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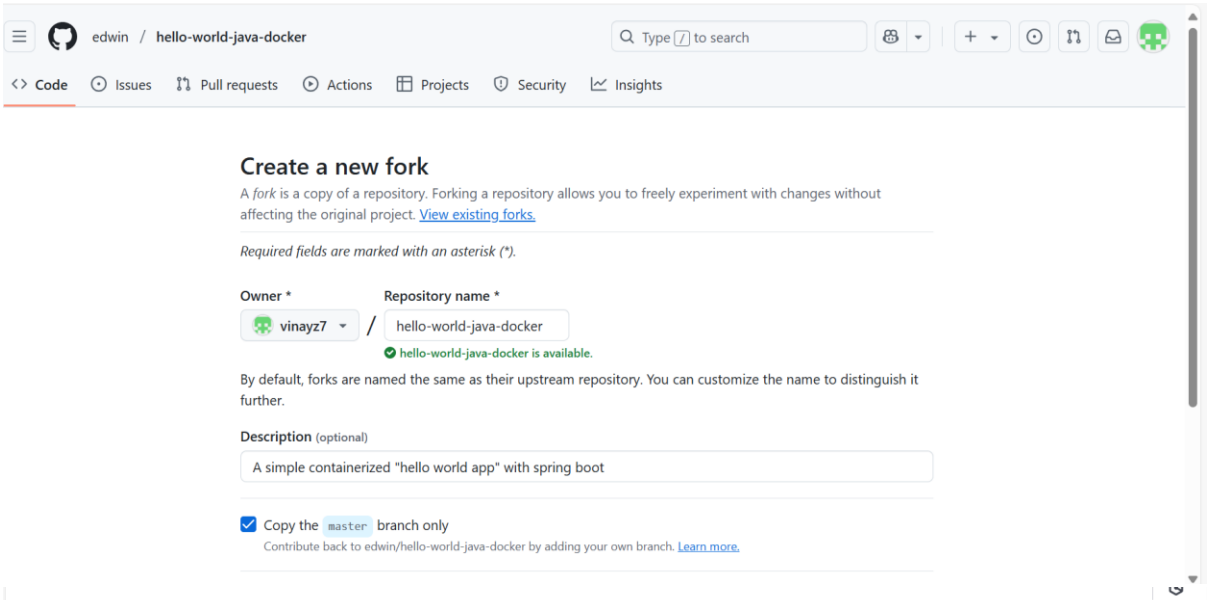
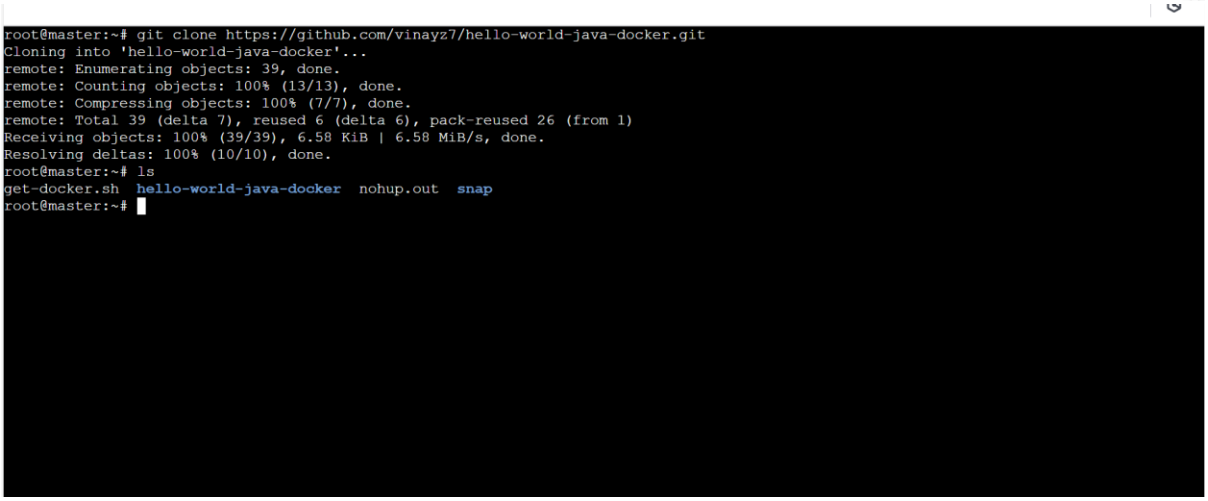
Assignment: Dockerizing a Java Application and Deploying it on Kubernetes

Task 1: Fork a Java Repository

1. Fork the given Java HelloWorld Git repository from GitHub.
2. Clone it into your local machine.

Github link: [vinayz7/hello-world-java-docker: A simple containerized "hello world app" with spring boot]





Task 2: Define a Dockerfile

Create a `Dockerfile` to containerize the Java application. It should:
• Use an appropriate base image (e.g., OpenJDK).
• Copy the Java files into the container.
• Compile and execute the Java program.

```
FROM registry.access.redhat.com/ubi8/ubi-minimal:8.5

MAINTAINER Muhammad Edwin < edwin at redhat dot com >

LABEL BASE_IMAGE="registry.access.redhat.com/ubi8/ubi-minimal:8.5"
LABEL JAVA_VERSION="11"

RUN microdnf install --nodocs java-11-openjdk-headless && microdnf clean all

WORKDIR /work/
COPY target/*.jar /work/application.jar

EXPOSE 8080
CMD ["java", "-jar", "application.jar"]
~
~
~
~
~
~
~
~
~
```

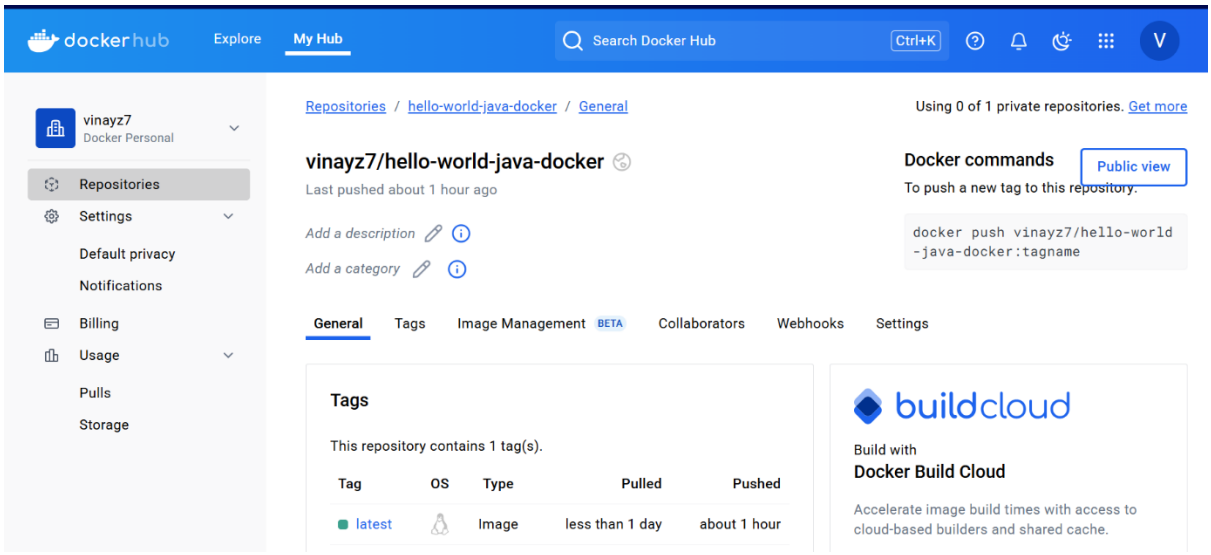
```
root@master:~# docker images
REPOSITORY                          TAG       IMAGE ID       CREATED          SIZE
vinayz7/hello-world-java-docker     latest    4acc8306b5ee   18 minutes ago   383MB
hello-world-java-docker             latest    3c977e7ead0d   18 minutes ago   383MB
<none>                              <none>    0fe6e12e0797   19 minutes ago   383MB
```

```
root@master:~# docker ps
CONTAINER ID   IMAGE                     COMMAND                  CREATED          STATUS          PORTS
           NAMES
9c41c1966a72   hello-world-java-docker   "java -jar applicati…"   19 minutes ago   Up 19 minutes   0.0.0.0:8881->8080/tcp, [::]:8881-
>8080/tcp   hello-world-java-docker
```

Task 3: Build and Push Docker Image

1. Build a Docker image from the Dockerfile.

Dockerhub repo link : [vinayz7/hello-world-java-docker general | Docker Hub]



```
root@master:~# docker images
REPOSITORY                          TAG       IMAGE ID       CREATED          SIZE
vinayz7/hello-world-java-docker     latest    4acc8306b5ee   18 minutes ago   383MB
hello-world-java-docker             latest    3c977e7ead0d   18 minutes ago   383MB
<none>                              <none>    0fe6e12e0797   19 minutes ago   383MB
```

Task 4: Create a Kubernetes Deployment

Define a Deployment YAML file (`deployment.yaml`) for your application and apply it using `kubectl apply -f deployment.yaml`.

```
  GNU nano 6.2                                        deployment.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: hello-world-deploy
  labels:
    app: hello-world-java-docker
spec:
  replicas: 1
  selector:
    matchLabels:
      app: hello-world-java-docker
  template:
    metadata:
      labels:
        app: hello-world-java-docker
    spec:
      containers:
      - name: hello-world-java-docker
        image: vinayz7/hello-world-java-docker
        ports:
        - containerPort: 8080
        imagePullPolicy: Always
```

```
root@master:~# vi deployment.yaml
root@master:~# kubectl apply -f deployment.yaml
deployment.apps/hello-world-deploy created
root@master:~# kubectl get deploy
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
hello-world-deploy  1/1     1            1           13s
```

Task 5: Scale Up and Scale Down

Scale out to 3 replicas:
kubectl scale deployment helloworld-deployment --replicas=3

Scale down to 1

replica:kubectl scale deployment helloworld-deployment --replicas=1

```
root@master:~# kubectl scale deployment hello-world-deploy --replicas=3
deployment.apps/hello-world-deploy scaled
root@master:~# kubectl get po
NAME                                READY   STATUS    RESTARTS   AGE
hello-world-deploy-86694445b-4gmsn  1/1     Running   0          14s
hello-world-deploy-86694445b-h9zq4  1/1     Running   0          10m
hello-world-deploy-86694445b-pfvkx  1/1     Running   0          14s
tomcat-deploy-677b8db9b9-f4rz5      1/1     Running   0          19h
root@master:~# kubectl scale deployment hello-world-deploy  --replicas=1
deployment.apps/hello-world-deploy scaled
root@master:~# kubectl get po
NAME                                READY   STATUS    RESTARTS   AGE
hello-world-deploy-86694445b-h9zq4  1/1     Running   0          11m
tomcat-deploy-677b8db9b9-f4rz5      1/1     Running   0          19h
root@master:~#
```

Task 6: Expose the Service Using NodePort

Create a `service.yaml` file and expose the service on a NodePort. Then, access it using `curl http://<public-ip>:30007`.

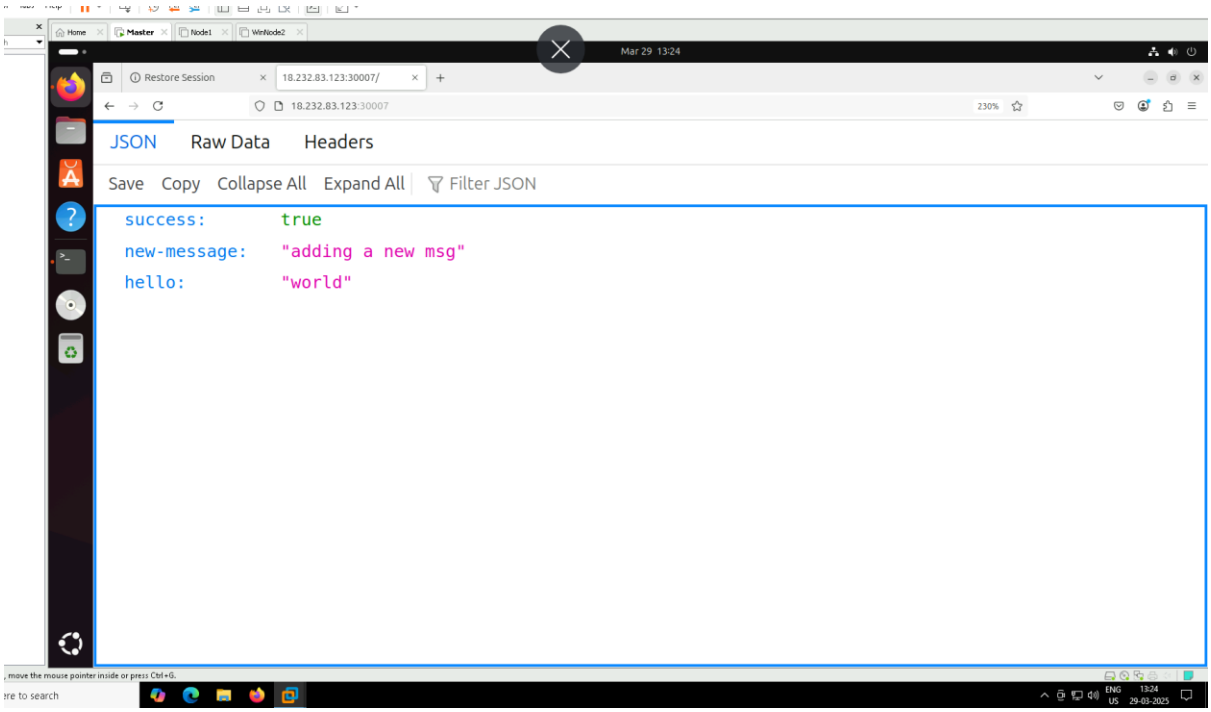
```yaml
apiVersion: v1
kind: Service
metadata:
  name: hello-world-service
spec:
  selector:
    app: hello-world-java-docker
  type: NodePort
  ports:
    - protocol: TCP
      port: 8080       # Service port
      targetPort: 8080 # Container port
      nodePort: 30007  # Exposed port (must be between 30000-32767)
```

```
root@master:~# vi service.yaml
root@master:~# kubectl apply -f service.yaml
service/hello-world-service created
root@master:~# kubectl get svc
NAME                  TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
hello-world-service   NodePort    10.96.229.241   <none>        8080:30007/TCP   9s
kubernetes            ClusterIP   10.96.0.1       <none>        443/TCP          20h
```

```
root@master:~# kubectl get svc
NAME                  TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
hello-world-service   NodePort    10.96.229.241   <none>        8080:30007/TCP   63m
```

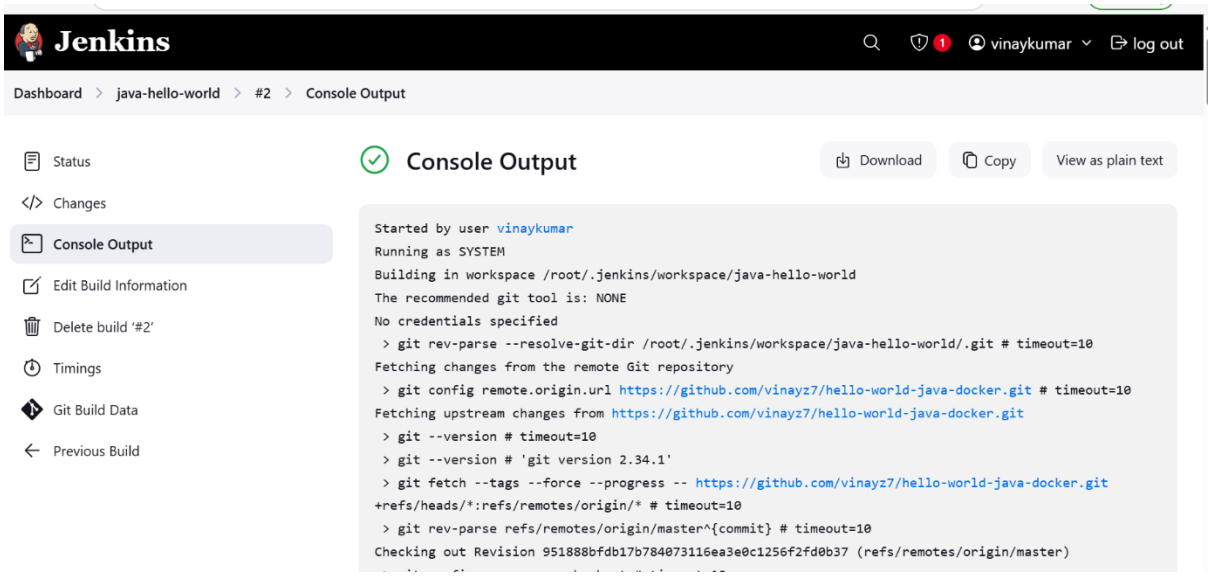
using `curl http://<public-ip>:30007`.

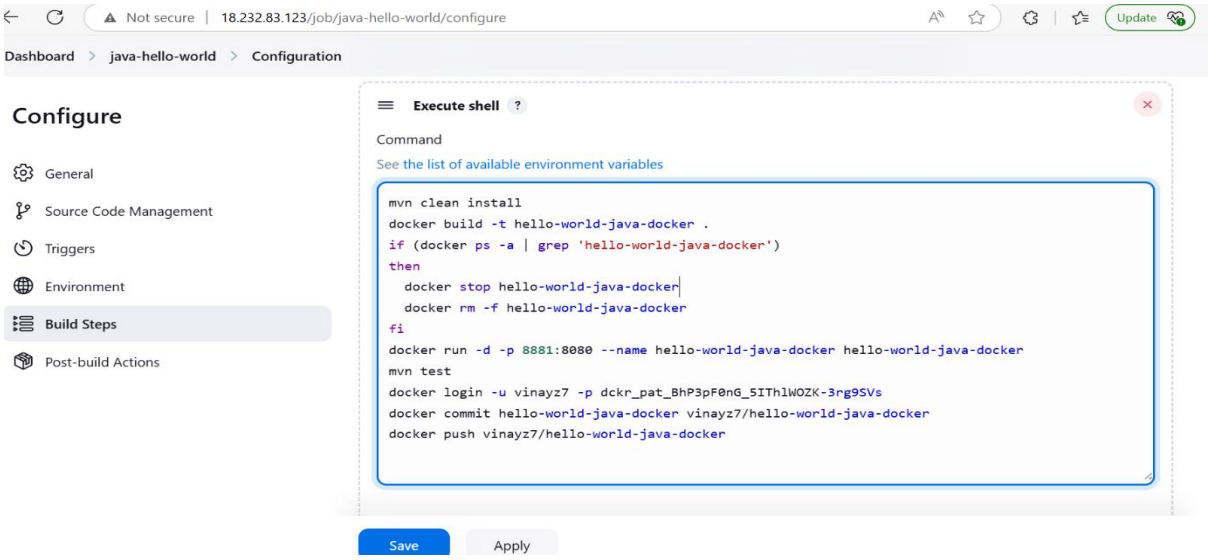
```
root@master:~# curl 18.232.83.123:30007
{"success":true,"new-message":"adding a new msg","hello":"world"}root@mast^C
root@master:~# curl localhost:30007
{"success":true,"new-message":"adding a new msg","hello":"world"}root@master:~#
```

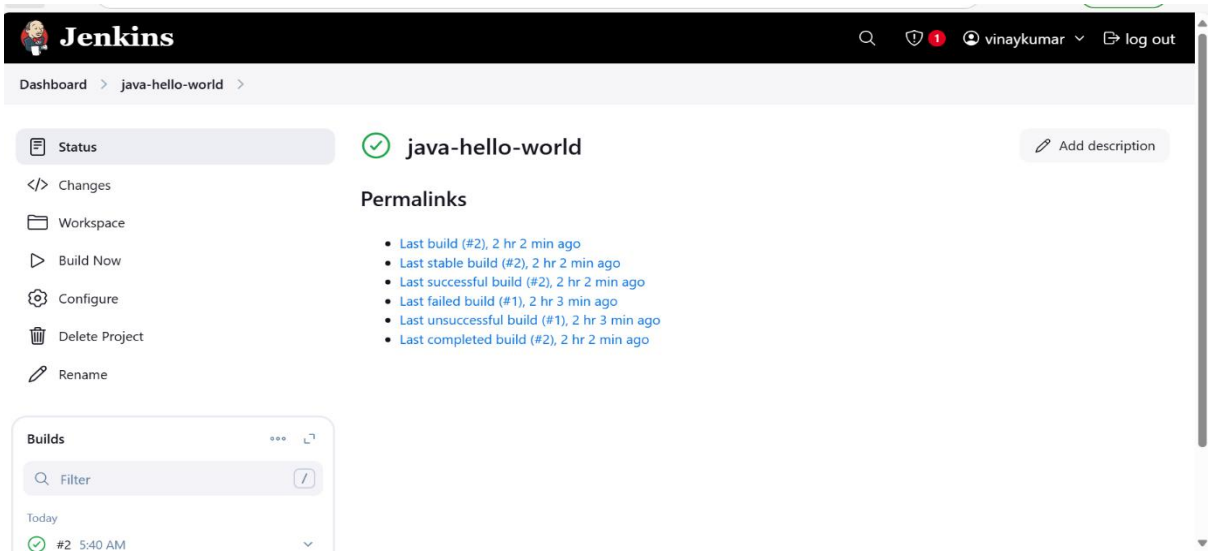


Task 7: Automate Deployment Using Jenkins

Install Jenkins, create a Freestyle Jenkins Job, and configure GitHub webhooks to automate deployment.




Not secure | 18.232.83.123/job/java-hello-world/configure
Update
Dashboard > java-hello-world > Configuration
Configure
General
Source Code Management
Triggers
Environment
Build Steps
Post-build Actions
Execute shell
Command
See the list of available environment variables
mvn clean install
docker build -t hello-world-java-docker .
if (docker ps -a | grep 'hello-world-java-docker')
then
docker stop hello-world-java-docker
docker rm -f hello-world-java-docker
fi
docker run -d -p 8881:8080 --name hello-world-java-docker hello-world-java-docker
mvn test
docker login -u vinayz7 -p dckr_pat_BhP3pF0nG_5IThlWOZK-3rg9SVs
docker commit hello-world-java-docker vinayz7/hello-world-java-docker
docker push vinayz7/hello-world-java-docker
Save
Apply


Jenkins
vinaykumar
log out
Dashboard > java-hello-world >
Status
Changes
Workspace
Build Now
Configure
Delete Project
Rename
java-hello-world
Add description
Permalinks
Last build (#2), 2 hr 2 min ago
Last stable build (#2), 2 hr 2 min ago
Last successful build (#2), 2 hr 2 min ago
Last failed build (#1), 2 hr 3 min ago
Last unsuccessful build (#1), 2 hr 3 min ago
Last completed build (#2), 2 hr 2 min ago
Builds
Filter
Today
#2 5:40 AM


Not secure | 18.232.83.123/job/java-hello-world/2/console
Update
Dashboard > java-hello-world > #2 > Console Output
+ docker push vinayz7/hello-world-java-docker
Using default tag: latest
The push refers to repository [docker.io/vinayz7/hello-world-java-docker]
b111145cb0d4: Preparing
2b6a5d9b3ab0: Preparing
889a085eab4b: Preparing
cb36459aaa32: Preparing
f1ccf0afcb5e: Preparing
235cb1df51fd: Preparing
235cb1df51fd: Waiting
f1ccf0afcb5e: Pushed
889a085eab4b: Pushed
b111145cb0d4: Pushed
2b6a5d9b3ab0: Pushed
235cb1df51fd: Pushed
cb36459aaa32: Pushed
latest: digest: sha256:ccb59f1f1b38434a61be53cd1cc07032302ab798dd811d147c704c4b941ff6b6 size: 1575
Finished: SUCCESS

configure GitHub webhooks to automate deployment.