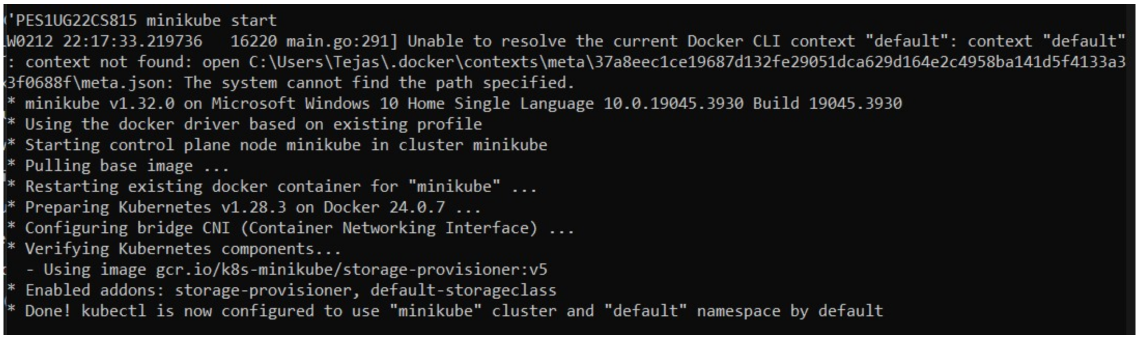
ASSIGNMENT -3: KUBERNETES

Task-1: After installation of both kubectl and minikube.

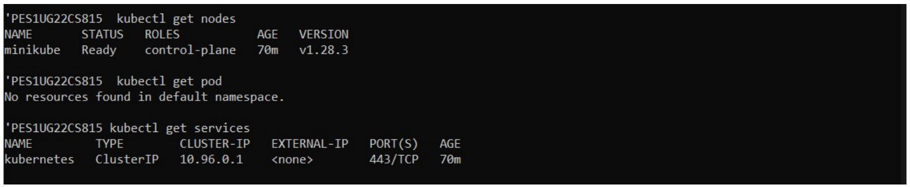
✓ SCREENSHOT 1a: Minikube running successfully.



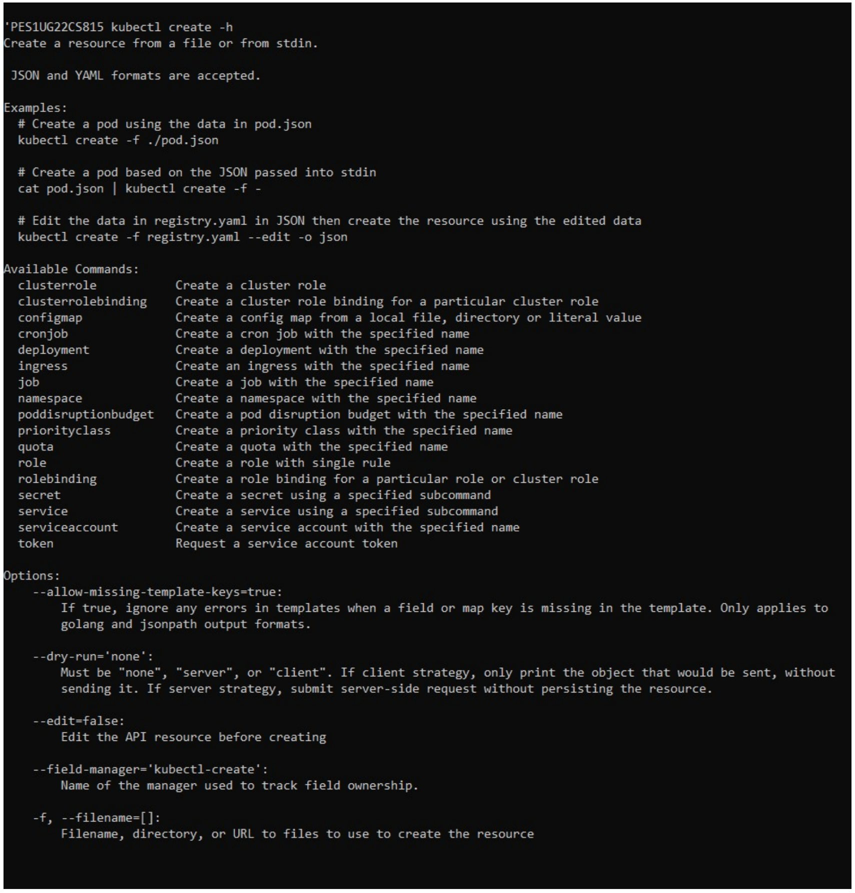
```
'PES1UG22CS815 minikube start
W0212 22:17:33.219736   16220 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
: context not found: open C:\Users\Tejas\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
* minikube v1.32.0 on Microsoft Windows 10 Home Single Language 10.0.19045.3930 Build 19045.3930
* 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" ...
* Preparing Kubernetes v1.28.3 on Docker 24.0.7 ...
* 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
```

Task-2: Creating pods and deployments, editing them and observing Rollback.

SCREENSHOT 2a: Get nodes, pods, services.

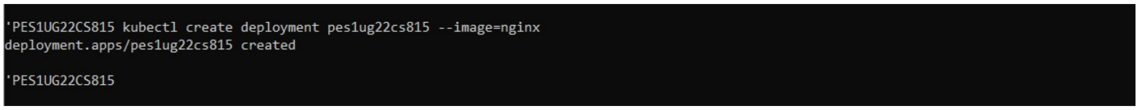


```
'PES1UG22CS815  kubectl get nodes
NAME       STATUS   ROLES           AGE   VERSION
minikube   Ready    control-plane   70m   v1.28.3

'PES1UG22CS815  kubectl get pod
No resources found in default namespace.

'PES1UG22CS815 kubectl get services
NAME         TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
kubernetes   ClusterIP   10.96.0.1    <none>        443/TCP   70m
```



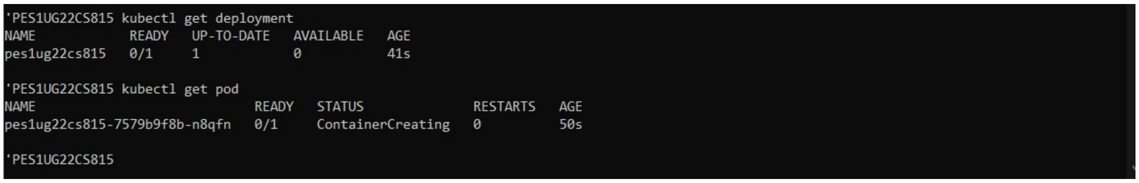
```
'PES1UG22CS815 kubectl create -h
Create a resource from a file or from stdin.

 JSON and YAML formats are accepted.

Examples:
  # Create a pod using the data in pod.json
  kubectl create -f ./pod.json

  # Create a pod based on the JSON passed into stdin
  cat pod.json | kubectl create -f -

  # Edit the data in registry.yaml in JSON then create the resource using the edited data
  kubectl create -f registry.yaml --edit -o json

Available Commands:
  clusterrole           Create a cluster role
  clusterrolebinding    Create a cluster role binding for a particular cluster role
  configmap             Create a config map from a local file, directory or literal value
  cronjob               Create a cron job with the specified name
  deployment            Create a deployment with the specified name
  ingress               Create an ingress with the specified name
  job                   Create a job with the specified name
  namespace             Create a namespace with the specified name
  poddisruptionbudget   Create a pod disruption budget with the specified name
  priorityclass         Create a priority class with the specified name
  quota                 Create a quota with the specified name
  role                  Create a role with single rule
  rolebinding           Create a role binding for a particular role or cluster role
  secret                Create a secret using a specified subcommand
  service               Create a service using a specified subcommand
  serviceaccount        Create a service account with the specified name
  token                 Request a service account token

Options:
    --allow-missing-template-keys=true:
        If true, ignore any errors in templates when a field or map key is missing in the template. Only applies to
        golang and jsonpath output formats.

    --dry-run='none':
        Must be "none", "server", or "client". If client strategy, only print the object that would be sent, without
        sending it. If server strategy, submit server-side request without persisting the resource.

    --edit=false:
        Edit the API resource before creating

    --field-manager='kubectl-create':
        Name of the manager used to track field ownership.

    -f, --filename=[]:
        Filename, directory, or URL to files to use to create the resource
```

SCREENSHOT 2b: Deployment Created (with SRN)



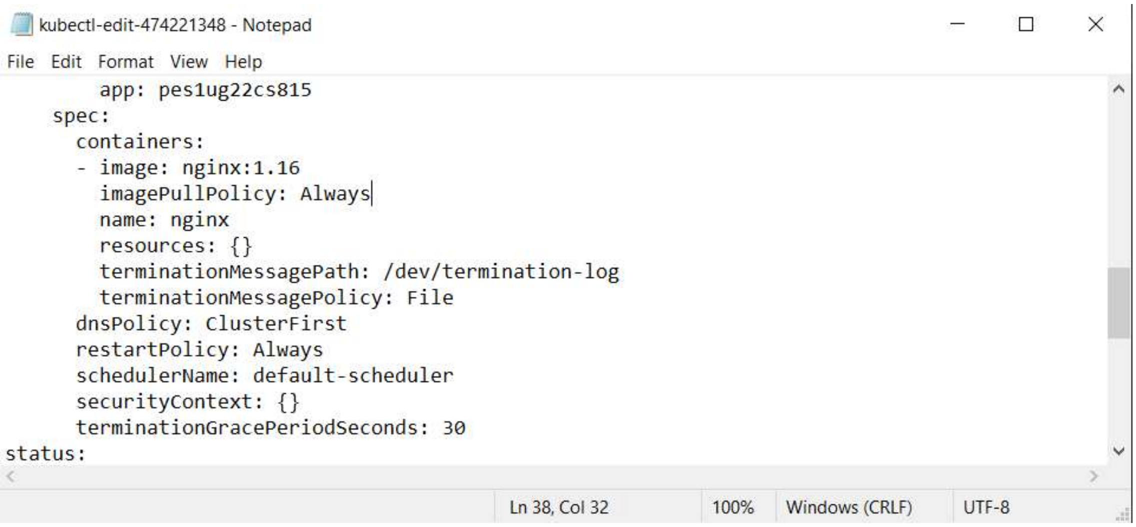
```
'PES1UG22CS815 kubectl create deployment pes1ug22cs815 --image=nginx
deployment.apps/pes1ug22cs815 created

'PES1UG22CS815
```

SCREENSHOT 2c: Get deployment and pod



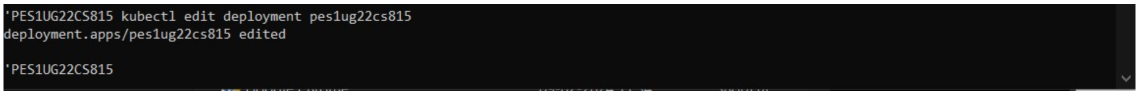
```
'PES1UG22CS815 kubectl get deployment
NAME            READY   UP-TO-DATE   AVAILABLE   AGE
pes1ug22cs815   0/1     1            0           41s

'PES1UG22CS815 kubectl get pod
NAME                           READY   STATUS              RESTARTS   AGE
pes1ug22cs815-7579b9f8b-n8qfn   0/1     ContainerCreating   0          50s

'PES1UG22CS815
```

SCREENSHOT 2d: Editing '-image:nginx'



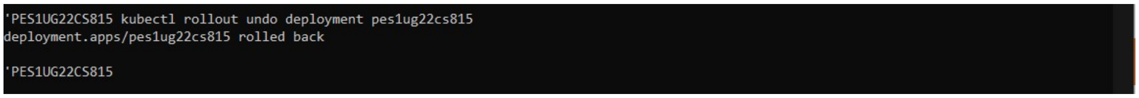
```
        app: pes1ug22cs815
    spec:
      containers:
      - image: nginx:1.16
        imagePullPolicy: Always
        name: nginx
        resources: {}
        terminationMessagePath: /dev/termination-log
        terminationMessagePolicy: File
      dnsPolicy: ClusterFirst
      restartPolicy: Always
      schedulerName: default-scheduler
      securityContext: {}
      terminationGracePeriodSeconds: 30
status:
```

SCREENSHOT 2e: Showing edited deployment.



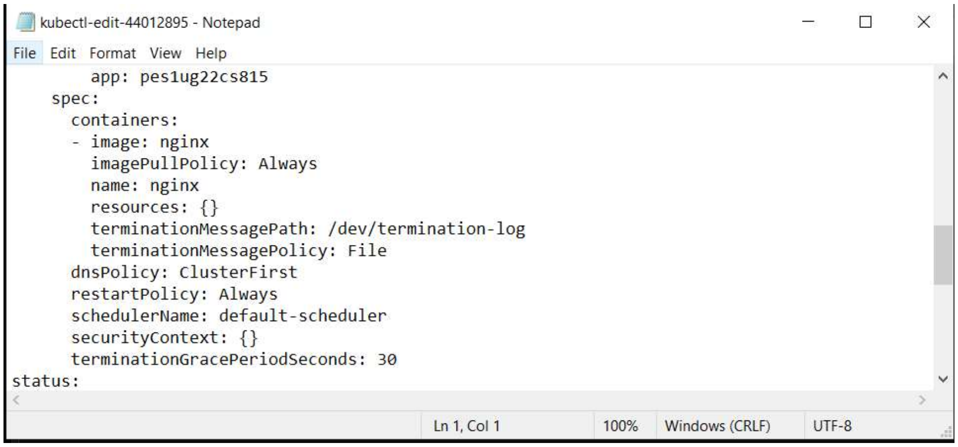
```
'PES1UG22CS815 kubectl edit deployment pes1ug22cs815
deployment.apps/pes1ug22cs815 edited

'PES1UG22CS815
```

SCREENSHOT 2f: Deployment rolled back



```
'PES1UG22CS815 kubectl rollout undo deployment pes1ug22cs815
deployment.apps/pes1ug22cs815 rolled back

'PES1UG22CS815
```

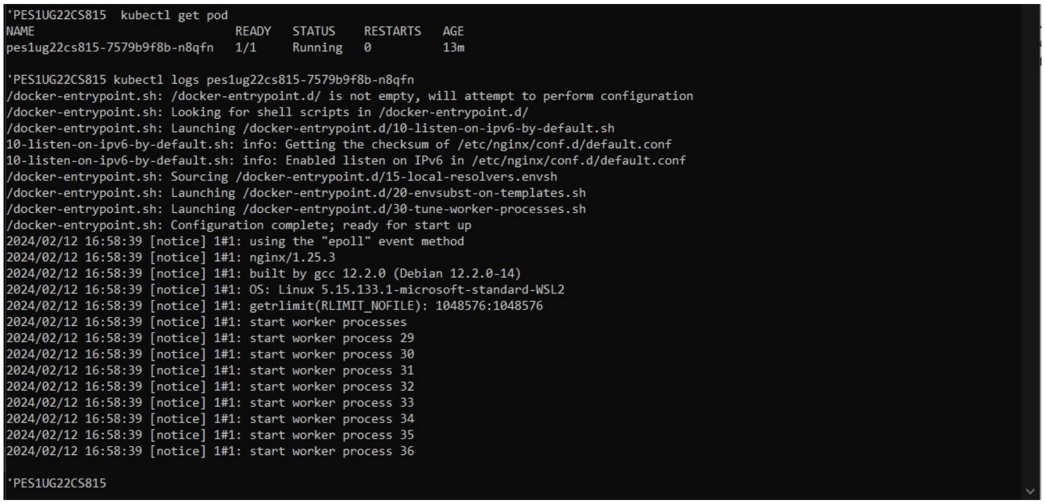
SCREENSHOT 2g: Changes after rolling back to original



```
        app: pes1ug22cs815
    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:
```

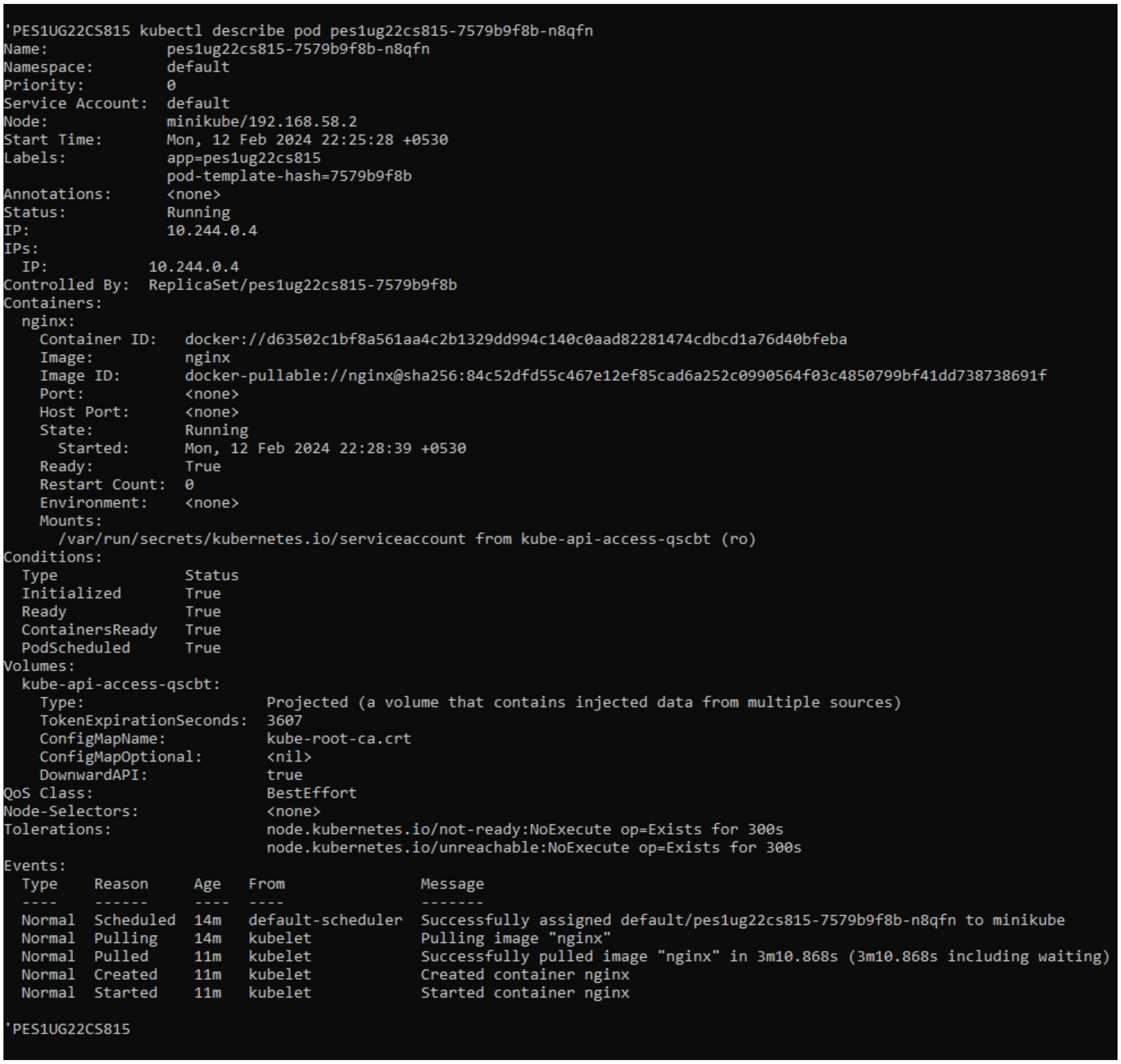
Task-3: Debugging Pods.

SCREENSHOT 3a: Kubectl logs displayed



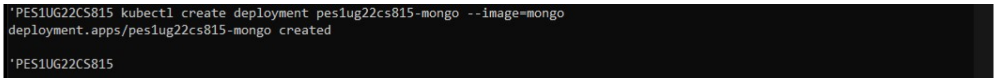
```
'PES1UG22CS815  kubectl get pod
NAME                           READY   STATUS    RESTARTS   AGE
pes1ug22cs815-7579b9f8b-n8qfn   1/1     Running   0          13m

'PES1UG22CS815 kubectl logs pes1ug22cs815-7579b9f8b-n8qfn
/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: Sourcing /docker-entrypoint.d/15-local-resolvers.envsh
/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
2024/02/12 16:58:39 [notice] 1#1: using the "epoll" event method
2024/02/12 16:58:39 [notice] 1#1: nginx/1.25.3
2024/02/12 16:58:39 [notice] 1#1: built by gcc 12.2.0 (Debian 12.2.0-14)
2024/02/12 16:58:39 [notice] 1#1: OS: Linux 5.15.133.1-microsoft-standard-WSL2
2024/02/12 16:58:39 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2024/02/12 16:58:39 [notice] 1#1: start worker processes
2024/02/12 16:58:39 [notice] 1#1: start worker process 29
2024/02/12 16:58:39 [notice] 1#1: start worker process 30
2024/02/12 16:58:39 [notice] 1#1: start worker process 31
2024/02/12 16:58:39 [notice] 1#1: start worker process 32
2024/02/12 16:58:39 [notice] 1#1: start worker process 33
2024/02/12 16:58:39 [notice] 1#1: start worker process 34
2024/02/12 16:58:39 [notice] 1#1: start worker process 35
2024/02/12 16:58:39 [notice] 1#1: start worker process 36

'PES1UG22CS815
```

SCREENSHOT 3b: Kubectl ‘describe pod’ command – Screenshot of “events” section.



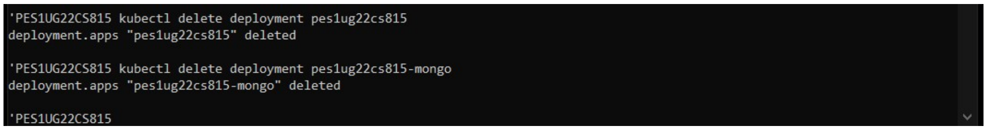
```
'PES1UG22CS815 kubectl describe pod pes1ug22cs815-7579b9f8b-n8qfn
Name:             pes1ug22cs815-7579b9f8b-n8qfn
Namespace:        default
Priority:         0
Service Account:  default
Node:             minikube/192.168.58.2
Start Time:       Mon, 12 Feb 2024 22:25:28 +0530
Labels:           app=pes1ug22cs815
                  pod-template-hash=7579b9f8b
Annotations:      <none>
Status:           Running
IP:               10.244.0.4
IPs:
  IP:           10.244.0.4
Controlled By:  ReplicaSet/pes1ug22cs815-7579b9f8b
Containers:
  nginx:
    Container ID:   docker://d63502c1bf8a561aa4c2b1329dd994c140c0aad82281474cdbcd1a76d40bfeba
    Image:          nginx
    Image ID:       docker-pullable://nginx@sha256:84c52dfd55c467e12ef85cad6a252c0990564f03c4850799bf41dd738738691f
    Port:           <none>
    Host Port:      <none>
    State:          Running
      Started:      Mon, 12 Feb 2024 22:28:39 +0530
    Ready:          True
    Restart Count:  0
    Environment:    <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-qscbt (ro)
Conditions:
  Type              Status
  Initialized       True
  Ready             True
  ContainersReady   True
  PodScheduled      True
Volumes:
  kube-api-access-qscbt:
    Type:                    Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds:  3607
    ConfigMapName:           kube-root-ca.crt
    ConfigMapOptional:       <nil>
    DownwardAPI:             true
QoS Class:                   BestEffort
Node-Selectors:              <none>
Tolerations:                 node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                             node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type    Reason     Age   From               Message
  ----    ------     ----  ----               -------
  Normal  Scheduled  14m   default-scheduler  Successfully assigned default/pes1ug22cs815-7579b9f8b-n8qfn to minikube
  Normal  Pulling    14m   kubelet            Pulling image "nginx"
  Normal  Pulled     11m   kubelet            Successfully pulled image "nginx" in 3m10.868s (3m10.868s including waiting)
  Normal  Created    11m   kubelet            Created container nginx
  Normal  Started    11m   kubelet            Started container nginx

'PES1UG22CS815
```

SCREENSHOT 3c: Creating mongo deployment



```
'PES1UG22CS815 kubectl create deployment pes1ug22cs815-mongo --image=mongo
deployment.apps/pes1ug22cs815-mongo created

'PES1UG22CS815
```

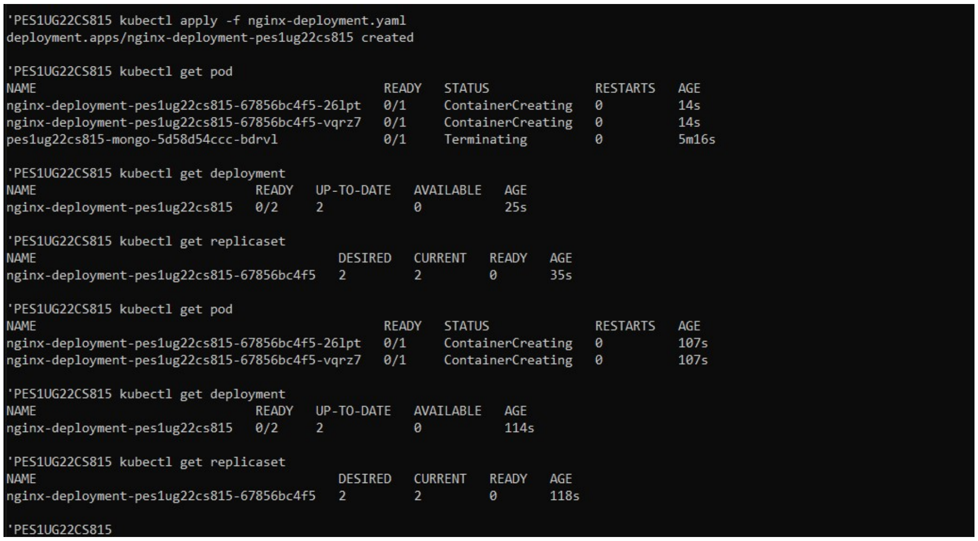
SCREENSHOT 3d: Deleting both requirement



```
'PES1UG22CS815 kubectl delete deployment pes1ug22cs815
deployment.apps "pes1ug22cs815" deleted

'PES1UG22CS815 kubectl delete deployment pes1ug22cs815-mongo
deployment.apps "pes1ug22cs815-mongo" deleted

'PES1UG22CS815
```

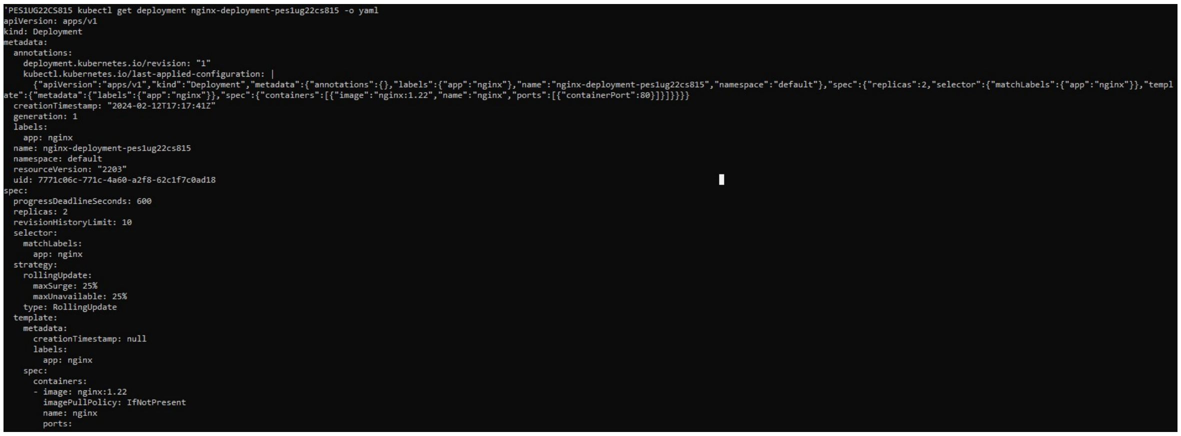
Task-4: Applying configuration files

SCREENSHOT 4a: Kubectl apply command on yaml file



```
'PES1UG22CS815 kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment-pes1ug22cs815 created

'PES1UG22CS815 kubectl get pod
NAME                                             READY   STATUS              RESTARTS   AGE
nginx-deployment-pes1ug22cs815-67856bc4f5-26lpt   0/1     ContainerCreating   0          14s
nginx-deployment-pes1ug22cs815-67856bc4f5-vqrz7   0/1     ContainerCreating   0          14s
pes1ug22cs815-mongo-5d58d54ccc-bdrvl              0/1     Terminating         0          5m16s

'PES1UG22CS815 kubectl get deployment
NAME                             READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment-pes1ug22cs815   0/2     2            0           25s

'PES1UG22CS815 kubectl get replicaset
NAME                                        DESIRED   CURRENT   READY   AGE
nginx-deployment-pes1ug22cs815-67856bc4f5   2         2         0       35s

'PES1UG22CS815 kubectl get pod
NAME                                             READY   STATUS              RESTARTS   AGE
nginx-deployment-pes1ug22cs815-67856bc4f5-26lpt   0/1     ContainerCreating   0          107s
nginx-deployment-pes1ug22cs815-67856bc4f5-vqrz7   0/1     ContainerCreating   0          107s

'PES1UG22CS815 kubectl get deployment
NAME                             READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment-pes1ug22cs815   0/2     2            0           114s

'PES1UG22CS815 kubectl get replicaset
NAME                                        DESIRED   CURRENT   READY   AGE
nginx-deployment-pes1ug22cs815-67856bc4f5   2         2         0       118s

'PES1UG22CS815
```

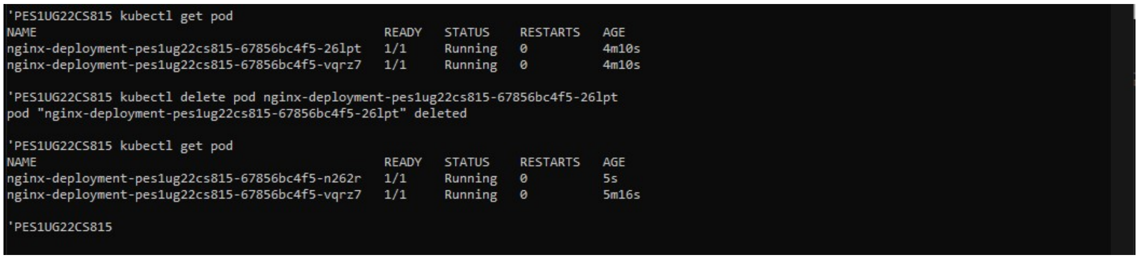
SCREENSHOT 4b: Kubectl get on yaml file.



```
'PES1UG22CS815 kubectl get deployment nginx-deployment-pes1ug22cs815 -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-pes1ug22cs815","namespace":"default"},"spec":{"replicas":2,"selector":{"matchLabels":{"app":"nginx"}},"templ
ate":{"metadata":{"labels":{"app":"nginx"}},"spec":{"containers":[{"image":"nginx:1.22","name":"nginx","ports":[{"containerPort":80}]}]}}}}
  creationTimestamp: "2024-02-12T17:17:41Z"
  generation: 1
  labels:
    app: nginx
  name: nginx-deployment-pes1ug22cs815
  namespace: default
  resourceVersion: "2203"
  uid: 7771c06c-771c-4a60-a2f8-62c1f7c0ad18
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:
```

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

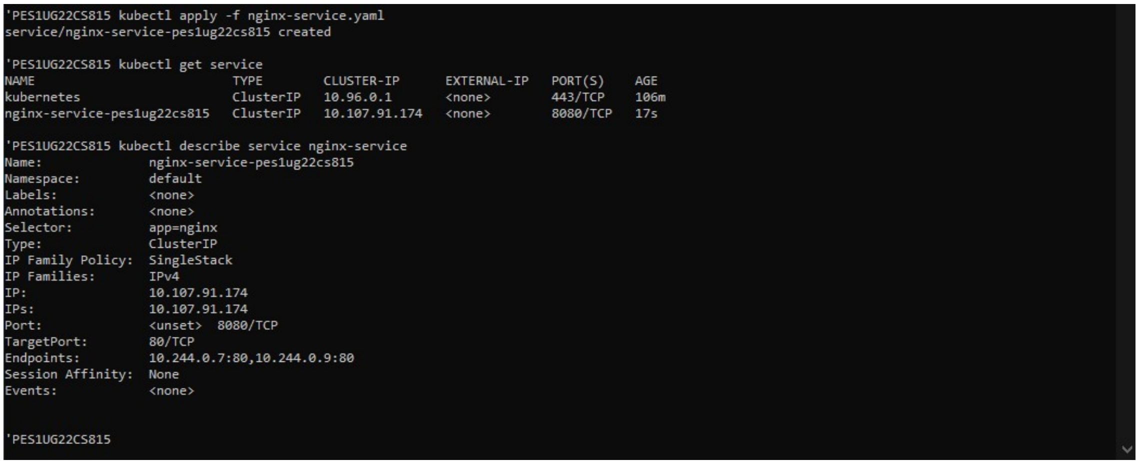
SCREENSHOT 5a: Delete pod



```
'PES1UG22CS815 kubectl get pod
NAME                                             READY   STATUS    RESTARTS   AGE
nginx-deployment-pes1ug22cs815-67856bc4f5-26lpt   1/1     Running   0          4m10s
nginx-deployment-pes1ug22cs815-67856bc4f5-vqrz7   1/1     Running   0          4m10s

'PES1UG22CS815 kubectl delete pod nginx-deployment-pes1ug22cs815-67856bc4f5-26lpt
pod "nginx-deployment-pes1ug22cs815-67856bc4f5-26lpt" deleted

'PES1UG22CS815 kubectl get pod
NAME                                             READY   STATUS    RESTARTS   AGE
nginx-deployment-pes1ug22cs815-67856bc4f5-n262r   1/1     Running   0          5s
nginx-deployment-pes1ug22cs815-67856bc4f5-vqrz7   1/1     Running   0          5m16s

'PES1UG22CS815
```

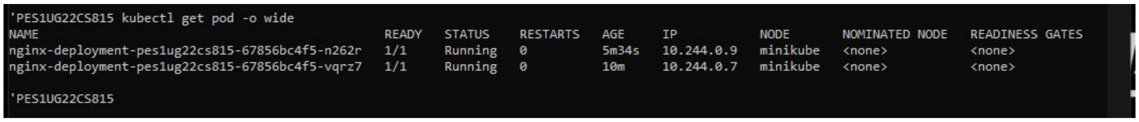
Task-6: Connecting Services to Deployments.

SCREENSHOT 6a: Kubectl apply and get command



```
'PES1UG22CS815 kubectl apply -f nginx-service.yaml
service/nginx-service-pes1ug22cs815 created

'PES1UG22CS815 kubectl get service
NAME                          TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)    AGE
kubernetes                    ClusterIP   10.96.0.1       <none>        443/TCP    106m
nginx-service-pes1ug22cs815   ClusterIP   10.107.91.174   <none>        8080/TCP   17s

'PES1UG22CS815 kubectl describe service nginx-service
Name:              nginx-service-pes1ug22cs815
Namespace:         default
Labels:            <none>
Annotations:       <none>
Selector:          app=nginx
Type:              ClusterIP
IP Family Policy:  SingleStack
IP Families:       IPv4
IP:                10.107.91.174
IPs:               10.107.91.174
Port:              <unset>  8080/TCP
TargetPort:        80/TCP
Endpoints:         10.244.0.7:80,10.244.0.9:80
Session Affinity:  None
Events:            <none>


'PES1UG22CS815
```

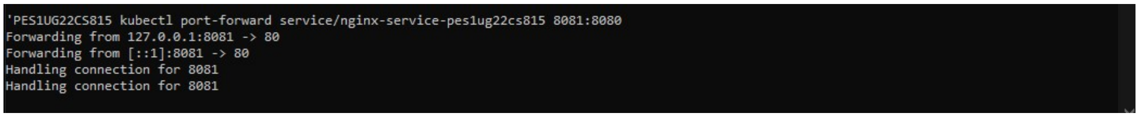
SCREENSHOT 6b: kubectl get pod -o wide command.



```
'PES1UG22CS815 kubectl get pod -o wide
NAME                                          READY   STATUS    RESTARTS   AGE    IP           NODE       NOMINATED NODE   READINESS GATES
nginx-deployment-pes1ug22cs815-67856bc4f5-n262r   1/1     Running   0          5m34s   10.244.0.9   minikube   <none>           <none>
nginx-deployment-pes1ug22cs815-67856bc4f5-vqrz7   1/1     Running   0          10m     10.244.0.7   minikube   <none>           <none>

'PES1UG22CS815
```

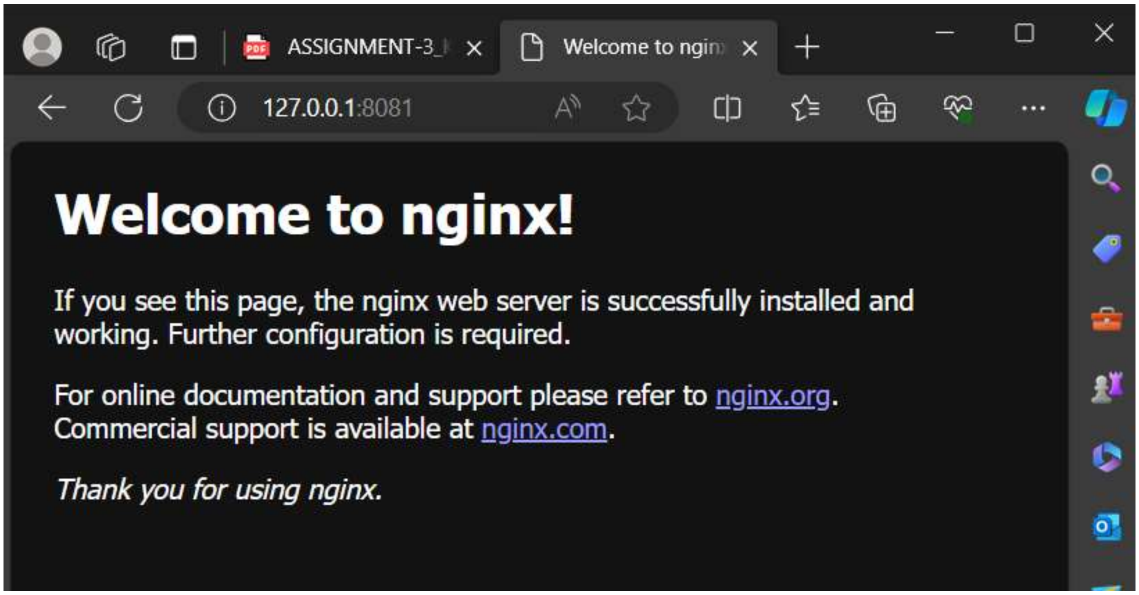
Task-7: Port Forwarding.

SCREENSHOT 7a: Kubectl port-forward command .



```
'PES1UG22CS815 kubectl port-forward service/nginx-service-pes1ug22cs815 8081:8080
Forwarding from 127.0.0.1:8081 -> 80
Forwarding from [::1]:8081 -> 80
Handling connection for 8081
Handling connection for 8081
```

SCREENSHOT 7b: Display welcome to nginx on web page.



Welcome to nginx!

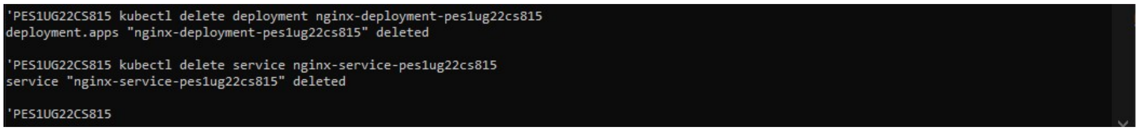
If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

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

Thank you for using nginx.

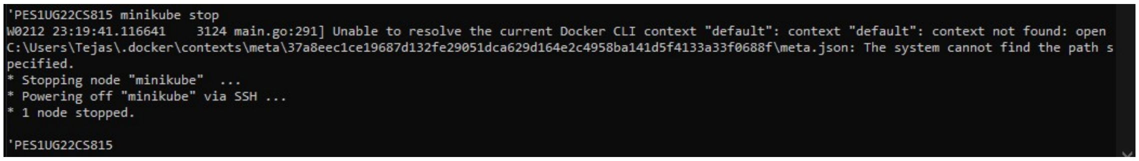
Task-8: Deleting service/deployment and Cleanup

SCREENSHOT 8a: Delete nginx deployments.



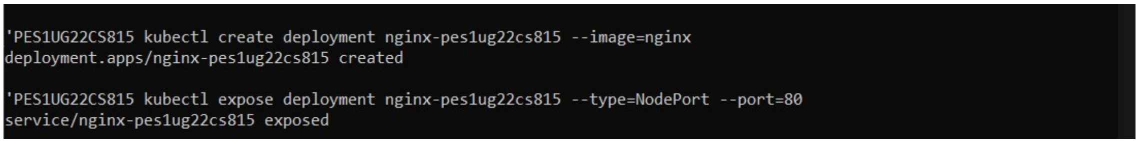
```
'PES1UG22CS815 kubectl delete deployment nginx-deployment-pes1ug22cs815
deployment.apps "nginx-deployment-pes1ug22cs815" deleted

'PES1UG22CS815 kubectl delete service nginx-service-pes1ug22cs815
service "nginx-service-pes1ug22cs815" deleted

'PES1UG22CS815
```

SCREENSHOT 8b: Minikube stop – Do this after the 9th Task.



```
'PES1UG22CS815 minikube stop
W0212 23:19:41.116641    3124 main.go:291] Unable to resolve the current Docker CLI context "default": context "default": context not found: open
C:\Users\Tejas\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a33f0688f\meta.json: The system cannot find the path s
pecified.
* Stopping node "minikube"  ...
* Powering off "minikube" via SSH ...
* 1 node stopped.

'PES1UG22CS815
```

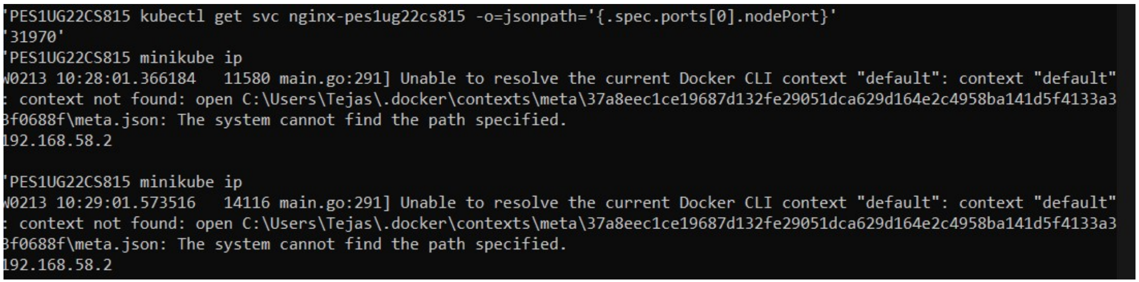
SCREENSHOT 9a: The command which exposes specifies the type of service (NodePort/LoadBalancer)



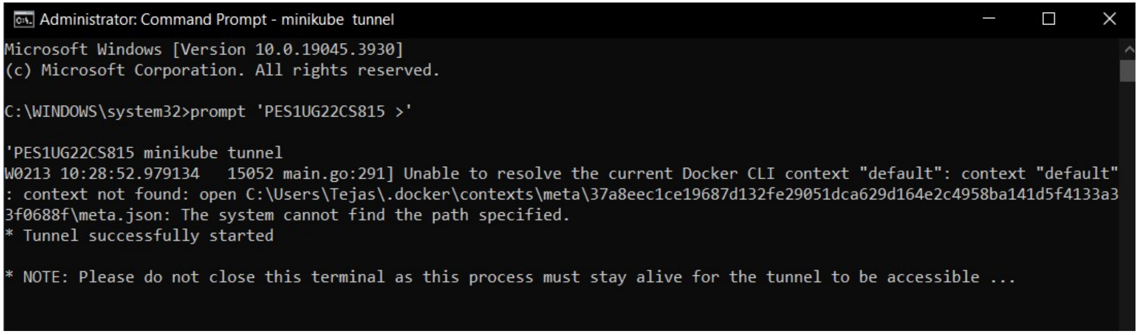
```
'PES1UG22CS815 kubectl create deployment nginx-pes1ug22cs815 --image=nginx
deployment.apps/nginx-pes1ug22cs815 created

'PES1UG22CS815 kubectl expose deployment nginx-pes1ug22cs815 --type=NodePort --port=80
service/nginx-pes1ug22cs815 exposed
```

SCREENSHOT 9b: kubectl get service command which displays the node port

SCREENSHOT 9c: minikube IP address

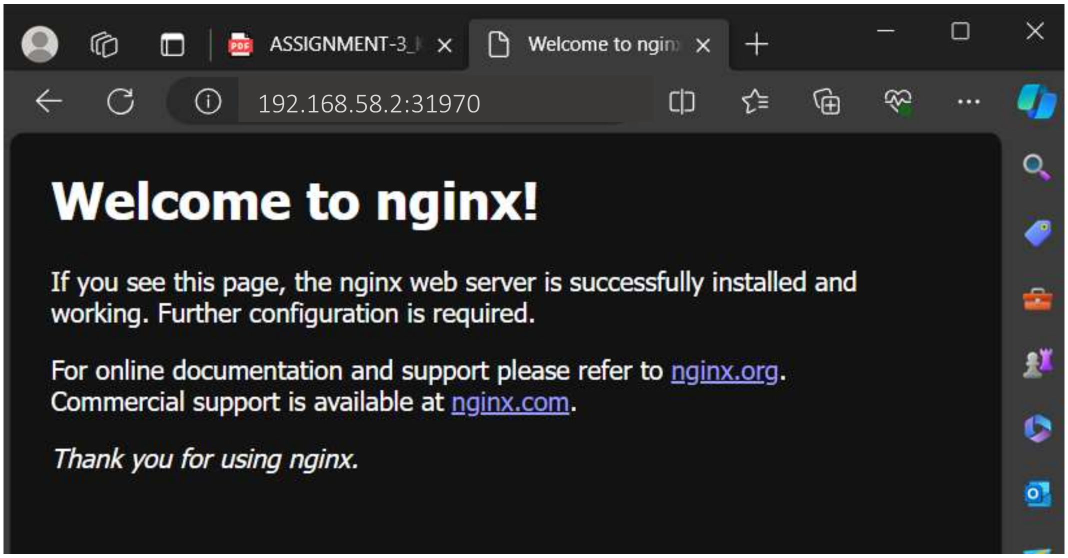


```
'PES1UG22CS815 kubectl get svc nginx-pes1ug22cs815 -o=jsonpath='{.spec.ports[0].nodePort}'
'31970'
'PES1UG22CS815 minikube ip
W0213 10:28:01.366184   11580 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
: context not found: open C:\Users\Tejas\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
192.168.58.2

'PES1UG22CS815 minikube ip
W0213 10:29:01.573516   14116 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
: context not found: open C:\Users\Tejas\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
192.168.58.2
```



```
Microsoft Windows [Version 10.0.19045.3930]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>prompt 'PES1UG22CS815 >'

'PES1UG22CS815 minikube tunnel
W0213 10:28:52.979134   15052 main.go:291] Unable to resolve the current Docker CLI context "default": context "default"
: context not found: open C:\Users\Tejas\.docker\contexts\meta\37a8eec1ce19687d132fe29051dca629d164e2c4958ba141d5f4133a3
3f0688f\meta.json: The system cannot find the path specified.
* Tunnel successfully started

* NOTE: Please do not close this terminal as this process must stay alive for the tunnel to be accessible ...
```

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)



192.168.58.2:31970

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.