



INFORMATION
TECHNOLOGY
UNIVERSITY

Software Development & Construction

Quiz 2

Docker & Kubernetes Challenge

Muhammad Hamza
Muhammad Sarmad
Hafiz Azfar Umar Sheikh

BSSE23001
BSSE23013
BSSE23064

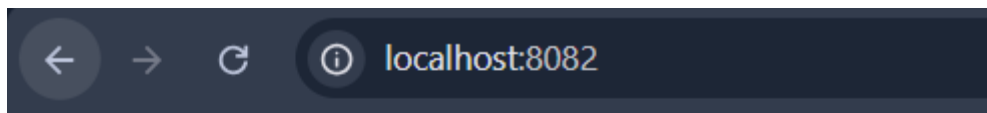
PHASE 1: Container Bootcamp

Nginx image container:

```
PS C:\Users\Azfar> docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS                    NAMES
f35ae4dcb6c    nginx    "/docker-entrypoint..." 2 minutes ago  Up 2 minutes  0.0.0.0:8081->80/tcp, [::]:8081->80/tcp  temp-nginx
PS C:\Users\Azfar> docker stop f35ae4dcb6c
f35ae4dcb6c
PS C:\Users\Azfar> docker rm f35ae4dcb6c
f35ae4dcb6c
PS C:\Users\Azfar>
```

V1 of custom nginx:

```
PS C:\Users\Azfar\Documents\GitHub\SCD-quiz2\phase-1> docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS                    NAMES
720b589439ea   c-nginx:v1 "/docker-entrypoint..." 56 seconds ago Up About a minute  0.0.0.0:8082->80/tcp, [::]:8082->80/tcp  custom-app
PS C:\Users\Azfar\Documents\GitHub\SCD-quiz2\phase-1>
```

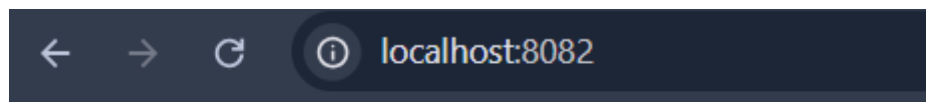


Hello from my Custom Container!

This is the initial version (v1).

Changing content while container is running:

```
PS C:\Users\Azfar\Documents\GitHub\SCD-quiz2\phase-1> docker exec -it custom-app /bin/bash
root@720b589439ea:/# echo "<h1>CHALLENGE COMPLETE!</h1><p>I changed this content while the container was running.</p>" > /usr/share/nginx/html/index.html
bash: !: event not found
root@720b589439ea:/# ^C
root@720b589439ea:/# echo "<h1>CHALLENGE</h1><p>changed this content while the container was running.</p>" > /usr/share/nginx/html/index.html
root@720b589439ea:/# exit
exit
```



CHALLENGE

changed this content while the container was running.

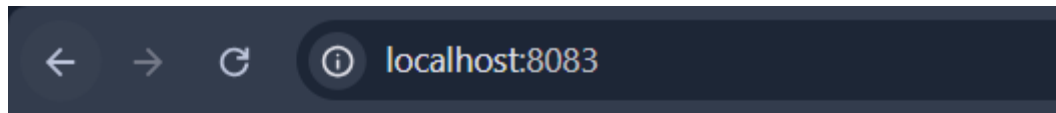
Rebuilt v2 image:

```
PS C:\Users\Azfar\Documents\Github\SCD-quiz2\phase-1> docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED
c-nginx	v2	9334293812d4	About a min
te ago			
225PB			
c-nginx	v1	55075d8a557a	26 minutes a
go			
225PB			
nginx	latest	553f64aecd3	11 days ago
225PB			
cicd-demo	v1	18b4753178ba	12 days ago


```
PS C:\Users\Azfar\Documents\Github\SCD-quiz2\phase-1> docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
895671a46743	c-nginx:v2	"/docker-entrypoint..."	About a minute ago	Up About a minute	0.0.0.0:8083->80/tcp, [::]:8083->80/tcp	custom-app-v2



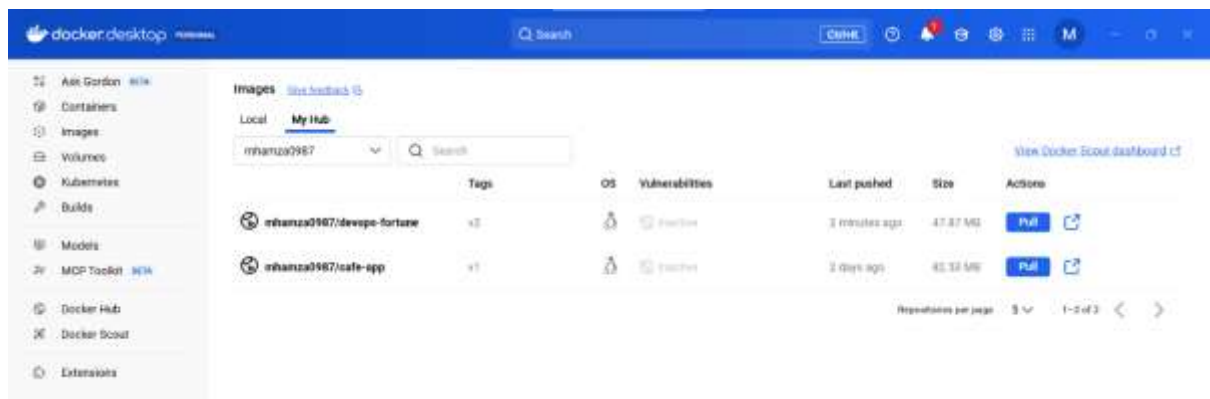
Hello from my Custom Container!

This is the newer version (v2).

Phase 2: App to Containers

Pushing image:

```
Windows PowerShell
PS D:\Github\Projects\SCD-quiz2\app> cd ../
PS D:\Github\Projects\SCD-quiz2> docker tag devops-fortune:v2 mhamza0987/devops-fortune:v2
PS D:\Github\Projects\SCD-quiz2> docker push mhamza0987/devops-fortune:v2
The push refers to repository [docker.io/mhamza0987/devops-fortune]
5f1d80ddf2c5: Pushed
f18232174bc9: Pushed
5b917ff1eb75: Pushed
c89ee076f3e5: Pushed
1e5a4c89cee5: Pushed
cc09213fda12: Pushed
3ed637fd8ff0: Pushed
dd71dde834b5: Pushed
25ff2da83641: Pushed
v2: digest: sha256:4e1b4823c6d6507d8372ee87cf4b6e61bb3eb6409074855df312fe6627ce9419 size: 856
PS D:\Github\Projects\SCD-quiz2>
```



Yaml files:

```
kubernetes > yml app-service.yaml
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: fortune-service
5  spec:
6    type: NodePort
7    selector:
8      app: fortune-app
9    ports:
10     - port: 80
11       targetPort: 3000
12       nodePort: 30007
```

index.html app-service.yaml app-deployment.yaml X redis-deployment.y

kubernetes > app-deployment.yaml

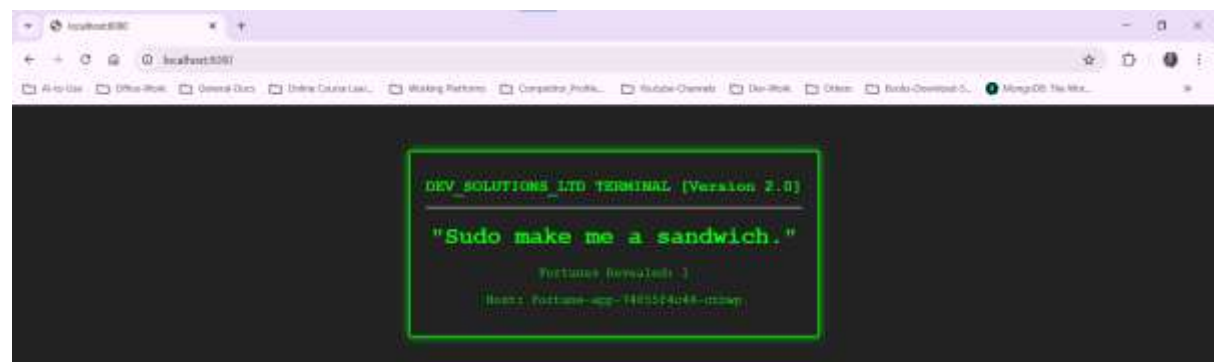
```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: fortune-app
5  spec:
6    replicas: 2
7    selector:
8      matchLabels:
9        app: fortune-app
10   template:
11     metadata:
12       labels:
13         app: fortune-app
14     spec:
15       containers:
16       - name: fortune-app
17         image: mhamza0987/devops-fortune:latest
18         imagePullPolicy: Always
19         ports:
20         - containerPort: 3000
21         env:
22         - name: REDIS_HOST
23           value: "redis-db"
```

```
index.html X app-service.yaml app-deployment.yaml redis-deployment.yaml X
kubernetes > redis-deployment.yaml
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: redis-deployment
5  spec:
6    replicas: 1
7    selector:
8      matchLabels:
9        app: redis
10   template:
11     metadata:
12       labels:
13         app: redis
14     spec:
15       containers:
16       - name: redis
17         image: redis:alpine
18         ports:
19         - containerPort: 6379
20   ---
21   apiVersion: v1
22   kind: Service
23   metadata:
24     name: redis-db
25   spec:
26     selector:
27       app: redis
28     ports:
29     - protocol: TCP
30       port: 6379
31       targetPort: 6379
```


Pods:

```
Windows PowerShell
PS D:\Github\Projects\SCD-quiz2> kubectl apply -f kubernetes/redis-deployment.yaml
deployment.apps/redis-deployment created
service/redis-db created
PS D:\Github\Projects\SCD-quiz2> kubectl apply -f kubernetes/app-deployment.yaml
deployment.apps/fortune-app created
PS D:\Github\Projects\SCD-quiz2> kubectl apply -f kubernetes/app-service.yaml
service/fortune-service created
PS D:\Github\Projects\SCD-quiz2> kubectl get pods
NAME                                READY   STATUS              RESTARTS   AGE
fortune-app-74855f4c46-ctbwp        1/1     Running             0           7s
fortune-app-74855f4c46-qgccd        0/1     ContainerCreating   0           7s
redis-deployment-78f87f4588-2bg95   1/1     Running             0          13s
PS D:\Github\Projects\SCD-quiz2> kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
fortune-app-74855f4c46-ctbwp        1/1     Running   0          10s
fortune-app-74855f4c46-qgccd        1/1     Running   0          10s
redis-deployment-78f87f4588-2bg95   1/1     Running   0          16s
PS D:\Github\Projects\SCD-quiz2>
```

```
Windows PowerShell
PS D:\Github\Projects\SCD-quiz2> kubectl port-forward svc/fortune-service 8080:80
Forwarding from 127.0.0.1:8080 -> 3000
Forwarding from [::1]:8080 -> 3000
Handling connection for 8080
Handling connection for 8080
Handling connection for 8080
```



Phase 3 Multi-Service App

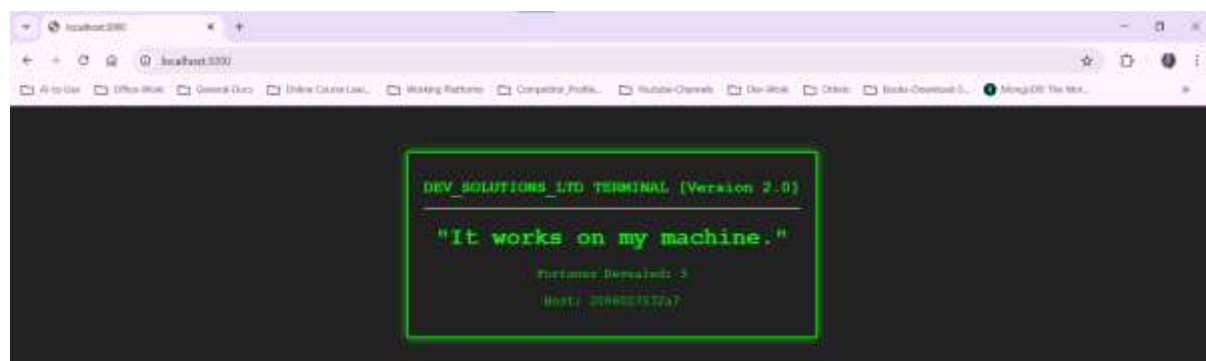
Docker-compose.yml:

```
docker-compose.yml X
docker-compose.yml
1  version: '3.8'
2
3  services:
4    app:
5      build: ./app
6      ports:
7        - "3000:3000"
8      environment:
9        - REDIS_HOST=redis_db
10     depends_on:
11       - redis_db
12     networks:
13       - devops-net
14
15     redis_db:
16       image: redis:alpine
17       container_name: redis_container
18       ports:
19         - "6379:6379"
20       networks:
21         - devops-net
22       volumes:
23         - redis-data:/data
24
25     networks:
26       devops-net:
27         driver: bridge
28
29     volumes:
30       redis-data:
```


Building docker-compose up:

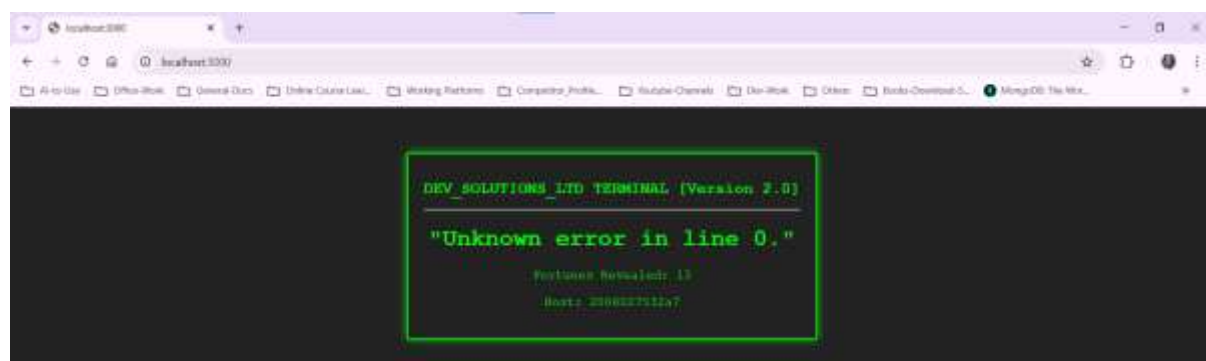
```
PS D:\Github\Projects\SCD-quizz> docker-compose up --build
time="2021-11-30T10:41:03+05:00" level=warning msg="D:\Github\Projects\SCD-quizz\docker-compose.yml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Building 4.4s (13/13) FINISHED
=> [internal] load local bake definitions
=> <= reading from stdin 118B
=> [internal] load build definition from Dockerfile
=> => transferring contextfile 1.70B
=> [internal] load metadata for docker.io/library/node:18-alpine
=> [auth] library/node:pull token for registry-1.docker.io
=> [internal] load dockerignore
=> => transferring contextfile 3B
=> [1/1] FROM docker.io/library/node:18-alpine@sha256:8d6421d865b4c28f05ebc488337f245011d11894358880a35c96c4bdcac9d5e
=> <= resolve docker.io/library/node:18-alpine@sha256:8d6421d865b4c28f05ebc488337f245011d11894358880a35c96c4bdcac9d5e
=> [internal] load build context
=> => transferring contextfile 33B
=> CACHED [2/3] WORKDIR /usr/src/app
=> CACHED [3/3] COPY package*.json ./
=> CACHED [4/3] RUN npm install
=> exporting to image
=> => exporting layers
=> => exporting manifest sha256:f44eca1c42eb27f7371fc3b057b8ca1261e9f906862012a7777feb31a27062909
=> => exporting config sha256:d4183778771ed01f8e63caf7b4466882b29ff0718e1af390d2f1d9f917506b07
=> => exporting attestation manifest sha256:0a6d4a5c9ade57e072cd127d4f246f56f2a13b03e61b092f0bae9f44f2300
=> => exporting exportfs manifest sha256:eb57d1123e7f7209e077a9e4811f672b7313dbdd10c4a9e1d35c212e553fcd1
=> => pushing to docker.io/library/scd-quizz-app:latest
=> => unpacking to docker.io/library/scd-quizz-app:latest
=> resolving provenance for metadata file
[+] scd-quizz-app build
Network scd-quizz_devops-net Created
Volume scd-quizz_redis-data Created
Container redis_container Started
Container scd-quizz-app-1 Started
PS D:\Github\Projects\SCD-quizz>
```

```
PS D:\Github\Projects\SCD-quizz> docker-compose logs --f app
time="2021-11-30T10:43:47+05:00" level=warning msg="D:\Github\Projects\SCD-quizz\docker-compose.yml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion"
app-1 | Devops Fortune App listening at http://localhost:3000
app-1 | connected to Redis
```

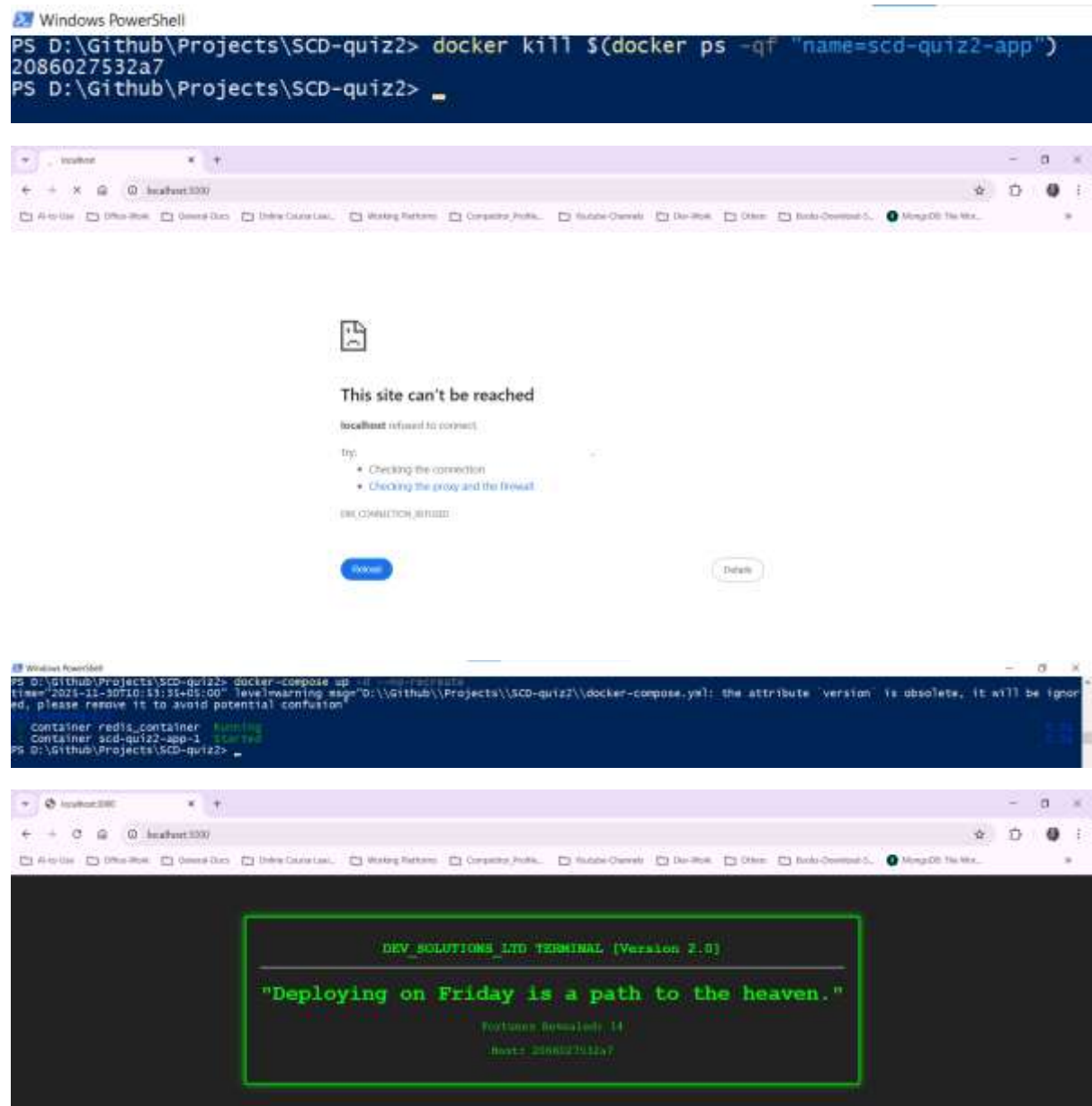


Removing and restarting service:

```
PS D:\Github\Projects\SCD-quizz> docker-compose rm --f redis_db
time="2021-11-30T10:46:08+05:00" level=warning msg="D:\Github\Projects\SCD-quizz\docker-compose.yml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion"
Container redis_container 1300px
going to remove redis_container
[+] Removing 1/1
Container redis_container 480px
PS D:\Github\Projects\SCD-quizz> docker-compose up --build
time="2021-11-30T10:47:40+05:00" level=warning msg="D:\Github\Projects\SCD-quizz\docker-compose.yml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion"
Container redis_container 1300px
Container scd-quizz-app-1 480px
PS D:\Github\Projects\SCD-quizz>
```

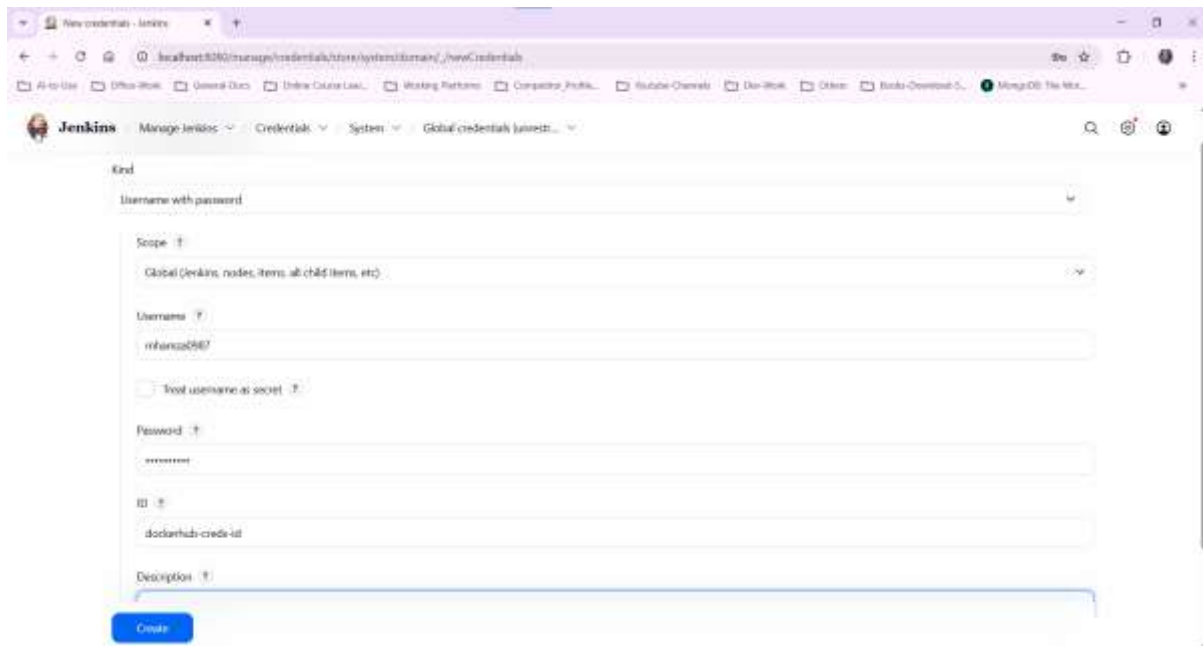


Killing backend and recovery:

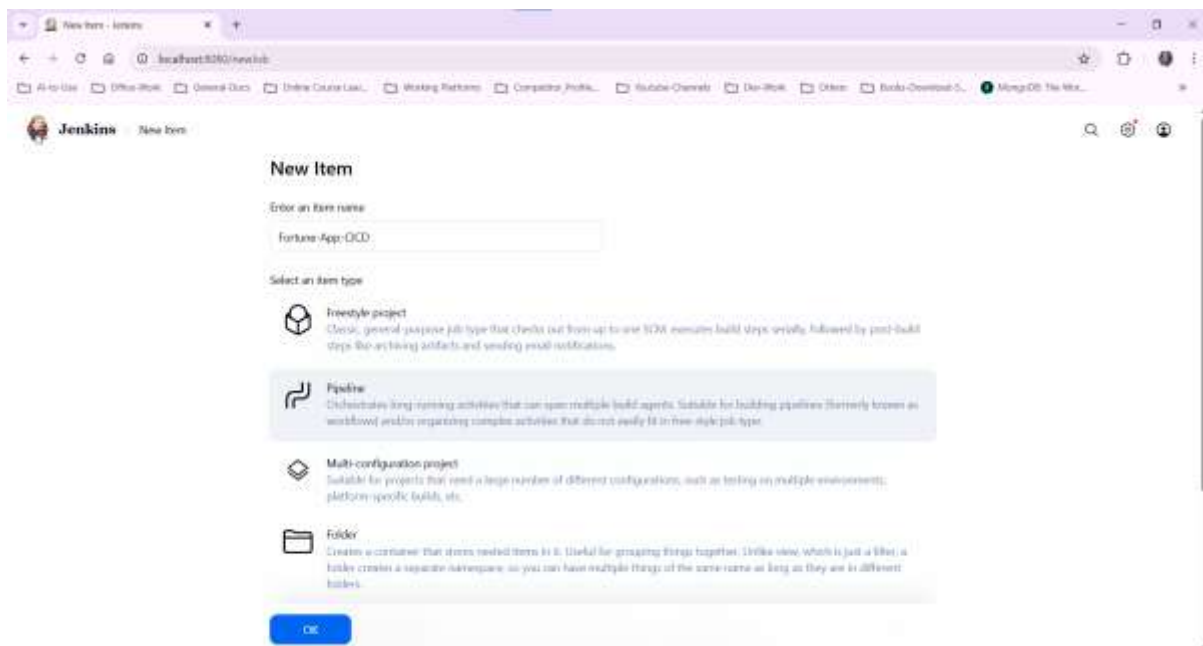


Phase 4: CI/CD War Zone

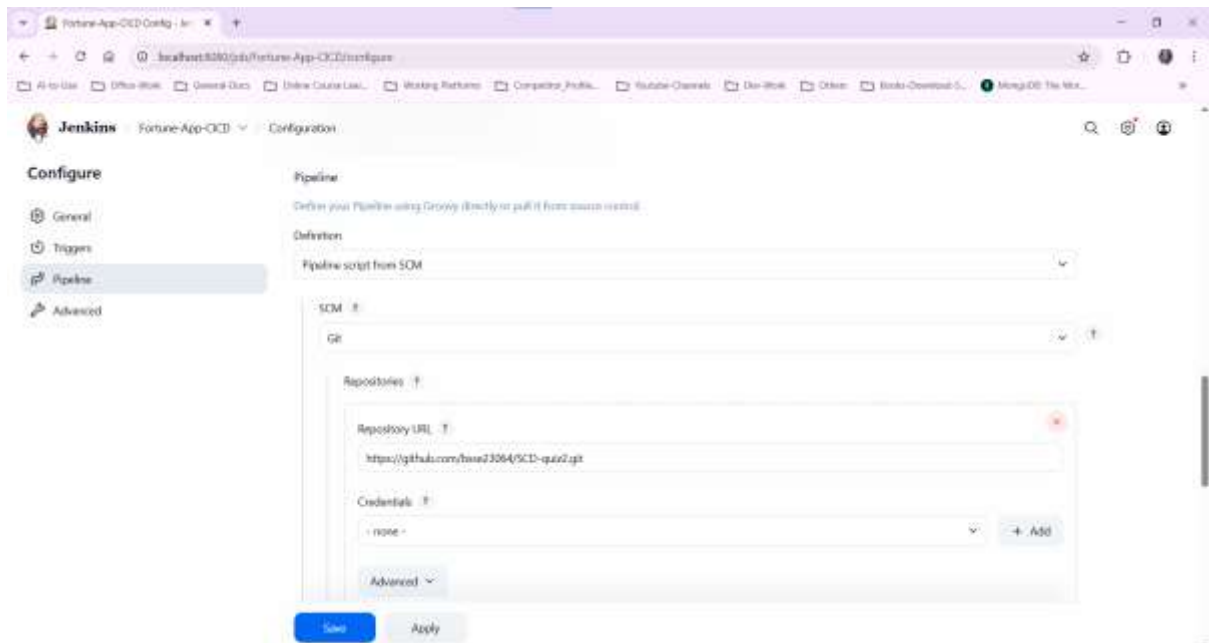
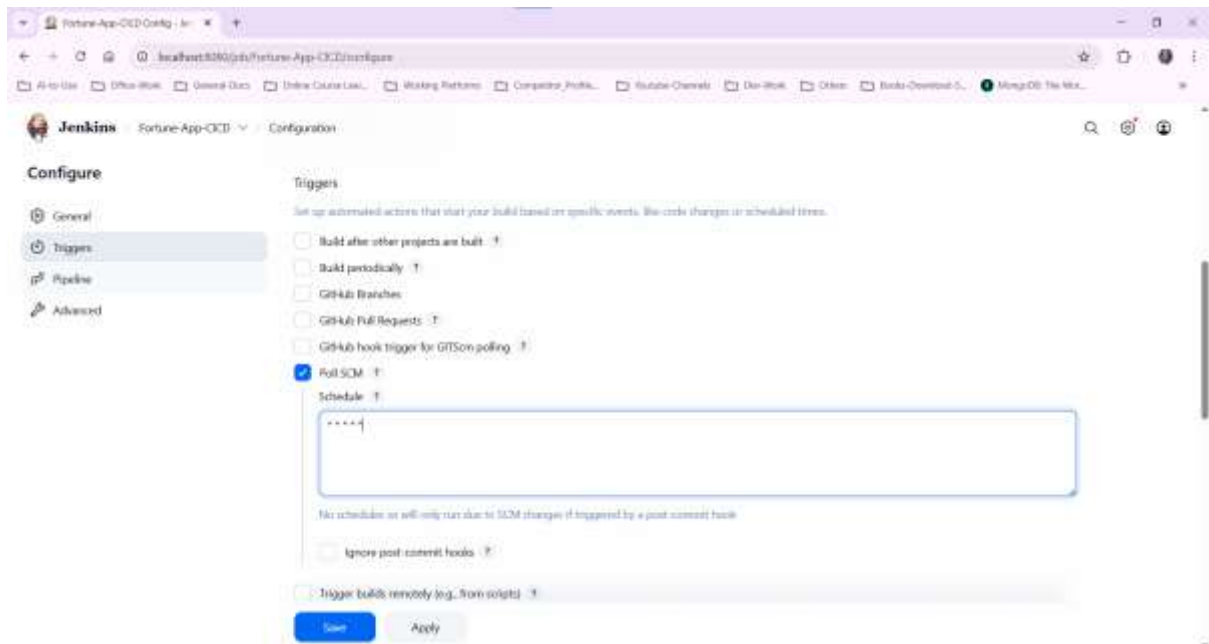
Initializing:

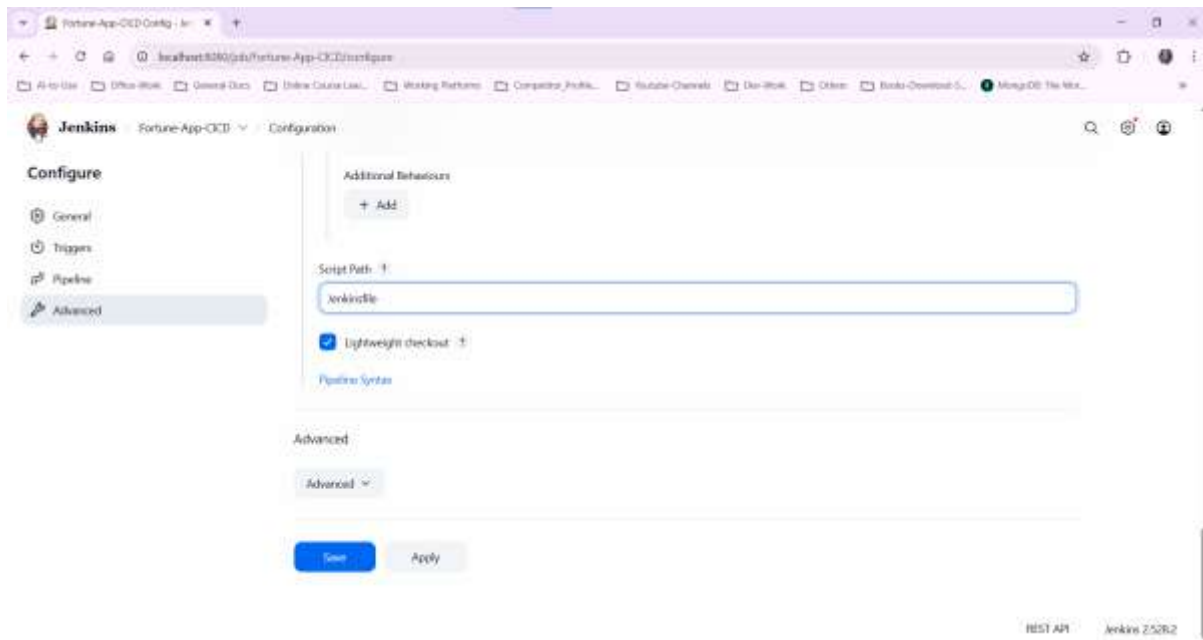


The screenshot shows the 'New Credentials' page in the Jenkins web interface. The browser's address bar displays 'localhost:8080/jenkins/credentials/store/system/domain/_/newCredentials'. The Jenkins navigation bar at the top includes 'Manage Jenkins', 'Credentials', 'System', and 'Global credentials (unrestricted)'. The form is titled 'Kind' and has a dropdown menu set to 'Username with password'. Below this, the 'Scope' dropdown is set to 'Global (Jenkins, nodes, items, all child items, etc)'. The 'Username' field contains 'mhanna@ME'. There is an unchecked checkbox for 'Treat username as secret'. The 'Password' field is masked with dots. The 'ID' field contains 'dodanhub-cred-id'. The 'Description' field is empty. A blue 'Create' button is at the bottom left of the form.



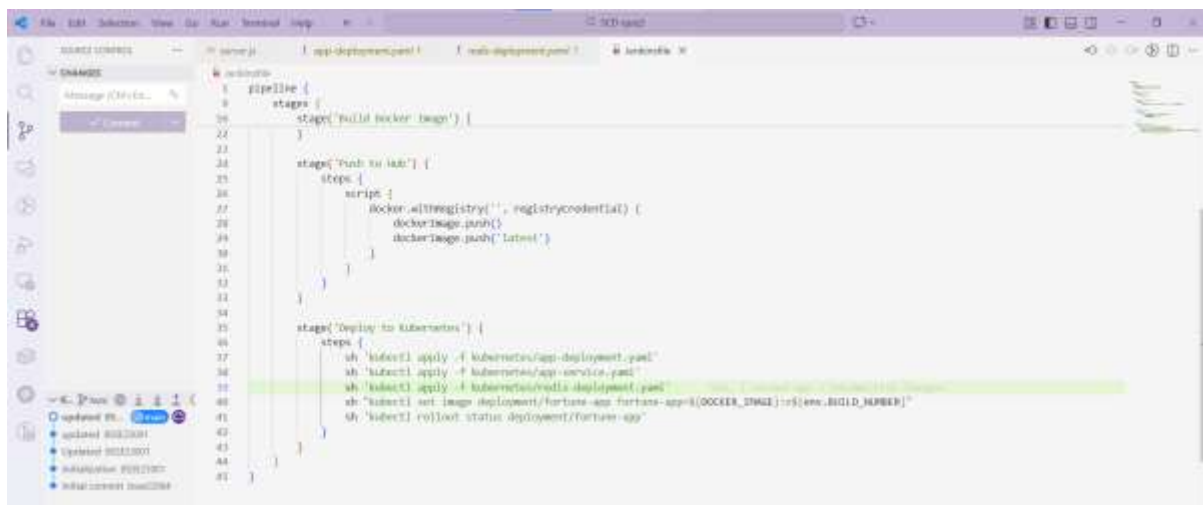
The screenshot shows the 'New Item' page in the Jenkins web interface. The browser's address bar displays 'localhost:8080/newJob'. The Jenkins navigation bar at the top includes 'Jenkins' and 'New Item'. The page title is 'New Item'. The 'Enter an item name' field contains 'Fortune-App-DCD'. The 'Select an item type' section lists four options: 'Freestyle project' (described as a classic, general-purpose job type), 'Pipeline' (described as a declarative way to define build steps), 'Multi-configuration project' (described as suitable for projects with many configurations), and 'Folder' (described as a container for other items). A blue 'OK' button is at the bottom left of the form.





Note: The pipeline checks the repo after every min and if there is a commit then it triggers the ci/cd

Jenkinsfile:



Jenkins Fortune-App-OCI

Changes

Build Now

Configure

Delete Pipeline

Full Stage View

Stages

Rename

Pipeline Syntax

Git Polling Log

Stage View

	Declarative: Checkout SCM	Checkout Code	Build Docker Image	Push to Hub	Deploy to Kubernetes
Average stage time: (all run times ~3min 50s)	2s	7s	7s	2min 50s	22s
New 30 100%	2s	7s	7s	10s	27s
New 30 100%	2s	7s	7s	5min 23s	17s

Permalinks

Builds

40 7:21 AM

40 3:08 AM

41 7:07 AM

localhost:8080/jenkins/Fortune-App-OCI/console

REST API

Jenkins 2.508.2

Making a commit:

```

17 app: &{env: APP_NAME}
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19 app: &{env: APP_NAME}
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Pipeline trigger:

The image shows two screenshots of the Jenkins web interface. The top screenshot displays the 'Stage View' for a pipeline named 'Fortune-App-OCI'. The bottom screenshot shows the details for a specific build, '#6 (Nov 30, 2025, 7:59:29 AM)'.

Stage View

Average stage times: (all run times ~2min 11s)

	Declarative Checkout SCM	Checkout Code	Build Docker Image	Push to Hub	Deploy to Kubernetes
Nov 30 12:59	2s	1s	12s	20s	24s
Nov 30 12:55	1s	1s	37s	27s	22s
Nov 30 12:25	2s	1s	1s	18s	41s
Nov 30 12:21	3s	2s	6s	18s	27s
Nov 30 12:09	0s	1s	7s	5min 23s	17s

Build Details: #6 (Nov 30, 2025, 7:59:29 AM)

Status: ✔ **#6 (Nov 30, 2025, 7:59:29 AM)**

Started by: Started by an SCM change

This run spent:

- 6.8 sec waiting
- 1 min 0 sec build duration
- 1 min 7 sec total from scheduled to completion

Revision: [0d1a5f35b0e0f3a1b0d0f18380a0c0e0e0d0](#)

Repository: <https://github.com/bsw2304/SCD-quiz.git>

- refs/remotes/origin/main

Changes:

1. Code Changed and Updated ([details / githubweb](#))
2. updated ([details / githubweb](#))

Footer: BEST API Jenkins 2.526.2

Pods and deployments:

The screenshot shows the Docker Desktop interface with the Kubernetes tab selected. The left sidebar contains navigation options: Ask Gordon, Containers, Images, Volumes, Kubernetes (selected), Builds, Models, MCP Toolkit, Docker Hub, Docker Scout, and Extensions.

Deployments

Name	Status	Pods
fortune-app	Available	2/2
redis-deployment	Available	1/1

Pods

Name	Status
redis-deployment-78f8714568-gfpx	Running
fortune-app-5c5bf458f7-gsp4	Running
fortune-app-5c5bf458f7-lbcbh	Running

Nodes

Name	Status
docker-desktop	Ready

Services

Name	Cluster IP	Ports
kubernetes	10.96.0.1	443/TCP
fortune-service	10.106.251.188	80/TCP
redis-db	10.96.19.58	6379/TCP

Cleanup:

Windows PowerShell

```
PS D:\Github\Projects\SCD-quiz2> kubectl delete deployment --all
deployment.apps "fortune-app" deleted from default namespace
deployment.apps "redis-deployment" deleted from default namespace
PS D:\Github\Projects\SCD-quiz2> kubectl delete services --all
service "fortune-service" deleted from default namespace
service "kubernetes" deleted from default namespace
service "redis-db" deleted from default namespace
PS D:\Github\Projects\SCD-quiz2>
```

The screenshot shows the Docker Desktop interface with the Images tab selected. The left sidebar is the same as in the previous screenshot.

Images

Local: My Hub

Search: mhamza0987

Image	Tags	OS	Vulnerabilities	Last pushed	Size	Actions
mhamza0987/devops-fortune	latest	linux	0 vulnerabilities	2 minutes ago	47.87 MB	Pull Copy
mhamza0987/devops-fortune	v8	linux	0 vulnerabilities	2 minutes ago	47.87 MB	Pull Copy
mhamza0987/devops-fortune	v7	linux	0 vulnerabilities	4 minutes ago	47.87 MB	Pull Copy
mhamza0987/devops-fortune	v6	linux	0 vulnerabilities	6 minutes ago	47.87 MB	Pull Copy
mhamza0987/devops-fortune	v5	linux	0 vulnerabilities	11 minutes ago	47.87 MB	Pull Copy
mhamza0987/safe-app	v1	linux	0 vulnerabilities	2 days ago	82.52 MB	Pull Copy

Repositories per page: 5 1-2 of 2

System status: Docker Desktop running. RAM 4.72 GB, CPU 36.46%, Disk 3.30 GB used (total 108.83 GB). Terminal v4.32.0

GITHUB LINK: <https://github.com/bsse23064/SCD-quiz2>