

# Assignment 2b - KUBERNETES

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Section:	K

## Deliverables:

### Section 1: Installation

#### o Screenshot 1a - Minikube running successfully.

```
Command Prompt
To generate this message, Docker took the following steps:
1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
   (amd64)
3. The Docker daemon created a new container from that image which runs the
   executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it
   to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/

C:\Users\chait\Desktop>kubect version
'kubect' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\chait\Desktop>winget install minikube
The 'msstore' source requires that you view the following agreements before using.
Terms of Transaction: https://aka.ms/microsoft-store-terms-of-transaction
The source requires the current machine's 2-letter geographic region to be sent to the backend service to function properly (ex. "US").

Do you agree to all the source agreements terms?
[Y] Yes [N] No: Y
Found Kubernetes - Minikube - A Local Kubernetes Development Environment [Kubernetes.minikube] Version 1.29.0
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://github.com/kubernetes/minikube/releases/download/v1.29.0/minikube-installer.exe
33.6 MB / 33.6 MB
Successfully verified installer hash
Starting package install...
Successfully installed

C:\Users\chait\Desktop>
```

```

Microsoft Windows [Version 10.0.19045.2486]
(c) Microsoft Corporation. All rights reserved.

C:\Users\chait>cd Desktop

C:\Users\chait\Desktop>minikube start
* minikube v1.29.0 on Microsoft Windows 10 Home Single Language 10.0.19045.2486 Build 19045.2486
* Automatically selected the docker driver
* Using Docker Desktop 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% 2.09 Mi
  > gcr.io/k8s-minikube/kicbase...: 407.19 MiB / 407.19 MiB 100.00% 2.09 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) ...
* Verifying Kubernetes components...
  - Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Enabled addons: storage-provisioner
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default

C:\Users\chait\Desktop>

```

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

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

```

- Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Enabled addons: storage-provisioner
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default

C:\Users\chait\Desktop>kubectl get nodes
'kubectl' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\chait\Desktop>kubectl get nodes
NAME          STATUS    ROLES          AGE      VERSION
minikube      Ready     control-plane   3m31s    v1.26.1

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

C:\Users\chait\Desktop>kubectl get services
NAME          TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)    AGE
kubernetes    ClusterIP   10.96.0.1    <none>        443/TCP    3m52s

C:\Users\chait\Desktop>

```

- Screenshot 2b- Deployment created.

```

C:\Users\chait\Desktop>kubectl create deployment peslug20cs634 --image=nginx
deployment.apps/peslug20cs634 created

C:\Users\chait\Desktop>

```

- Screenshot 2c- get deployment and pod command.

```
C:\Users\chait\Desktop>kubectl get deployment
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
pes1ug20cs634       1/1     1             1           76s

C:\Users\chait\Desktop>kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
pes1ug20cs634-76d88956f9-m9g4s     1/1     Running   0          83s

C:\Users\chait\Desktop>
```

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

```
spec:
  containers:
  - image: nginx:1.16
    imagePullPolicy: Always
    name: nginx
    resources: {}
    terminationMessagePath: /dev/termination-log
    terminationMessagePolicy: File
```

- Screenshot 2e- showing edited deployment.

```
C:\Users\chait\Desktop>kubectl edit deployment pes1ug20cs634
deployment.apps/pes1ug20cs634 edited

C:\Users\chait\Desktop>
```

- Screenshot 2f- deployment is rolled back.

```
C:\Users\chait\Desktop>kubectl rollout undo deployment/pes1ug20cs634
deployment.apps/pes1ug20cs634 rolled back

C:\Users\chait\Desktop>■
```

- Screenshot 2g- showing original nginx image.

```
spec:
  containers:
  - image: nginx
    imagePullPolicy: Always
    name: nginx
    resources: {}
    terminationMessagePath: /dev/termination-log
    terminationMessagePolicy: File
  dnsPolicy: ClusterFirst
  restartPolicy: Always
  schedulerName: default-scheduler
  securityContext: {}
```

## Section 3: Debugging Pods

- Screenshot 3a - Kubectl logs displayed.

```
C:\Users\chait\Desktop>kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
pes1ug20cs634-76d88956f9-k6d6w    1/1     Running   0           110s

C:\Users\chait\Desktop>kubectl logs pes1ug20cs634-76d88956f9-k6d6w
/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
2023/02/23 16:41:56 [notice] 1#1: using the "epoll" event method
2023/02/23 16:41:56 [notice] 1#1: nginx/1.23.3
2023/02/23 16:41:56 [notice] 1#1: built by gcc 10.2.1 202110110 (Debian 10.2.1-6)
2023/02/23 16:41:56 [notice] 1#1: OS: Linux 5.10.16.3-microsoft-standard-WSL2
2023/02/23 16:41:56 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2023/02/23 16:41:56 [notice] 1#1: start worker processes
2023/02/23 16:41:56 [notice] 1#1: start worker process 29
2023/02/23 16:41:56 [notice] 1#1: start worker process 30
2023/02/23 16:41:56 [notice] 1#1: start worker process 31
2023/02/23 16:41:56 [notice] 1#1: start worker process 32
2023/02/23 16:41:56 [notice] 1#1: start worker process 33
2023/02/23 16:41:56 [notice] 1#1: start worker process 34
2023/02/23 16:41:56 [notice] 1#1: start worker process 35
2023/02/23 16:41:56 [notice] 1#1: start worker process 36

C:\Users\chait\Desktop>
```

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

```
node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type       Reason      Age   From          Message
  ----       -
Normal      Scheduled   3m30s default-scheduler Successfully assigned default/pes1ug20cs634-76d88956f9-k6d6w to minikube
Normal      Pulling     3m29s kubelet        Pulling image "nginx"
Normal      Pulled      3m26s kubelet        Successfully pulled image "nginx" in 2.335115424s (2.335128196s including waiting)
Normal      Created     3m26s kubelet        Created container nginx
Normal      Started     3m26s kubelet        Started container nginx

C:\Users\chait\Desktop>
```

- Screenshot 3c - Create mongo deployment.

```
C:\Users\chait\Desktop>kubectl get pod
NAME                                READY   STATUS             RESTARTS   AGE
pes1ug20cs634-76d88956f9-k6d6w     1/1     Running            0           5m52s
pes1ug20cs634-mongo-759b9c786-plp7c 0/1     ContainerCreating  0           27s

C:\Users\chait\Desktop>kubectl exec -it pes1ug20cs634-76d88956f9-k6d6w -- bin/bash
root@pes1ug20cs634-76d88956f9-k6d6w:/# ls
bin boot dev docker-entrypoint.d docker-entrypoint.sh etc home lib lib64 media mnt opt proc root run sbin srv sys tmp usr var
root@pes1ug20cs634-76d88956f9-k6d6w:/# exit
exit

C:\Users\chait\Desktop>
```

## Screenshot 3d - Delete both requirements.

```
C:\Users\chait\Desktop>kubectl delete deployment pes1ug20cs634
deployment.apps "pes1ug20cs634" deleted

C:\Users\chait\Desktop>kubectl delete deployment pes1ug20cs634-mongo
deployment.apps "pes1ug20cs634-mongo" deleted

C:\Users\chait\Desktop>
```

## Section 4: Applying configuration files

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

```
C:\Users\chait\Desktop>kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment-peslug20cs634 created

C:\Users\chait\Desktop>kubectl get deployment
NAME                                READY    UP-TO-DATE    AVAILABLE    AGE
nginx-deployment-peslug20cs634      2/2      2              2             2m26s

C:\Users\chait\Desktop>kubectl get pod
NAME                                READY    STATUS    RESTARTS    AGE
nginx-deployment-peslug20cs634-8cf4bf97-nwldf  1/1      Running   0            2m36s
nginx-deployment-peslug20cs634-8cf4bf97-trx7d  1/1      Running   0            2m36s

C:\Users\chait\Desktop>kubectl get replicaset
NAME                                DESIRED    CURRENT    READY    AGE
nginx-deployment-peslug20cs634-8cf4bf97      2           2           2         2m50s

C:\Users\chait\Desktop>kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment-peslug20cs634 unchanged

C:\Users\chait\Desktop>kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment-peslug20cs634 configured

C:\Users\chait\Desktop>kubectl get pod
NAME                                READY    STATUS    RESTARTS    AGE
nginx-deployment-peslug20cs634-8cf4bf97-2cpbp  1/1      Running   0            11s
nginx-deployment-peslug20cs634-8cf4bf97-nwldf  1/1      Running   0           4m21s
nginx-deployment-peslug20cs634-8cf4bf97-trx7d  1/1      Running   0           4m21s

C:\Users\chait\Desktop>kubectl get replicaset
NAME                                DESIRED    CURRENT    READY    AGE
nginx-deployment-peslug20cs634-8cf4bf97      3           3           3         4m27s

C:\Users\chait\Desktop>
```

- Screenshot 4b- Kubectl get on yaml file

```
C:\Users\chait\Desktop>kubectl get deployment nginx-deployment-peslug20cs634 -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-peslug20cs634","namespace":"default"},"spec":{"replicas":3,"selector":{"matchLabels":{"app":"nginx"},"template":{"metadata":{"labels":{"app":"nginx"},"spec":{"containers":[{"containerPort":80}]}}}}}
  creationTimestamp: "2023-02-23T16:53:40Z"
  generation: 2
  labels:
    app: nginx
  name: nginx-deployment-peslug20cs634
  namespace: default
  resourceVersion: "2625"
  uid: 39193735-2b4f-48fb-9431-40ec87884a10
spec:
  progressDeadlineSeconds: 600
  replicas: 3
  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
```

```

metadata:
  creationTimestamp: null
  labels:
    app: nginx
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: "2023-02-23T16:53:40Z"
    lastUpdateTime: "2023-02-23T16:53:59Z"
    message: ReplicaSet "nginx-deployment-peslug20cs634-8cf4bf97" has successfully
      progressed.
    reason: NewReplicaSetAvailable
    status: "True"
    type: Progressing
  - lastTransitionTime: "2023-02-23T16:57:52Z"
    lastUpdateTime: "2023-02-23T16:57:52Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  observedGeneration: 2
  readyReplicas: 3
  replicas: 3
  updatedReplicas: 3
C:\Users\chait\Desktop>

```

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

### ● Screenshot 5a - Deleted pod

```

C:\Users\chait\Desktop>kubect1 get pod
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-peslug20cs634-8cf4bf97-2cpbp  1/1     Running   0           4m50s
nginx-deployment-peslug20cs634-8cf4bf97-nwldf  1/1     Running   0           9m
nginx-deployment-peslug20cs634-8cf4bf97-trx7d  1/1     Running   0           9m

C:\Users\chait\Desktop>kubect1 delete pod nginx-deployment-peslug20cs634-8cf4bf97-2cpbp
pod "nginx-deployment-peslug20cs634-8cf4bf97-2cpbp" deleted

C:\Users\chait\Desktop>kubect1 delete pod nginx-deployment-peslug20cs634-8cf4bf97-nwldf
pod "nginx-deployment-peslug20cs634-8cf4bf97-nwldf" deleted

C:\Users\chait\Desktop>kubect1 delete pod nginx-deployment-peslug20cs634-8cf4bf97-trx7d
pod "nginx-deployment-peslug20cs634-8cf4bf97-trx7d" deleted

C:\Users\chait\Desktop>kubect1 get pod
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-peslug20cs634-8cf4bf97-lfs64  1/1     Running   0           5s
nginx-deployment-peslug20cs634-8cf4bf97-rdksk  1/1     Running   0          15s
nginx-deployment-peslug20cs634-8cf4bf97-r1rcr  1/1     Running   0          28s

```

## Section 6: Connecting Services to Deployments

- Screenshot 6a- Kubectl apply and get command.

```
C:\Users\chait\Desktop>kubectl apply -f nginx-service.yaml
service/nginx-service-pes1ug20cs634 created

C:\Users\chait\Desktop>kubectl get service
NAME                                TYPE        CLUSTER-IP      EXTERNAL-IP  PORT(S)    AGE
kubernetes                         ClusterIP    10.96.0.1        <none>       443/TCP    52m
nginx-service-pes1ug20cs634        ClusterIP    10.104.10.195    <none>       8080/TCP   9s

C:\Users\chait\Desktop>kubectl describe service nginx-service
Name:                               nginx-service-pes1ug20cs634
Namespace:                         default
Labels:                            <none>
Annotations:                       <none>
Selector:                          app=nginx
Type:                              ClusterIP
IP Family Policy:                  SingleStack
IP Families:                      IPv4
IP:                                10.104.10.195
IPs:                               10.104.10.195
Port:                              <unset> 8080/TCP
TargetPort:                       80/TCP
Endpoints:                        10.244.0.10:80,10.244.0.11:80,10.244.0.13:80
Session Affinity:                 None
Events:                            <none>

C:\Users\chait\Desktop>
```

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

```
C:\Users\chait\Desktop>kubectl get pod -o wide
NAME                                READY   STATUS    RESTARTS   AGE   IP            NODE       NOMINATED NODE   READINESS GATES
nginx-deployment-pes1ug20cs634-8cf4bf97-n42fq  1/1     Running   0          4m10s  10.244.0.13   minikube   <none>           <none>
nginx-deployment-pes1ug20cs634-8cf4bf97-rdksk  1/1     Running   0          4m51s  10.244.0.11   minikube   <none>           <none>
nginx-deployment-pes1ug20cs634-8cf4bf97-rlrcr  1/1     Running   0          5m4s   10.244.0.10   minikube   <none>           <none>

C:\Users\chait\Desktop>
```

## Section 7: Port Forwarding

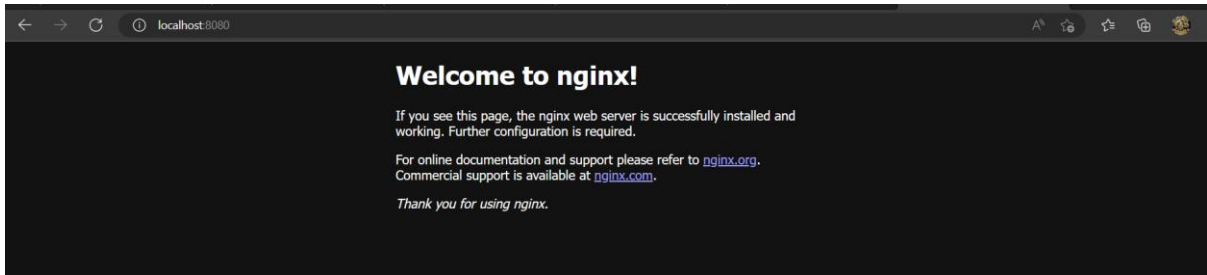
- Screenshot 7a -Kubectl port-forward command

```
C:\Users\chait\Desktop>kubectl port-forward service/nginx-service-pes1ug20cs634 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



## **Section 8: Deleting service/deployment and Cleanup**

- Screenshot 8a - Delete nginx deployments

```
C:\Users\chait\Desktop>kubectl delete deployment nginx-deployment-pes1ug20cs634
deployment.apps "nginx-deployment-pes1ug20cs634" deleted

C:\Users\chait\Desktop>kubectl delete service nginx-deployment-pes1ug20cs634
Error from server (NotFound): services "nginx-deployment-pes1ug20cs634" not found

C:\Users\chait\Desktop>kubectl delete service nginx-service-pes1ug20cs634
service "nginx-service-pes1ug20cs634" deleted

C:\Users\chait\Desktop>
```

- Screenshot 8b - stop minikube

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

C:\Users\chait\Desktop>
```

## 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\chait\Desktop>kubect1 create deployment nginx2-pes1ug20cs634 --image=nginx
deployment.apps/nginx2-pes1ug20cs634 created

C:\Users\chait\Desktop>kubect1 expose deployment nginx2-pes1ug20cs634 --type=NodePort --port=80
service/nginx2-pes1ug20cs634 exposed
```

- Screenshot 9b - kubect1 get service command which displays the node port

```
C:\Users\chait\Desktop>kubect1 get service nginx2-pes1ug20cs634
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
nginx2-pes1ug20cs634	NodePort	10.111.135.193	<none>	80:30213/TCP	77s

- Screenshot 9c - minikube IP address

```
C:\Users\chait\Desktop>minikube ip
192.168.49.2
```

```
C:\Users\chait\Desktop>minikube service nginx2-pes1ug20cs634
```

NAMESPACE	NAME	TARGET PORT	URL
default	nginx2-pes1ug20cs634	80	http://192.168.49.2:30213

\* Starting tunnel for service nginx2-pes1ug20cs634.

NAMESPACE	NAME	TARGET PORT	URL
default	nginx2-pes1ug20cs634		http://127.0.0.1:58686

\* Opening service default/nginx2-pes1ug20cs634 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.

