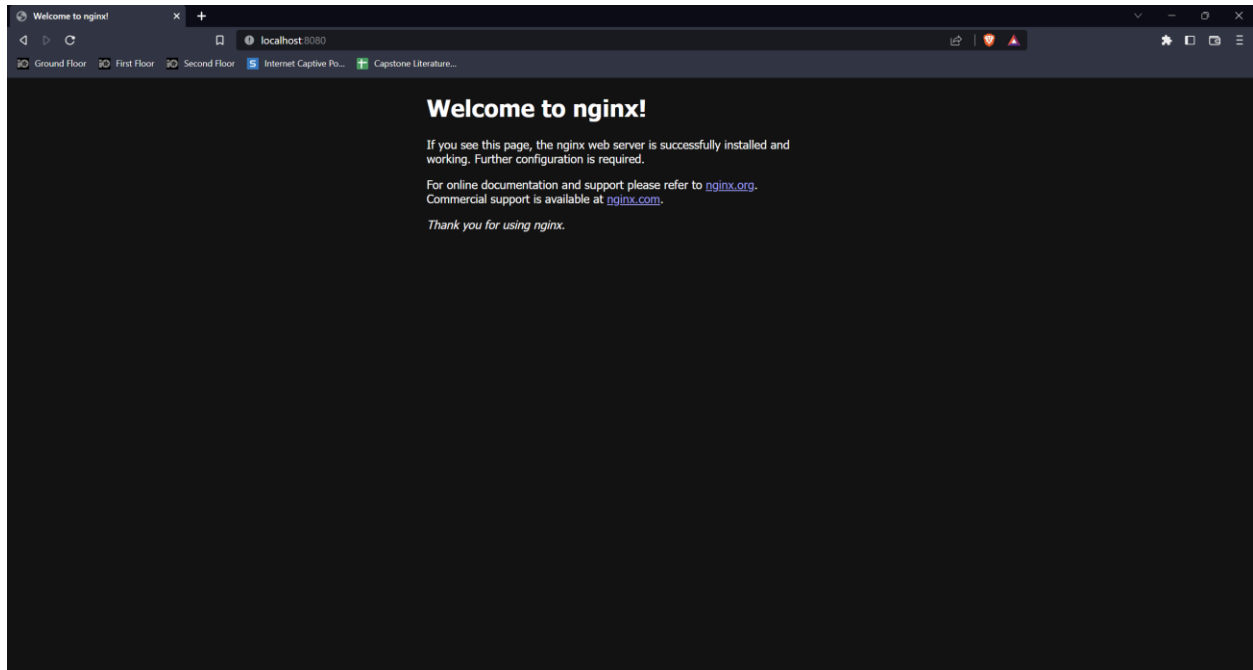
```

7. Section 7: Port Forwarding:-

- Screenshot 7a -Kubectl port-forward command

```
C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectl port-forward service/nginx-service-peslug20cs621 8080:8080
Forwarding from 127.0.0.1:8080 -> 80
Forwarding from [::1]:8080 -> 80
```

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



8. Section 8: Deleting service/deployment and Cleanup

- Screenshot 8a - Delete nginx deployments

```
C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectl delete deployment nginx-deployment-peslug20cs621
deployment.apps "nginx-deployment-peslug20cs621" deleted

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectl delete service nginx-service-peslug20cs621
service "nginx-service-peslug20cs621" deleted
```

- Screenshot 8b - stop minikube

```
C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>minikube stop
👉 Stopping node "minikube" ...
🔴 Powering off "minikube" via SSH ...
🔴 1 node stopped.

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>|
```


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)

```
C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectl create deployment nginx-peslug20cs621 --image=nginx
deployment.apps/nginx-peslug20cs621 created
```

```
C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectl expose deployment nginx-peslug20cs621 --port=80 --type=LoadBalancer
service/nginx-peslug20cs621 exposed
```

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

```
C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>kubectl get service
NAME                TYPE          CLUSTER-IP    EXTERNAL-IP    PORT(S)          AGE
kubernetes           ClusterIP     10.96.0.1     <none>         443/TCP          107m
nginx-peslug20cs621  LoadBalancer 10.106.188.11 <pending>      80:30391/TCP     42m
```

- Screenshot 9c - minikube IP address

```
Command Prompt - minikube x + v
nginx-peslug20cs621 LoadBalancer 10.106.188.11 <pending> 80:30391/TCP 42m

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>minikube ip
192.168.49.2

C:\Users\adith\Documents\PES-Assignments\6th Sem\CC\Assignment 2\2b>minikube service nginx-peslug20cs621
|-----|-----|-----|
| NAMESPACE | NAME | TARGET PORT | URL |
|-----|-----|-----|
| default | nginx-peslug20cs621 | 80 | http://192.168.49.2:30391 |
|-----|-----|-----|
🚀 Starting tunnel for service nginx-peslug20cs621.
|-----|-----|-----|
| NAMESPACE | NAME | TARGET PORT | URL |
|-----|-----|-----|
| default | nginx-peslug20cs621 | | http://127.0.0.1:57283 |
|-----|-----|-----|
🌐 Opening service default/nginx-peslug20cs621 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. (If the IP Address is not visible in the screenshot, you will lose significant portion of marks w.r.t. Section 9)

