CLOUD COMPUTING LAB – 19MAM58

CONTINUOUS ASSESSMENT TEST – 2

TEAM MEMBERS:

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AIM:

To dockerize a web application and deploy it in the Kubernetes cluster.

APPLICATION:

HOSPITAL MANAGEMENT

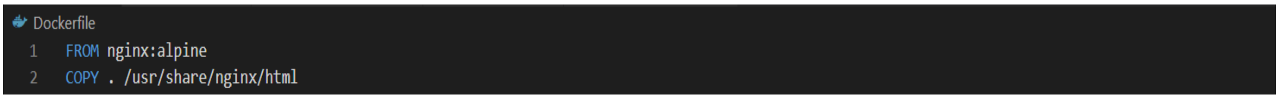
PROBLEM STATEMENT:

In this pandemic situation, it is hard to book an appointment for the consultation of the doctor in person and consulting doctor personally was not advisable at this situation.

PROPOSED SOLUTION:

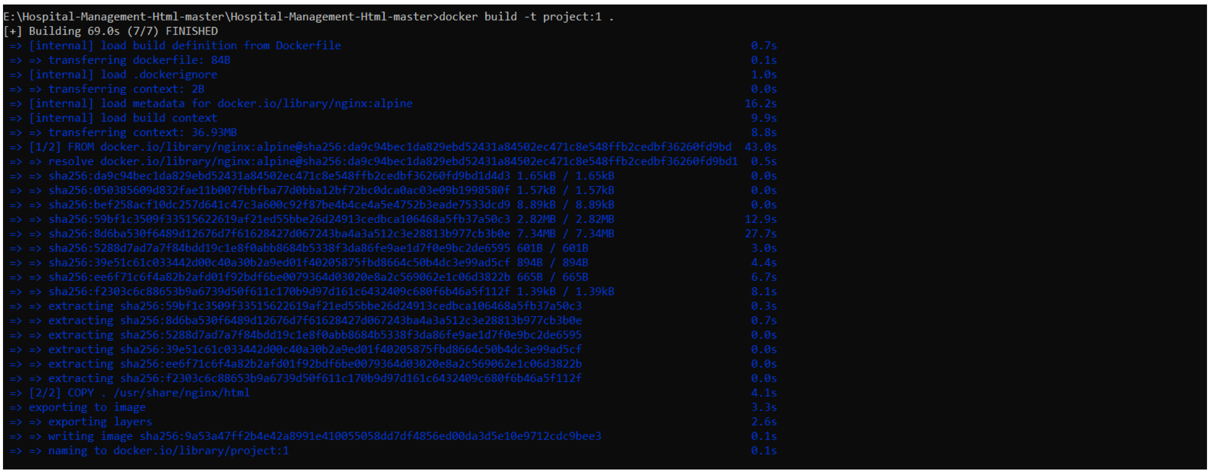
The solution for this problem is online consultation of the doctors and booking an appointment through online registration makes the work easier and simpler.

DOCKERFILE:



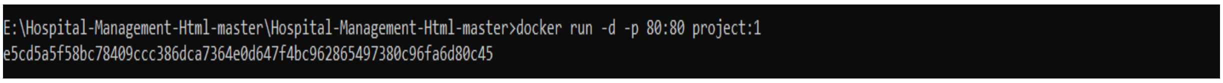
```
Dockerfile
FROM nginx:alpine
COPY . /usr/share/nginx/html
```

BUILDING DOCKER IMAGE:



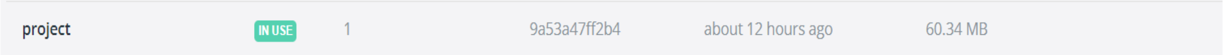
```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>docker build -t project:1 .
[+] Building 69.0s (7/7) FINISHED
 => [internal] load build definition from Dockerfile                                                               0.7s
 => => transferring dockerfile: 84B                                                                                0.1s
 => [internal] load .dockerignore                                                                                  1.0s
 => => transferring context: 2B                                                                                    0.0s
 => [internal] load metadata for docker.io/library/nginx:alpine                                                   16.2s
 => [internal] load build context                                                                                  9.9s
 => => transferring context: 36.93MB                                                                               8.8s
 => [1/2] FROM docker.io/library/nginx:alpine@sha256:da9c94bec1da829ebd52431a84502ec471c8e548ffb2cedbf36260fd9bd  43.0s
 => => resolve docker.io/library/nginx:alpine@sha256:da9c94bec1da829ebd52431a84502ec471c8e548ffb2cedbf36260fd9bd1  0.5s
 => => sha256:da9c94bec1da829ebd52431a84502ec471c8e548ffb2cedbf36260fd9bd1d4d3 1.65kB / 1.65kB                     0.0s
 => => sha256:050385609d832fae11b007fbbfba77d0bba12bf72bc0dca0ac03e09b1998580f 1.57kB / 1.57kB                     0.0s
 => => sha256:bef258acf10dc257d641c47c3a600c92f87be4b4ce4a5e4752b3eade7533dcd9 8.89kB / 8.89kB                     0.0s
 => => sha256:59bf1c3509f33515622619af21ed55bbe26d24913cedbca106468a5fb37a50c3 2.82MB / 2.82MB                    12.9s
 => => sha256:8d6ba530f6489d12676d7f61628427d067243ba4a3a512c3e28813b977cb3b0e 7.34MB / 7.34MB                    27.7s
 => => sha256:5288d7ad7a7f84bdd19c1e8f0abb8684b5338f3da86fe9ae1d7f0e9bc2de6595 601B / 601B                         3.0s
 => => sha256:39e51c61c033442d00c40a30b2a9ed01f40205875fbd8664c50b4dc3e99ad5cf 894B / 894B                         4.4s
 => => sha256:ee6f71c6f4a82b2afd01f92bdf6be0079364d03020e8a2c569062e1c06d3822b 665B / 665B                         6.7s
 => => sha256:f2303c6c88653b9a6739d50f611c170b9d97d161c6432409c680f6b46a5f112f 1.39kB / 1.39kB                     8.1s
 => => extracting sha256:59bf1c3509f33515622619af21ed55bbe26d24913cedbca106468a5fb37a50c3                          0.3s
 => => extracting sha256:8d6ba530f6489d12676d7f61628427d067243ba4a3a512c3e28813b977cb3b0e                          0.7s
 => => extracting sha256:5288d7ad7a7f84bdd19c1e8f0abb8684b5338f3da86fe9ae1d7f0e9bc2de6595                          0.0s
 => => extracting sha256:39e51c61c033442d00c40a30b2a9ed01f40205875fbd8664c50b4dc3e99ad5cf                          0.0s
 => => extracting sha256:ee6f71c6f4a82b2afd01f92bdf6be0079364d03020e8a2c569062e1c06d3822b                          0.0s
 => => extracting sha256:f2303c6c88653b9a6739d50f611c170b9d97d161c6432409c680f6b46a5f112f                          0.0s
 => [2/2] COPY . /usr/share/nginx/html                                                                             4.1s
 => exporting to image                                                                                             3.3s
 => => exporting layers                                                                                            2.6s
 => => writing image sha256:9a53a47ff2b4e42a8991e410055058dd7df4856ed00da3d5e10e9712cdc9bee3                       0.1s
 => => naming to docker.io/library/project:1                                                                       0.1s
```

RUNNING DOCKER IMAGE [CONTAINER DEPLOYMENT]:



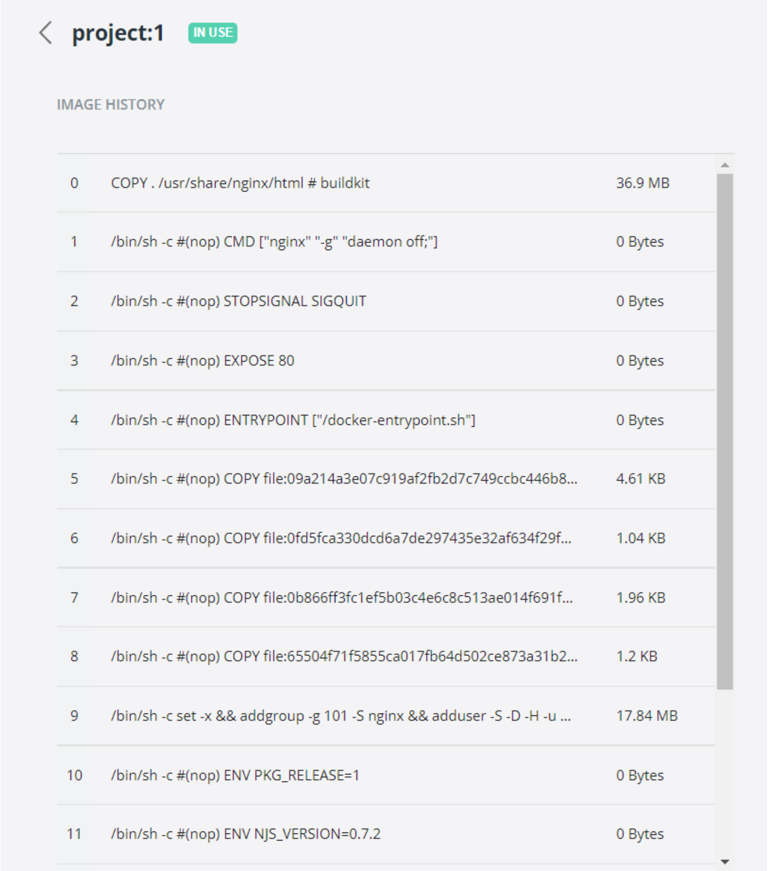
```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>docker run -d -p 80:80 project:1
e5cd5a5f58bc78409ccc386dca7364e0d647f4bc962865497380c96fa6d80c45
```

IMAGE CACHING:



project	IN USE	1	9a53a47ff2b4	about 12 hours ago	60.34 MB

LAYER CACHING:

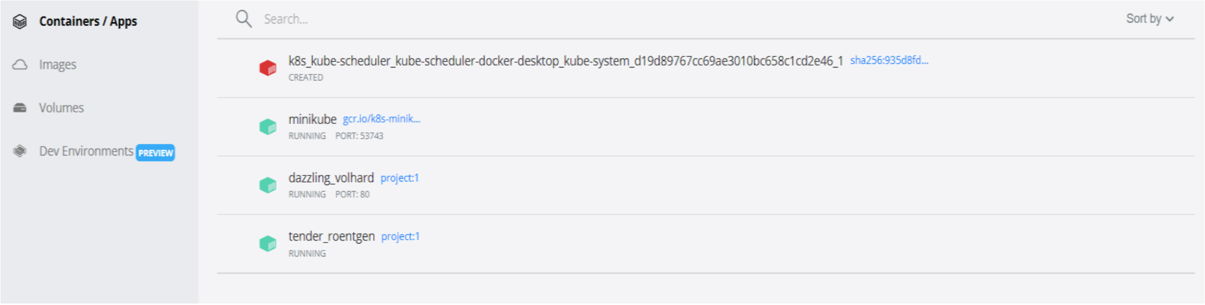


project:1 IN USE

IMAGE HISTORY

0	COPY . /usr/share/nginx/html # buildkit	36.9 MB
1	/bin/sh -c #(nop) CMD ["nginx" "-g" "daemon off;"]	0 Bytes
2	/bin/sh -c #(nop) STOPSIGNAL SIGQUIT	0 Bytes
3	/bin/sh -c #(nop) EXPOSE 80	0 Bytes
4	/bin/sh -c #(nop) ENTRYPOINT ["/docker-entrypoint.sh"]	0 Bytes
5	/bin/sh -c #(nop) COPY file:09a214a3e07c919af2fb2d7c749ccbc446b8...	4.61 KB
6	/bin/sh -c #(nop) COPY file:0fd5fca330dcd6a7de297435e32af634f29f...	1.04 KB
7	/bin/sh -c #(nop) COPY file:0b866ff3fc1ef5b03c4e6c8c513ae014f691f...	1.96 KB
8	/bin/sh -c #(nop) COPY file:65504f71f5855ca017fb64d502ce873a31b2...	1.2 KB
9	/bin/sh -c set -x && addgroup -g 101 -S nginx && adduser -S -D -H -u ...	17.84 MB
10	/bin/sh -c #(nop) ENV PKG_RELEASE=1	0 Bytes
11	/bin/sh -c #(nop) ENV NJS_VERSION=0.7.2	0 Bytes

CONTAINERS:



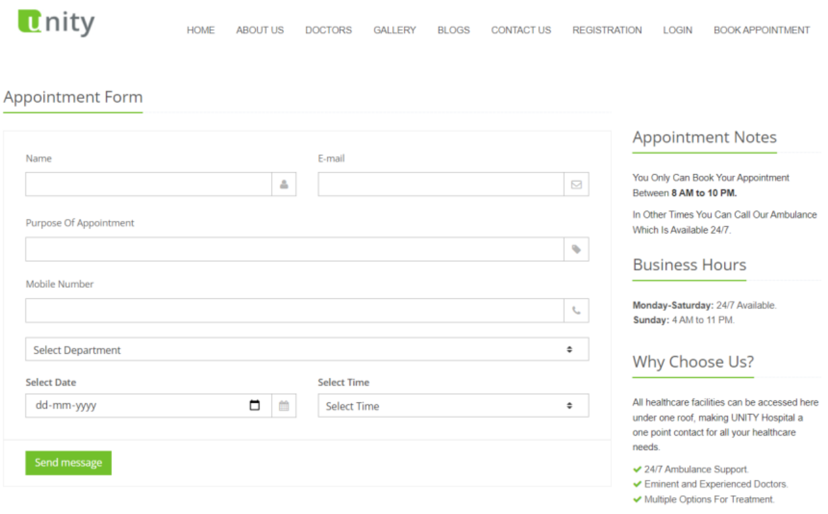
k8s_kube-scheduler_kube-scheduler-docker-desktop_kube-system_d19d89767cc69ae3010bc658c1cd2e46_1 sha256:935d8fd...
CREATED

minikube gcr.io/k8s-minik...
RUNNING PORT: 53743

dazzling_volhard project:1
RUNNING PORT: 80

tender_roentgen project:1
RUNNING

CONTAINER SERVICE EXPOSURE:



Appointment Form

Appointment Notes

You Only Can Book Your Appointment Between **8 AM to 10 PM.**

In Other Times You Can Call Our Ambulance Which Is Available 24/7.

Business Hours

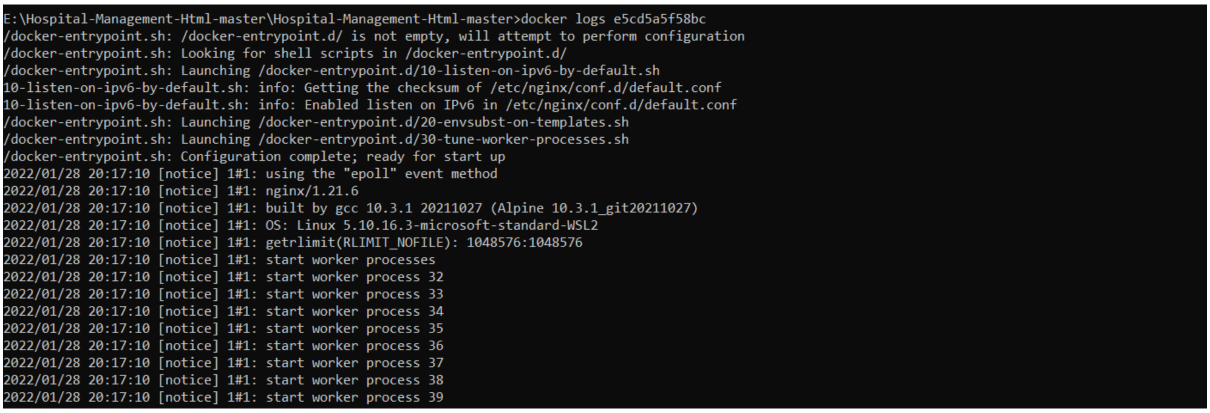
Monday-Saturday: 24/7 Available.
Sunday: 4 AM to 11 PM.

Why Choose Us?

All healthcare facilities can be accessed here under one roof, making UNITY Hospital a one point contact for all your healthcare needs.

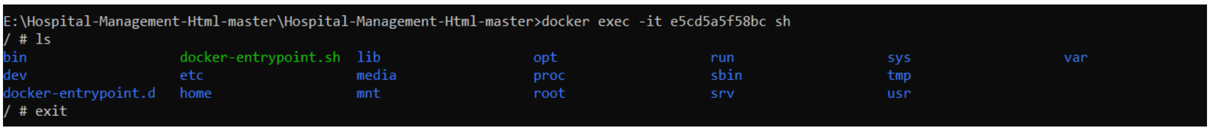
- ✓ 24/7 Ambulance Support.
- ✓ Eminent and Experienced Doctors.
- ✓ Multiple Options For Treatment.

CONTAINER LOG FETCHING:



```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>docker logs e5cd5a5f58bc
/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
2022/01/28 20:17:10 [notice] 1#1: using the "epoll" event method
2022/01/28 20:17:10 [notice] 1#1: nginx/1.21.6
2022/01/28 20:17:10 [notice] 1#1: built by gcc 10.3.1 20211027 (Alpine 10.3.1_git20211027)
2022/01/28 20:17:10 [notice] 1#1: OS: Linux 5.10.16.3-microsoft-standard-WSL2
2022/01/28 20:17:10 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2022/01/28 20:17:10 [notice] 1#1: start worker processes
2022/01/28 20:17:10 [notice] 1#1: start worker process 32
2022/01/28 20:17:10 [notice] 1#1: start worker process 33
2022/01/28 20:17:10 [notice] 1#1: start worker process 34
2022/01/28 20:17:10 [notice] 1#1: start worker process 35
2022/01/28 20:17:10 [notice] 1#1: start worker process 36
2022/01/28 20:17:10 [notice] 1#1: start worker process 37
2022/01/28 20:17:10 [notice] 1#1: start worker process 38
2022/01/28 20:17:10 [notice] 1#1: start worker process 39
```

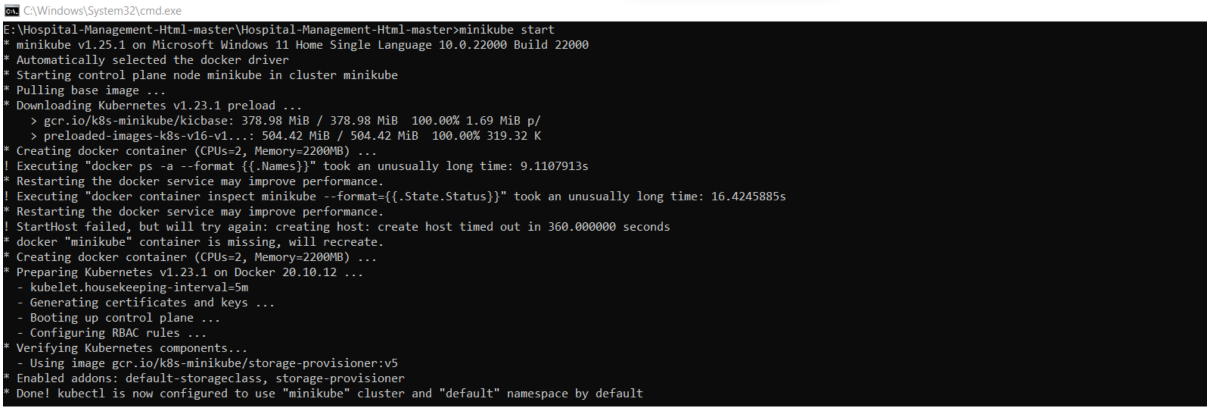
EXECUTING INTO THE DOCKER:



```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>docker exec -it e5cd5a5f58bc sh
/ # ls
bin                   docker-entrypoint.sh  lib                   opt                   run                   sys                   var
dev                   etc                   media                 proc                  sbin                  tmp
docker-entrypoint.d   home                  mnt                   root                  srv                   usr
/ # exit
```

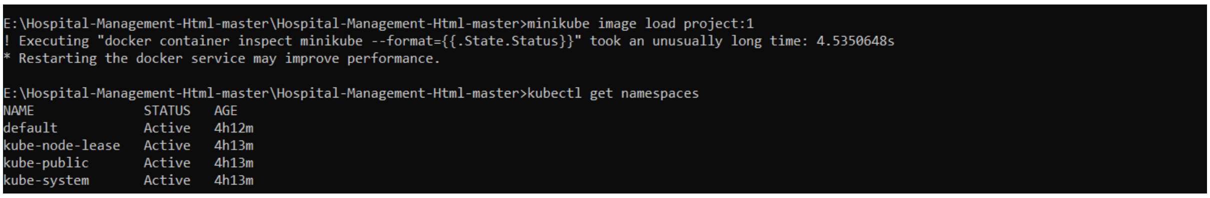
KUBERNETS:

STARTING MINIKUBE:

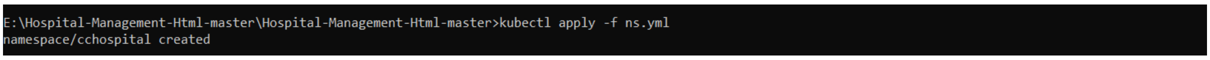


```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>minikube start
* minikube v1.25.1 on Microsoft Windows 11 Home Single Language 10.0.22000 Build 22000
* Automatically selected the docker driver
* Starting control plane node minikube in cluster minikube
* Pulling base image ...
* Downloading Kubernetes v1.23.1 preload ...
    > gcr.io/k8s-minikube/kicbase: 378.98 MiB / 378.98 MiB  100.00% 1.69 MiB p/
    > preloaded-images-k8s-v16-v1...: 504.42 MiB / 504.42 MiB  100.00% 319.32 K
* Creating docker container (CPUs=2, Memory=2200MB) ...
! Executing "docker ps -a --format {{.Names}}" took an unusually long time: 9.1107913s
* Restarting the docker service may improve performance.
! Executing "docker container inspect minikube --format={{.State.Status}}" took an unusually long time: 16.4245885s
* Restarting the docker service may improve performance.
! StartHost failed, but will try again: creating host: create host timed out in 360.000000 seconds
* docker "minikube" container is missing, will recreate.
* Creating docker container (CPUs=2, Memory=2200MB) ...
* Preparing Kubernetes v1.23.1 on Docker 20.10.12 ...
  - kubelet.housekeeping-interval=5m
  - Generating certificates and keys ...
  - Booting up control plane ...
  - Configuring RBAC rules ...
* Verifying Kubernetes components...
  - Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Enabled addons: default-storageclass, storage-provisioner
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
```

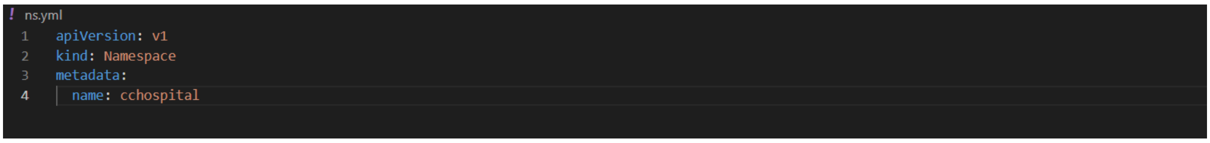
CREATING NAME SPACE:



```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>minikube image load project:1
! Executing "docker container inspect minikube --format={{.State.Status}}" took an unusually long time: 4.5350648s
* Restarting the docker service may improve performance.

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl get namespaces
NAME              STATUS   AGE
default           Active   4h12m
kube-node-lease   Active   4h13m
kube-public       Active   4h13m
kube-system       Active   4h13m
```

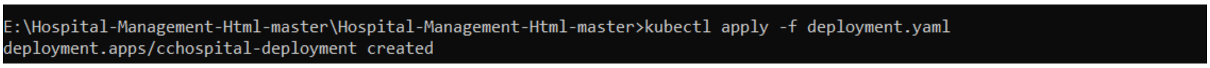


```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl apply -f ns.yml
namespace/cchospital created
```

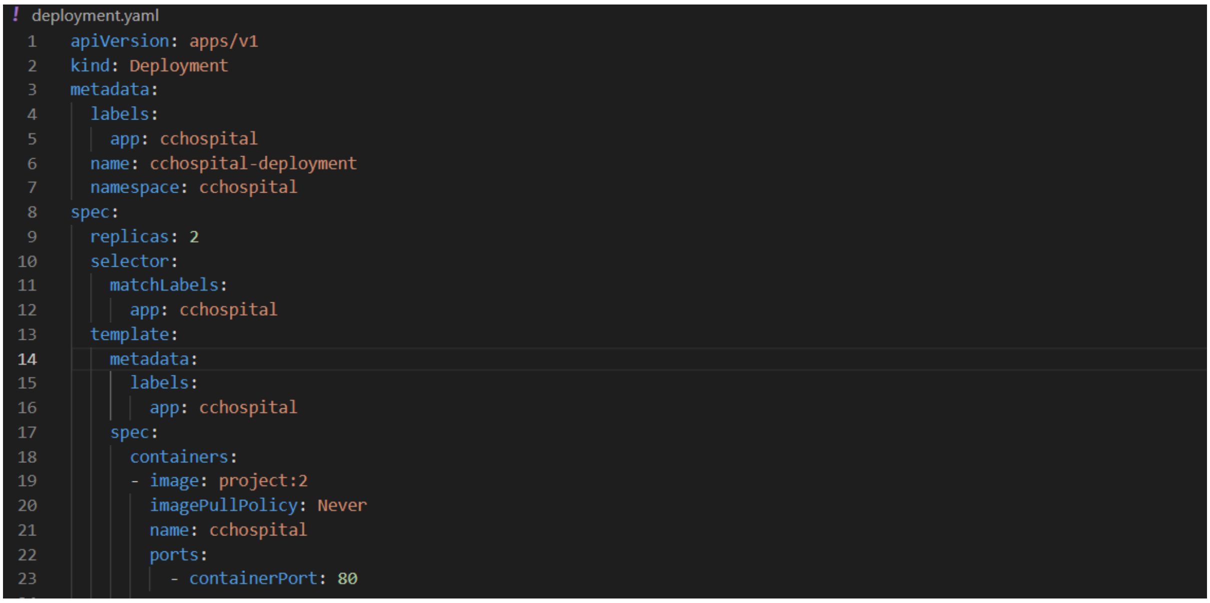


```yaml
apiVersion: v1
kind: Namespace
metadata:
  name: cchospital
```

CREATING POD IN THE NAME SPACE:

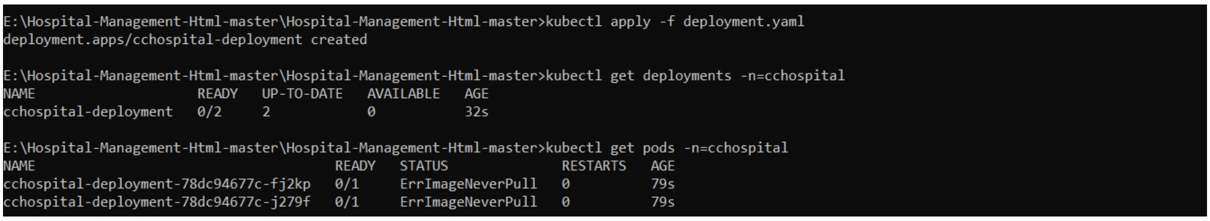


```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl apply -f deployment.yaml
deployment.apps/cchospital-deployment created
```



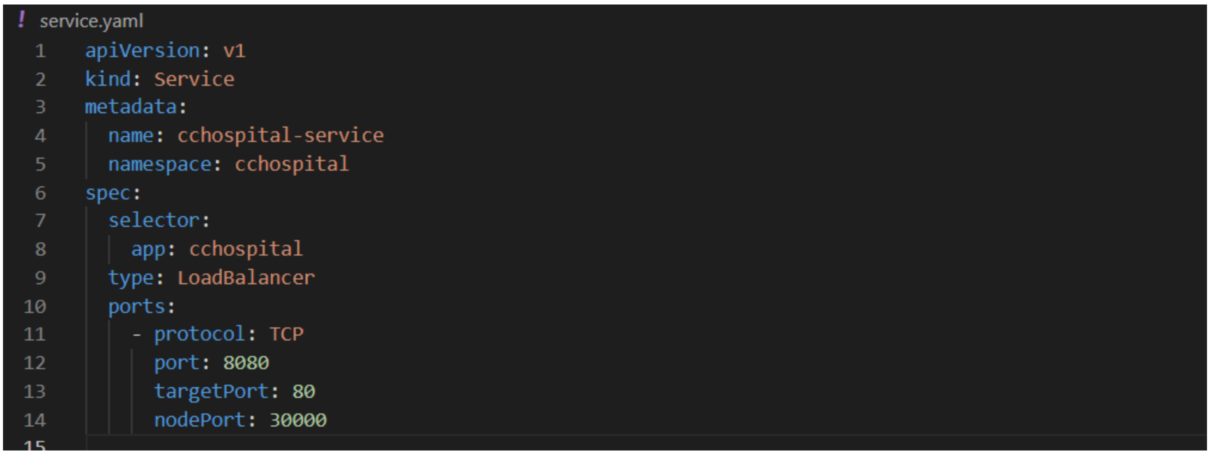
```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  labels:
    app: cchospital
  name: cchospital-deployment
  namespace: cchospital
spec:
  replicas: 2
  selector:
    matchLabels:
      app: cchospital
  template:
    metadata:
      labels:
        app: cchospital
    spec:
      containers:
      - image: project:2
        imagePullPolicy: Never
        name: cchospital
        ports:
          - containerPort: 80
```

CONFIGURING DEPLOYMENT POD WITH 2 REPLICAS:



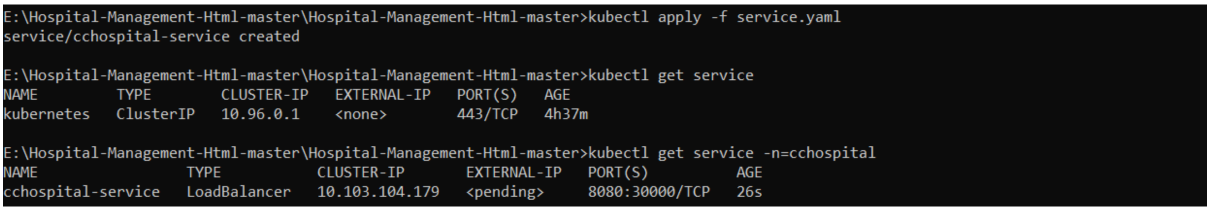
```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl apply -f deployment.yaml
deployment.apps/cchospital-deployment created

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl get deployments -n=cchospital
NAME                    READY   UP-TO-DATE   AVAILABLE   AGE
cchospital-deployment   0/2     2            0           32s

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl get pods -n=cchospital
NAME                                     READY   STATUS              RESTARTS   AGE
cchospital-deployment-78dc94677c-fj2kp   0/1     ErrImageNeverPull   0          79s
cchospital-deployment-78dc94677c-j279f   0/1     ErrImageNeverPull   0          79s
```

SERVICE EXPOSURE(v1):

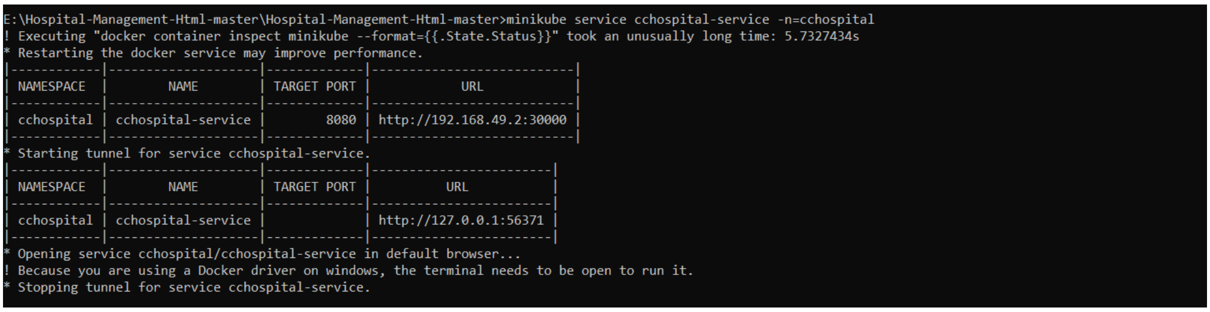


! service.yaml

```
apiVersion: v1
kind: Service
metadata:
  name: cchospital-service
  namespace: cchospital
spec:
  selector:
    app: cchospital
  type: LoadBalancer
  ports:
    - protocol: TCP
      port: 8080
      targetPort: 80
      nodePort: 30000
```

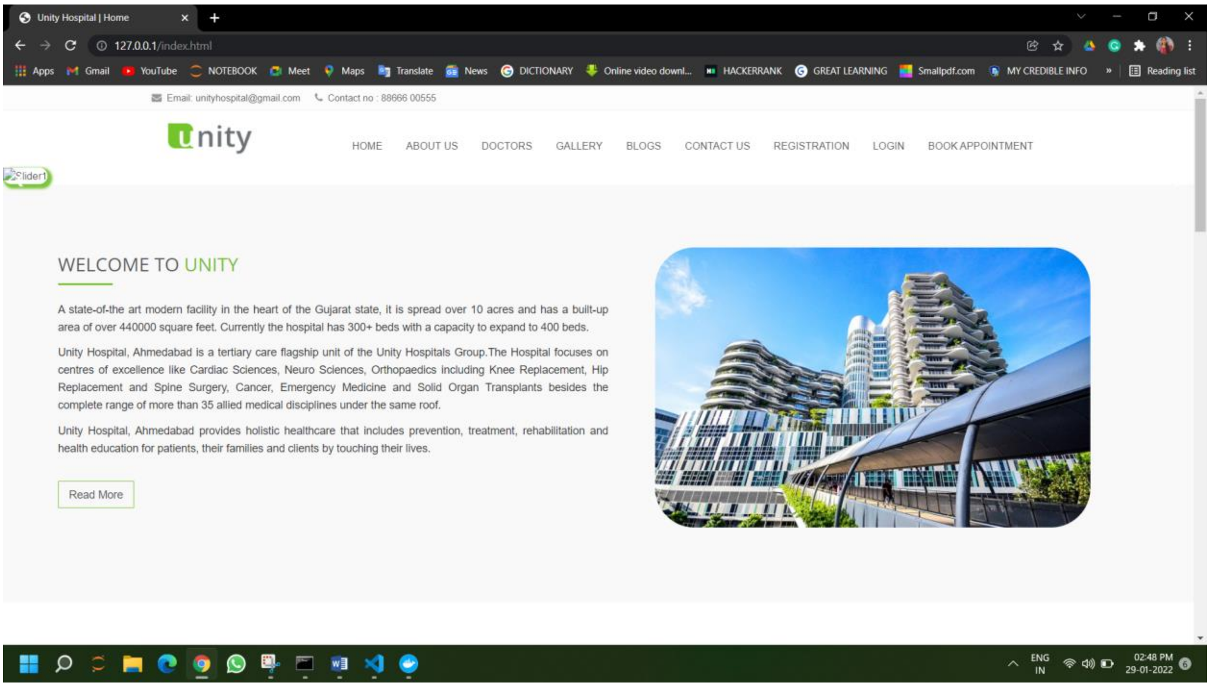


```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl apply -f service.yaml
service/cchospital-service created

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl get service
NAME         TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
kubernetes   ClusterIP   10.96.0.1    <none>        443/TCP   4h37m

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl get service -n=cchospital
NAME                 TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
cchospital-service   LoadBalancer   10.103.104.179   <pending>     8080:30000/TCP   26s
```



```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>minikube service cchospital-service -n=cchospital
! Executing "docker container inspect minikube --format={{.State.Status}}" took an unusually long time: 5.7327434s
* Restarting the docker service may improve performance.
|------------|--------------------|-------------|---------------------------|
| NAMESPACE  |        NAME        | TARGET PORT |            URL            |
|------------|--------------------|-------------|---------------------------|
| cchospital | cchospital-service |        8080 | http://192.168.49.2:30000 |
|------------|--------------------|-------------|---------------------------|
* Starting tunnel for service cchospital-service.
|------------|--------------------|-------------|------------------------|
| NAMESPACE  |        NAME        | TARGET PORT |          URL           |
|------------|--------------------|-------------|------------------------|
| cchospital | cchospital-service |             | http://127.0.0.1:56371 |
|------------|--------------------|-------------|------------------------|
* Opening service cchospital/cchospital-service in default browser...
! Because you are using a Docker driver on windows, the terminal needs to be open to run it.
* Stopping tunnel for service cchospital-service.
```

HOSTED WEBPAGE:



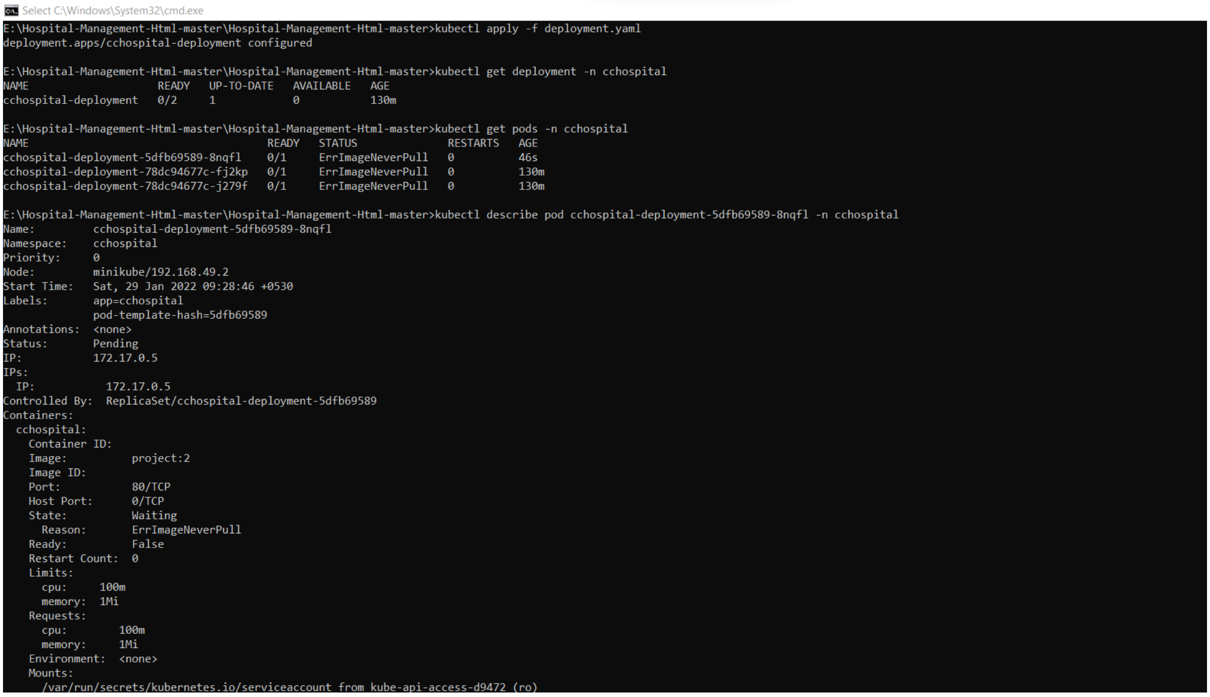
WELCOME TO UNITY

A state-of-the art modern facility in the heart of the Gujarat state, it is spread over 10 acres and has a built-up area of over 440000 square feet. Currently the hospital has 300+ beds with a capacity to expand to 400 beds.

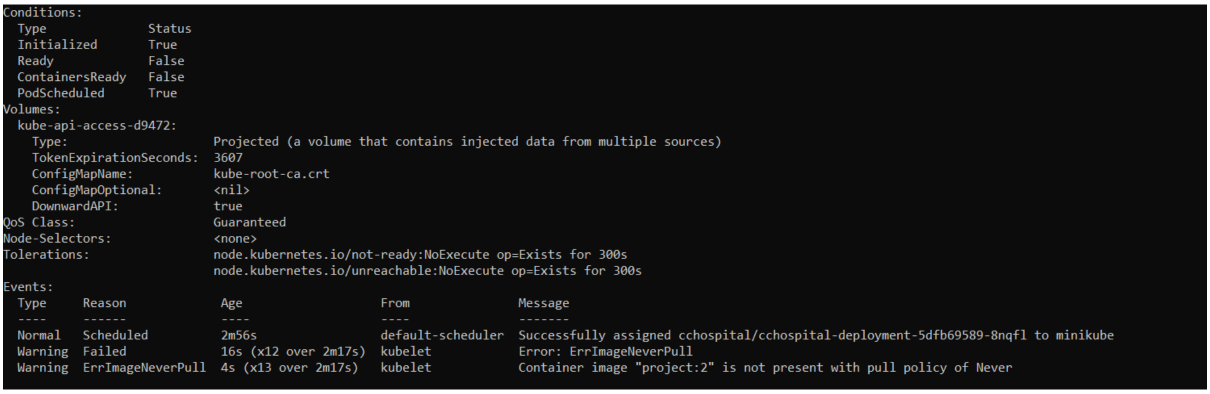
Unity Hospital, Ahmedabad is a tertiary care flagship unit of the Unity Hospitals Group.The Hospital focuses on centres of excellence like Cardiac Sciences, Neuro Sciences, Orthopaedics including Knee Replacement, Hip Replacement and Spine Surgery, Cancer, Emergency Medicine and Solid Organ Transplants besides the complete range of more than 35 allied medical disciplines under the same roof.

Unity Hospital, Ahmedabad provides holistic healthcare that includes prevention, treatment, rehabilitation and health education for patients, their families and clients by touching their lives.

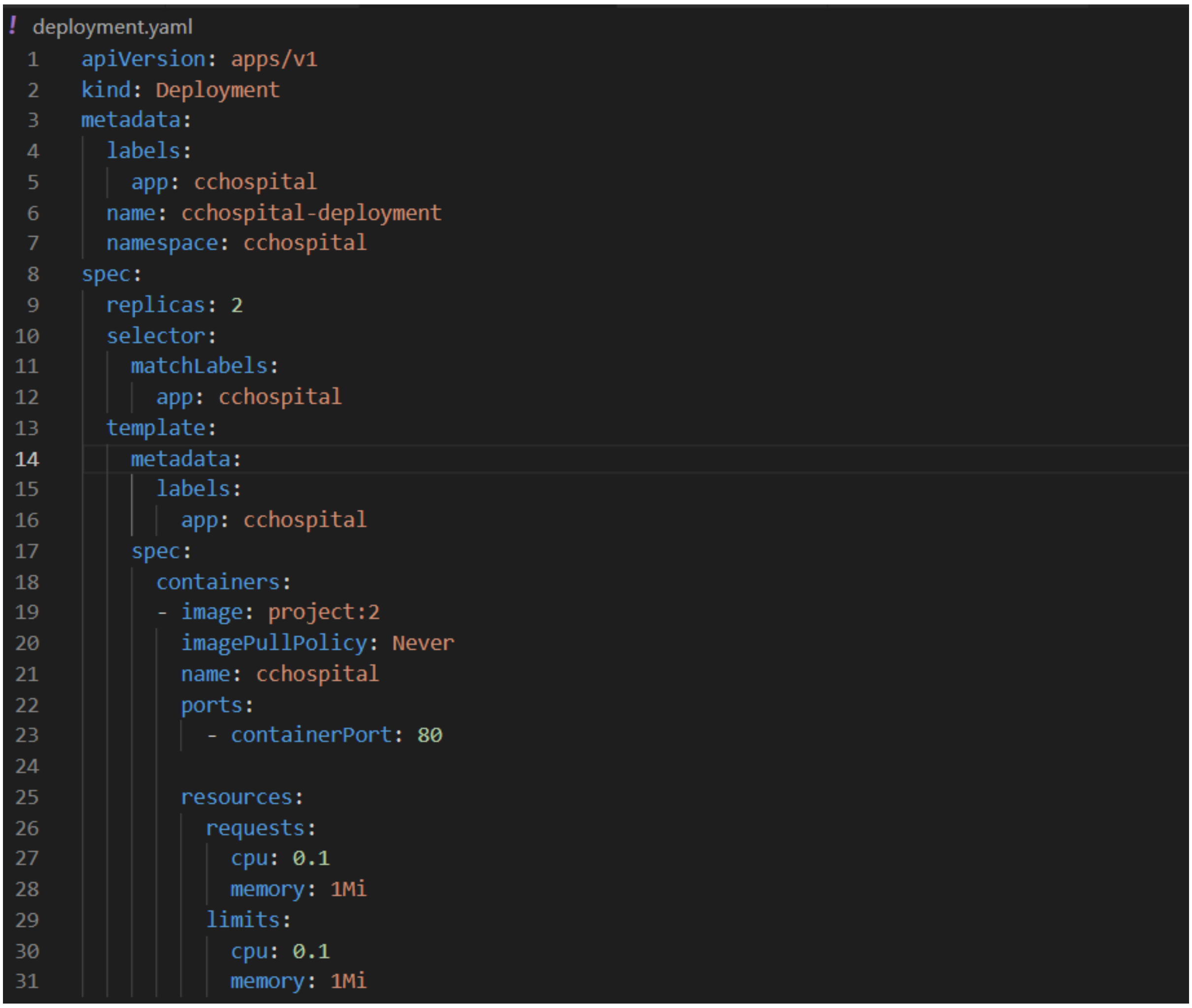
RESOURCE LIMITATION:



```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl apply -f deployment.yaml
deployment.apps/cchospital-deployment configured

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl get deployment -n cchospital
NAME                    READY   UP-TO-DATE   AVAILABLE   AGE
cchospital-deployment   0/2     1            0           130m

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl get pods -n cchospital
NAME                                     READY   STATUS              RESTARTS   AGE
cchospital-deployment-5dfb69589-8nqfl    0/1     ErrImageNeverPull   0          46s
cchospital-deployment-78dc94677c-fj2kp   0/1     ErrImageNeverPull   0          130m
cchospital-deployment-78dc94677c-j279f   0/1     ErrImageNeverPull   0          130m

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl describe pod cchospital-deployment-5dfb69589-8nqfl -n cchospital
Name:         cchospital-deployment-5dfb69589-8nqfl
Namespace:    cchospital
Priority:     0
Node:         minikube/192.168.49.2
Start Time:   Sat, 29 Jan 2022 09:28:46 +0530
Labels:       app=cchospital
              pod-template-hash=5dfb69589
Annotations:  <none>
Status:       Pending
IP:           172.17.0.5
IPs:
  IP:           172.17.0.5
Controlled By:  ReplicaSet/cchospital-deployment-5dfb69589
Containers:
  cchospital:
    Container ID:
    Image:          project:2
    Image ID:
    Port:           80/TCP
    Host Port:      0/TCP
    State:          Waiting
      Reason:       ErrImageNeverPull
    Ready:          False
    Restart Count:  0
    Limits:
      cpu:     100m
      memory:  1Mi
    Requests:
      cpu:        100m
      memory:     1Mi
    Environment:  <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-d9472 (ro)
```



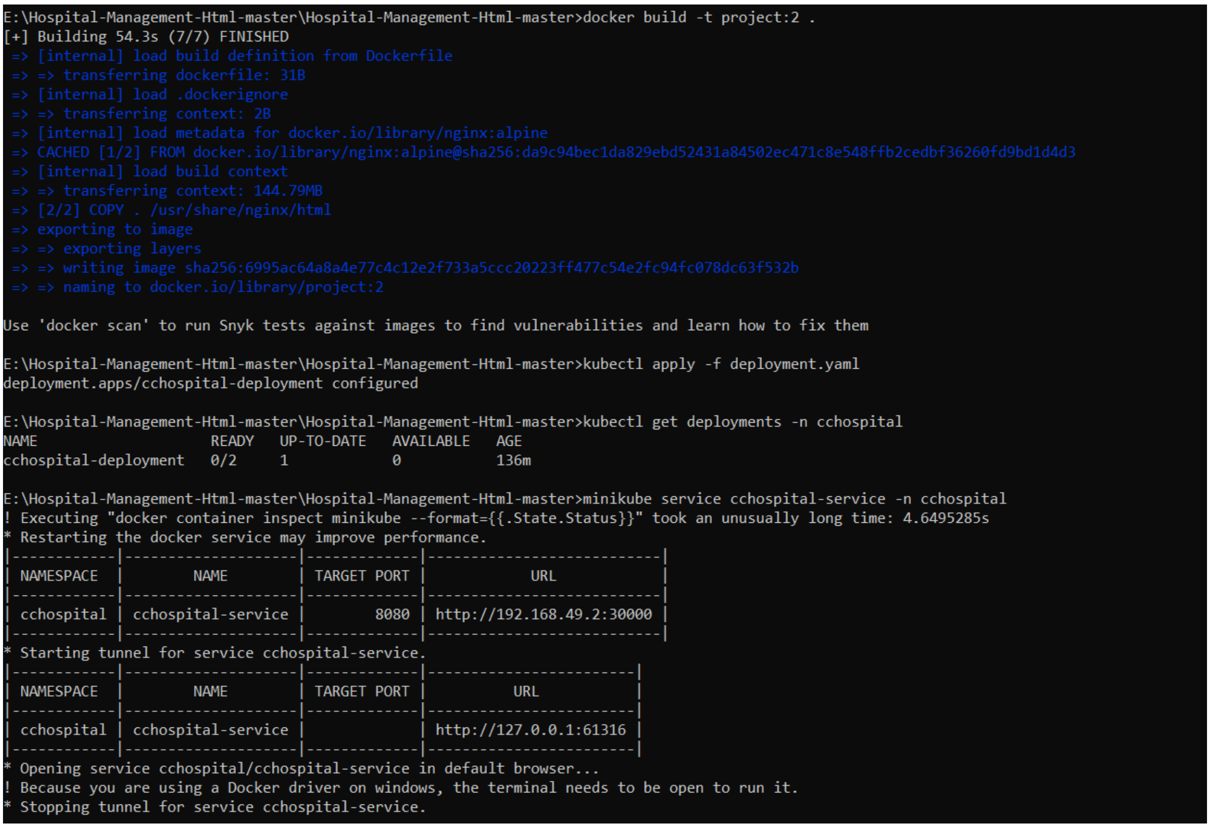
```
Conditions:
  Type              Status
  Initialized       True
  Ready             False
  ContainersReady   False
  PodScheduled      True
Volumes:
  kube-api-access-d9472:
    Type:                    Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds:  3607
    ConfigMapName:           kube-root-ca.crt
    ConfigMapOptional:       <nil>
    DownwardAPI:             true
QoS Class:                   Guaranteed
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          2m56s                 default-scheduler  Successfully assigned cchospital/cchospital-deployment-5dfb69589-8nqfl to minikube
  Warning  Failed             16s (x12 over 2m17s)  kubelet            Error: ErrImageNeverPull
  Warning  ErrImageNeverPull  4s (x13 over 2m17s)   kubelet            Container image "project:2" is not present with pull policy of Never
```



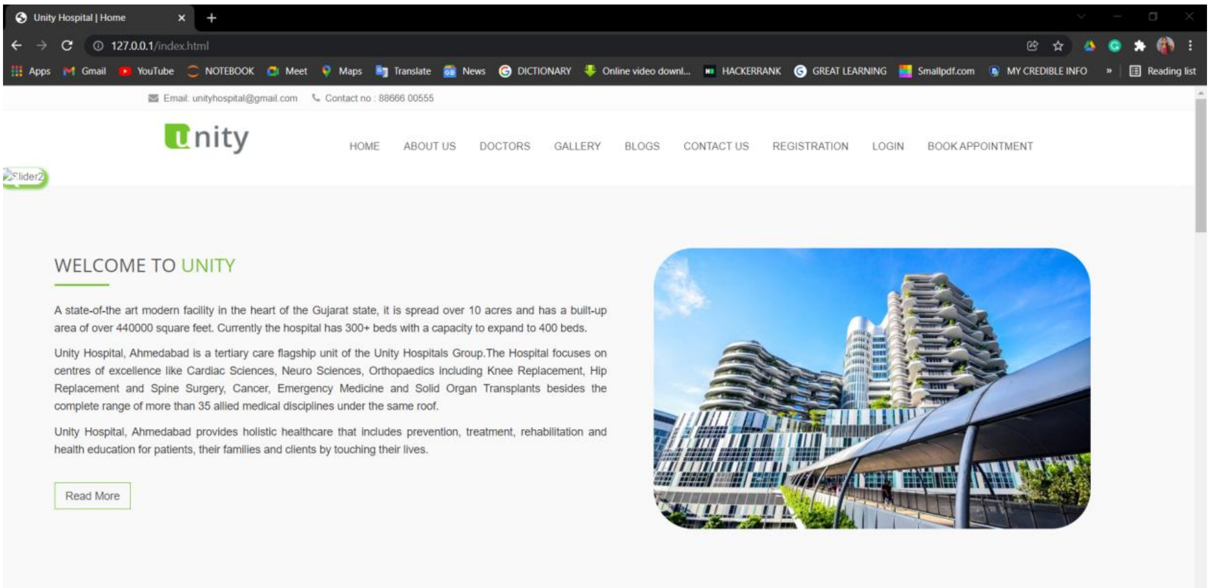
```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  labels:
    app: cchospital
  name: cchospital-deployment
  namespace: cchospital
spec:
  replicas: 2
  selector:
    matchLabels:
      app: cchospital
  template:
    metadata:
      labels:
        app: cchospital
    spec:
      containers:
      - image: project:2
        imagePullPolicy: Never
        name: cchospital
        ports:
          - containerPort: 80

        resources:
          requests:
            cpu: 0.1
            memory: 1Mi
          limits:
            cpu: 0.1
            memory: 1Mi
```

ROLLBACK STRATEGY

VERSION 2:



```
E:\Hospital-Management-Html-master\Hospital-Management-Html-master>docker build -t project:2 .
[+] Building 54.3s (7/7) FINISHED
 => [internal] load build definition from Dockerfile
 => => transferring dockerfile: 31B
 => [internal] load .dockerignore
 => => transferring context: 2B
 => [internal] load metadata for docker.io/library/nginx:alpine
 => CACHED [1/2] FROM docker.io/library/nginx:alpine@sha256:da9c94bec1da829ebd52431a84502ec471c8e548ffb2cedbf36260fd9bd1d4d3
 => [internal] load build context
 => => transferring context: 144.79MB
 => [2/2] COPY . /usr/share/nginx/html
 => exporting to image
 => => exporting layers
 => => writing image sha256:6995ac64a8a4e77c4c12e2f733a5ccc20223ff477c54e2fc94fc078dc63f532b
 => => naming to docker.io/library/project:2

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl apply -f deployment.yaml
deployment.apps/cchospital-deployment configured

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>kubectl get deployments -n cchospital
NAME                    READY   UP-TO-DATE   AVAILABLE   AGE
cchospital-deployment   0/2     1            0           136m

E:\Hospital-Management-Html-master\Hospital-Management-Html-master>minikube service cchospital-service -n cchospital
! Executing "docker container inspect minikube --format={{.State.Status}}" took an unusually long time: 4.6495285s
* Restarting the docker service may improve performance.
|------------|--------------------|-------------|---------------------------|
| NAMESPACE  |        NAME        | TARGET PORT |            URL            |
|------------|--------------------|-------------|---------------------------|
| cchospital | cchospital-service |        8080 | http://192.168.49.2:30000 |
|------------|--------------------|-------------|---------------------------|
* Starting tunnel for service cchospital-service.
|------------|--------------------|-------------|------------------------|
| NAMESPACE  |        NAME        | TARGET PORT |          URL           |
|------------|--------------------|-------------|------------------------|
| cchospital | cchospital-service |             | http://127.0.0.1:61316 |
|------------|--------------------|-------------|------------------------|
* Opening service cchospital/cchospital-service in default browser...
! Because you are using a Docker driver on windows, the terminal needs to be open to run it.
* Stopping tunnel for service cchospital-service.
```



WELCOME TO UNITY

A state-of-the art modern facility in the heart of the Gujarat state, it is spread over 10 acres and has a built-up area of over 440000 square feet. Currently the hospital has 300+ beds with a capacity to expand to 400 beds.

Unity Hospital, Ahmedabad is a tertiary care flagship unit of the Unity Hospitals Group.The Hospital focuses on centres of excellence like Cardiac Sciences, Neuro Sciences, Orthopaedics including Knee Replacement, Hip Replacement and Spine Surgery, Cancer, Emergency Medicine and Solid Organ Transplants besides the complete range of more than 35 allied medical disciplines under the same roof.

Unity Hospital, Ahmedabad provides holistic healthcare that includes prevention, treatment, rehabilitation and health education for patients, their families and clients by touching their lives.