# Cloud Computing - Assignment 2

Name – Safiya Nawar SRN – PES2UG20CS455

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

```
C:\Windows\system32>minikube start
* minikube v1.29.0 on Microsoft Windows 11 Home Single Language 10.0.22000.1455 Build 22000.1455
* Automatically selected the hyperv driver
* Downloading VM boot image ...
    > minikube-v1.29.0-amd64.iso....:  65 B / 65 B [---------] 100.00% ? p/s 0s
    > minikube-v1.29.0-amd64.iso:  276.35 MiB / 276.35 MiB  100.00% 1.23 MiB p/
* Starting control plane node minikube in cluster minikube
* Downloading Kubernetes v1.26.1 preload ...
    > preloaded-images-k8s-v18-v1...:  397.05 MiB / 397.05 MiB  100.00% 833.24
* Creating hyperv VM (CPUs=2, Memory=2200MB, Disk=20000MB) ...
! StartHost failed, but will try again: creating host: create: precreate: Hyper-V PowerShell Module is n
ot available
* Creating hyperv VM (CPUs=2, Memory=2200MB, Disk=20000MB) ...
* Failed to start hyperv VM. Running "minikube delete" may fix it: creating host: create: precreate: Hyp
er-V PowerShell Module is not available

X Exiting due to PR_HYPERV_MODULE_NOT_INSTALLED: Failed to start host: creating host: create: precreate:
 Hyper-V PowerShell Module is not available
* Suggestion: Run: 'Enable-WindowsOptionalFeature -Online -FeatureName Microsoft-Hyper-V-Tools-All -All'
* Documentation: https://www.altaro.com/hyper-v/install-hyper-v-powershell-module/
* Related issue: https://github.com/kubernetes/minikube/issues/9040
```

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

```
C:\Windows\system32>kubectl get nodes
NAME             STATUS   ROLES           AGE    VERSION
docker-desktop   Ready    control-plane   110m   v1.25.4

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   110m

C:\Windows\system32>_
```

    - Screenshot 2b- Deployment created.

```
C:\Windows\system32>kubectl create deployment pes2ug20cs455 --image=nginx
deployment.apps/pes2ug20cs455 created

C:\Windows\system32>_
```

    - Screenshot 2c- get deployment and pod command .

```
C:\Windows\system32>kubectl get deployment
NAME                 READY   UP-TO-DATE   AVAILABLE   AGE
pes2ug20cs455        1/1     1            1           3m30s

C:\Windows\system32>kubectl get pod
NAME                                  READY   STATUS    RESTARTS      AGE
pes2ug20cs455-cb845c56c-ff2wl         1/1     Running   0             3m44s
```

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

```
      app: pes1ug20cs455
  spec:
    containers:
    - image: nginx:1.16
      imagePullPolicy: Always
      name: nginx
```

- Screenshot 2e- showing edited deployment.

```
  Normal  ScalingReplicaSet  2m50s  deployment-controller  Scaled
6 to 1

C:\Windows\system32>kubectl edit deployment pes1ug20cs455
deployment.apps/pes1ug20cs455 edited
```

- Screenshot 2f- deployment is rolled back.

```
C:\Windows\system32>kubectl rollout undo deployment/pes1ug20cs455
deployment.apps/pes1ug20cs455 rolled back

C:\Windows\system32>
```

- Screenshot 2g- showing original nginx image.

```
      app: pes1ug20cs455
  spec:
    containers:
    - image: nginx
      imagePullPolicy: Always
      name: nginx
```

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

```
C:\Windows\system32>kubectl logs pes2ug20cs455-cb845c56c-ff2wl
/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 16:47:21 [notice] 1#1: using the "epoll" event method
2023/02/23 16:47:21 [notice] 1#1: nginx/1.23.3
2023/02/23 16:47:21 [notice] 1#1: built by gcc 10.2.1 20210110 (Debian 10.2.1-6)
2023/02/23 16:47:21 [notice] 1#1: OS: Linux 5.15.79.1-microsoft-standard-WSL2
2023/02/23 16:47:21 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2023/02/23 16:47:21 [notice] 1#1: start worker processes
2023/02/23 16:47:21 [notice] 1#1: start worker process 29
2023/02/23 16:47:21 [notice] 1#1: start worker process 30
2023/02/23 16:47:21 [notice] 1#1: start worker process 31
2023/02/23 16:47:21 [notice] 1#1: start worker process 32
2023/02/23 16:47:21 [notice] 1#1: start worker process 33
2023/02/23 16:47:21 [notice] 1#1: start worker process 34
2023/02/23 16:47:21 [notice] 1#1: start worker process 35
2023/02/23 16:47:21 [notice] 1#1: start worker process 36

C:\Windows\system32>_
```

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

```
Events:
  Type    Reason     Age    From               Message
  ----    ------     ----   ----               -------
  Normal  Scheduled  9m2s   default-scheduler  Successfully assigned default/pes2ug20cs455-cb845c56c-ff2w
l to docker-desktop
  Normal  Pulling    8m59s  kubelet            Pulling image "nginx"
  Normal  Pulled     8m56s  kubelet            Successfully pulled image "nginx" in 3.246492025s
  Normal  Created    8m56s  kubelet            Created container nginx
  Normal  Started    8m56s  kubelet            Started container nginx
```

- Screenshot 3c - Create mongo deployment.

```
C:\Windows\system32>kubectl create deployment pes2ug20cs455-mongo --image=mongo
deployment.apps/pes2ug20cs455-mongo created
```

- Screenshot 3d - Delete both requirements.

```
C:\Windows\system32>kubectl delete deployment pes2ug20cs455
deployment.apps "pes2ug20cs455" deleted

C:\Windows\system32>kubectl delete deployment pes2ug20cs455-mongo
deployment.apps "pes2ug20cs455-mongo" deleted
```

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

```
C:\Windows\system32>kubectl apply -f "C:\Users\Safiya Nawar\Downloads\nginx-deployment.yaml"
deployment.apps/nginx-deployment-pes2ug20cs455 created
```

```
C:\Windows\system32>kubectl get pod
NAME                                          READY   STATUS    RESTARTS   AGE
nginx-deployment-pes2ug20cs455-645549fcf7-hvwbw   1/1     Running   0          117s
nginx-deployment-pes2ug20cs455-645549fcf7-rnf7w   1/1     Running   0          117s

C:\Windows\system32>kubectl get replicaset
NAME                                    DESIRED   CURRENT   READY   AGE
nginx-deployment-pes2ug20cs455-645549fcf7   2         2         2       2m11s

C:\Windows\system32>kubectl get replicaset
NAME                                    DESIRED   CURRENT   READY   AGE
nginx-deployment-pes2ug20cs455-645549fcf7   2         2         2       2m49s

C:\Windows\system32>kubectl apply -f "C:\Users\Safiya Nawar\Downloads\nginx-deployment.yaml"
deployment.apps/nginx-deployment-pes2ug20cs455 configured
```

- Screenshot 4b- Kubectl get on yaml file

```
C:\Windows\system32>kubectl get deployment nginx-deployment-pes2ug20cs455 -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-pes2ug20cs455","namespace":"default"},"spec":{"replicas":3,"selector":{"matchLabe
ls":{"app":"nginx"}},"template":{"metadata":{"labels":{"app":"nginx"}},"spec":{"containers":[{"image":"ng
inx:1.22","name":"nginx","ports":[{"containerPort":80}]}]}}}}
  creationTimestamp: "2023-02-23T17:02:06Z"
  generation: 2
  labels:
    app: nginx
  name: nginx-deployment-pes2ug20cs455
  namespace: default
  resourceVersion: "12568"
  uid: 536e0366-be39-4999-8e2f-3158e8847de6
spec:
  progressDeadlineSeconds: 600
      terminationGracePeriodSeconds: 30
status:
  availableReplicas: 3
  conditions:
  - lastTransitionTime: "2023-02-23T17:02:06Z"
    lastUpdateTime: "2023-02-23T17:02:31Z"
    message: ReplicaSet "nginx-deployment-pes2ug20cs455-645549fcf7" has successfully
      progressed.
    reason: NewReplicaSetAvailable
    status: "True"
    type: Progressing
  - lastTransitionTime: "2023-02-23T17:05:14Z"
    lastUpdateTime: "2023-02-23T17:05:14Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  observedGeneration: 2
  readyReplicas: 3
  replicas: 3
  updatedReplicas: 3

C:\Windows\system32>
```

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

```
C:\Windows\system32>kubectl get pod
NAME                                              READY   STATUS    RESTARTS   AGE
nginx-deployment-pes2ug20cs455-645549fcf7-hvwbw   1/1     Running   0          6m38s
nginx-deployment-pes2ug20cs455-645549fcf7-rnf7w   1/1     Running   0          6m38s
nginx-deployment-pes2ug20cs455-645549fcf7-z6c64   1/1     Running   0          3m33s

C:\Windows\system32>kubectl delete pod nginx-deployment-pes2ug20cs455-645549fcf7-hvwbw
pod "nginx-deployment-pes2ug20cs455-645549fcf7-hvwbw" deleted

C:\Windows\system32>kubectl get pod
NAME                                              READY   STATUS    RESTARTS   AGE
nginx-deployment-pes2ug20cs455-645549fcf7-p552v   1/1     Running   0          9s
nginx-deployment-pes2ug20cs455-645549fcf7-rnf7w   1/1     Running   0          7m26s
nginx-deployment-pes2ug20cs455-645549fcf7-z6c64   1/1     Running   0          4m21s
```

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

```
C:\Windows\system32>kubectl get service
NAME                         TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)    AGE
kubernetes                   ClusterIP   10.96.0.1        <none>        443/TCP    167m
nginx-service-pes2ug20cs455  ClusterIP   10.104.182.182   <none>        8080/TCP   10s

C:\Windows\system32>
```

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

```
C:\Windows\system32>kubectl get pod -o wide
NAME                                              READY   STATUS    RESTARTS   AGE     IP          NODE             NOMINATED NODE   READINESS GATES
nginx-deployment-pes2ug20cs455-645549fcf7-p552v   1/1     Running   0          3m13s   10.1.0.21   docker-desktop   <none>           <none>
nginx-deployment-pes2ug20cs455-645549fcf7-rnf7w   1/1     Running   0          10m     10.1.0.18   docker-desktop   <none>           <none>
nginx-deployment-pes2ug20cs455-645549fcf7-z6c64   1/1     Running   0          7m25s   10.1.0.20   docker-desktop   <none>           <none>

C:\Windows\system32>
```

7. Section 7: Port Forwarding:-

- Screenshot 7a -Kubectl port-forward command

```
C:\Windows\system32>kubectl port-forward service/nginx-service-pes2ug20cs455 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

```
C:\Windows\system32>kubectl delete deployment nginx-deployment-pes2ug20cs455
deployment.apps "nginx-deployment-pes2ug20cs455" deleted

C:\Windows\system32>kubectl delete service nginx-service-pes2ug20cs455
service "nginx-service-pes2ug20cs455" deleted

C:\Windows\system32>
```

- Screenshot 8b - stop minikube

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:\Windows\system32>kubectl create deployment nginx-pes2ug20cs455 --image=nginx
deployment.apps/nginx-pes2ug20cs455 created
```

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

```
C:\Windows\system32>kubectl expose deployment nginx-pes2ug20cs455 --type=NodePort --port=80
service/nginx-pes2ug20cs455 exposed
```

- Screenshot 9c - minikube IP address

```
C:\Windows\system32> minikube ip
192.168.49.2
```

- 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)

---

# Welcome to nginx!

If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

*Thank you for using nginx.*