

Red Hat OpenShift Development I: Introduction to Containers with Podman 4.14

CERTIFICATE OF ATTENDANCE

THIS IS TO CERTIFY THAT

Fnu Pratichi

George Washington University

HAS SUCCESSFULLY ATTENDED THE COURSE

Red Hat OpenShift Development I: Introduction to Containers with Podman (DO188)

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Please note that documentation (only proofs are required) is not needed for project 7 and 8 as discussed with professor in one of the classes.

Chapter 1. Introduction and Overview of Containers

No labs

Chapter 2. Introduction and Overview of Containers

Lab: Pod man Basics

```
student@workstation:~ — /home/student/.venv/labs/bin/python /home/student/.venv/labs
[student@workstation ~]$ PS1="Fnu Pratichi>"
Fnu Pratichi>lab start basics-podman
SUCCESS Verifying cluster state
SUCCESS Verifying if Podman is installed
SUCCESS Authenticating Podman with classroom registry
SUCCESS Copy exercise files
SUCCESS Copying container files
SUCCESS Verifying port 8080 is not in use
SUCCESS Authenticating Podman with classroom registry
SUCCESS Starting the basics-podman-secret container

Starting lab.

[student@workstation basics-podman]$ podman network inspect lab-net
[
  {
    "name": "lab-net",
    "id": "ca67ec0b5449624a5ad0e79ebecaf94a06f8f67361f6dd715415c16868927e61",
    "driver": "bridge",
    "network_interface": "podman1",
    "created": "2024-12-02T19:35:23.955221389-05:00",
    "subnets": [
      {
        "subnet": "10.89.0.0/24",
        "gateway": "10.89.0.1"
      }
    ],
    "ipv6_enabled": false,
    "internal": false,
    "dns_enabled": true,
    "ipam_options": {
      "driver": "host-local"
    }
  }
]
```

```
student@workstation:~  
Hint: Use the registry.ocp4.example.com:8443/ubi8/httpd-24 container image  
✖ 8. The basics-podman-client container is missing a network  
A container is missing a required network  
Hint: Remove and create the basics-podman-client with the required network  
6 passing  
2 failing  
[19:38:54] Watching Basics Podman Lab  
✓ 1. Extract a secret file from a container  
✓ 2. Podman network created  
✓ 3. Start the basics-podman-server container  
✓ 4. The basics-podman-server container is missing a network  
✓ 5. Container basics-podman-server should have published ports  
✓ 6. Checking index.html content inside the container  
✓ 7. Start the basics-podman-client container  
✓ 8. The basics-podman-client container is missing a network  
8 passing  
0 failing  
You have successfully completed the exercise.  
Would you like to run 'lab finish' (default: y) ? (this will clean up resources) [y|n]  
Finishing lab.  
SUCCESS Verifying if Podman is installed  
SUCCESS Stopping and removing specified containers  
SUCCESS Removing specified networks  
SUCCESS Pruning images  
Fnu Pratichi>
```

Chapter 3

Lab: Container Images

```
student@workstation:~ — /home/student/.venv/labs/bin/python  
Fnu Pratichi>lab start images-lab  
SUCCESS Verifying cluster state  
SUCCESS Verifying if Podman is installed  
SUCCESS Copy exercise files  
Starting lab.
```

```
[student@workstation images-lab]$ curl localhost:8080
It is pitch black. You are likely to be eaten by a grue.
[student@workstation images-lab]$ lab finish images-lab
```

Finishing lab.

```
SUCCESS Verifying if Podman is installed
SUCCESS Stopping and removing specified containers
SUCCESS Pruning images
```

```
[student@workstation images-lab]$
```

```
student@workstation:~
1 passing
2 failing

[19:48:44] Watching Images Lab

✓ 1. Push an image to remote repository
✓ 2. Checking that the image is tagged
✗ 3. Start a container
  Container images-lab not running
  Hint: Use the images-lab:grue container image
  Hint: Name the container images-lab

2 passing
1 failing

[19:49:21] Watching Images Lab

✓ 1. Push an image to remote repository
✓ 2. Checking that the image is tagged
✓ 3. Start a container

3 passing
0 failing

You have successfully completed the exercise.
Would you like to run 'lab finish' (default: y) ? (this will clean up resources) [y/n]

Finishing lab.

SUCCESS Verifying if Podman is installed
SUCCESS Stopping and removing specified containers
SUCCESS Pruning images

Fnu.Pratichi>
```

Chapter 4

Lab: Custom Container Images

```
student@workstation:~
Fnu.Pratichi>lab start custom-lab
SUCCESS Verifying cluster state
SUCCESS Verifying if Podman is installed
SUCCESS Copy exercise files
SUCCESS Creating .npmrc config file for internal NPM registry
SUCCESS Verifying port 8080 is not in use
SUCCESS Verifying port 8443 is not in use
SUCCESS Authenticating Podman with classroom registry

Starting lab.
```

```
Fnu Pratichi>podman run --name=custom-lab \  
> -p 8080:8080 -p 8443:8443 podman-qr-app  
  
> custom-images-lab@1.0.0 start  
> node index.js
```

TLS Server running on port 8443
Server running on port 8080

```
[20:06:30] Watching Custom Images Lab  
  
✓ 1. Set the environment variables  
✓ 2. Set the /app working directory  
✓ 3. Install application dependencies  
✓ 4. Set user  
✓ 5. Set entrypoint command  
✓ 6. Test container ports  
  
6 passing  
0 failing  
  
You have successfully completed the exercise.  
Would you like to run 'lab finish' (default: y) ? (this will clean up resources) [y|n]  
  
Finishing lab.  
  
SUCCESS Verifying if Podman is installed  
SUCCESS Stopping and removing specified containers  
SUCCESS Pruning images  
  
Fnu Pratichi>
```

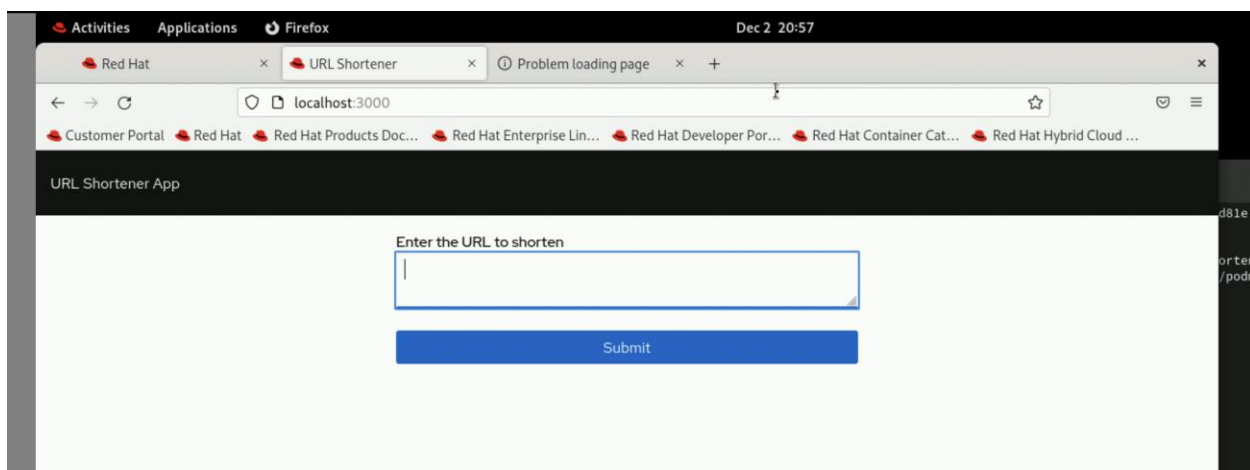
Chapter 5. Persisting Data

Lab: Persisting Data

```
student@workstation:~ — /home/student/.venv/labs/bin/python /home/stud...

[student@workstation ~]$ PS1="Fnu Pratchi>"
Fnu Pratchi> lab start persisting-lab
SUCCESS Verifying cluster state
SUCCESS Verifying if Podman is installed
SUCCESS Copy exercise files
SUCCESS Copying container files
SUCCESS Verifying port 8080 is not in use
SUCCESS Verifying port 3000 is not in use
SUCCESS Authenticating Podman with classroom registry

Starting lab.
```



```
[20:52:20] Watching Persisting Lab

✓ 1. Create the postgres-vol volume
✓ 2. Import data into the postgres-vol volume
✓ 3. Start the persisting-db database container
✓ 4. Check volume on the persisting-db database container
✓ 5. Check that the persisting-backend container runs on port 8080
✓ 6. Check that the persisting-frontend container runs on port 3000
✓ 7. Check the application works

7 passing
0 failing

You have successfully completed the exercise.
Would you like to run 'lab finish' (default: y) ? (this will clean up resources) [y/n]
Fnu Pratchi>

Copying blob 11687d0eadd4 done
Copying blob 5c4e685edac1 done
Copying config b745b43a62 done
Writing manifest to image destination
Storing signatures
e30e9b7382e28a876d40d171e2cc989f1cc25f46f22f213053339b71a7a41d5b
Fnu Pratchi>lab finish persisting-lab

Finishing lab.

SUCCESS Verifying if Podman is installed
SUCCESS Stopping and removing specified containers
SUCCESS Removing specified volumes ['postgres-vol']
SUCCESS Removing specified networks
SUCCESS Pruning images

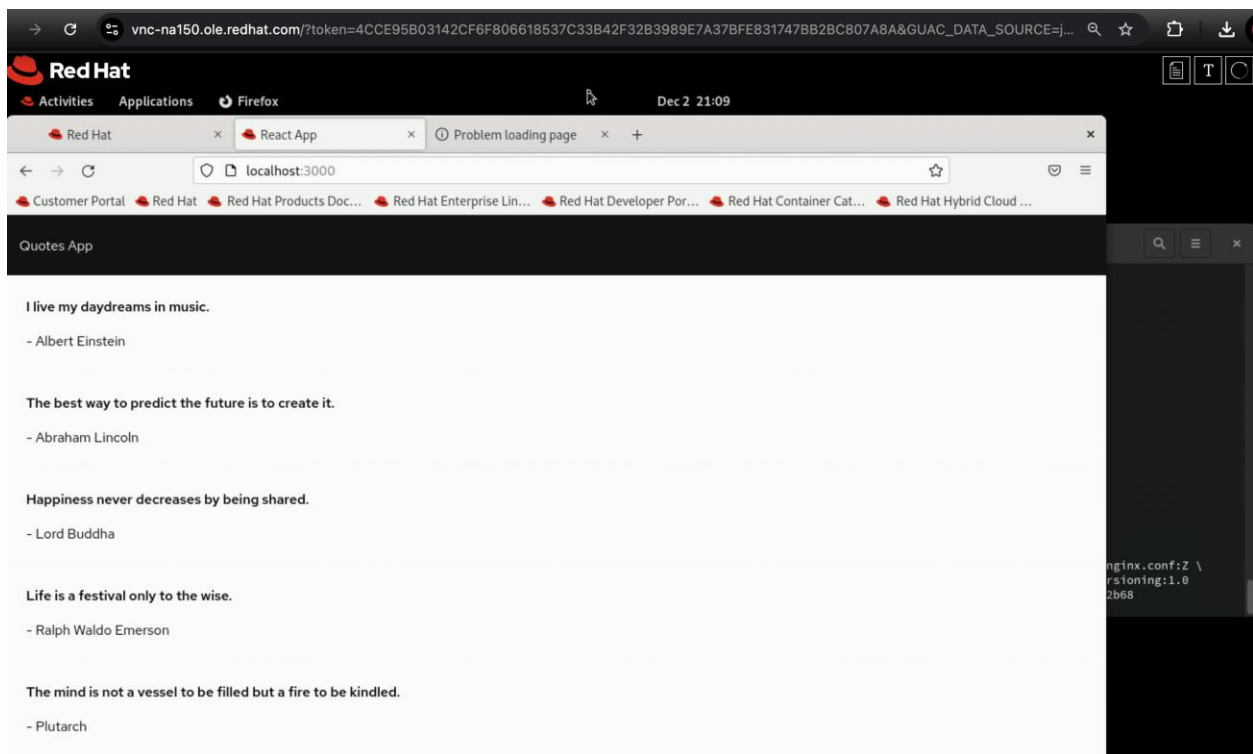
Fnu Pratchi>
```

Chapter 6. Troubleshooting Containers

Lab: Troubleshooting Containers

```
student@workstation:~ — /home/student/.venv/labs/bin/python /home/student/v...
Fnu Pratchi> lab start troubleshooting-lab
SUCCESS Verifying cluster state
SUCCESS Verifying if Podman is installed
SUCCESS Copy exercise files
SUCCESS Authenticating Podman with classroom registry
SUCCESS Create specified network ['troubleshooting-lab']
SUCCESS Starting the quotes-api-v1 container
SUCCESS Starting the quotes-api-v2 container
SUCCESS Starting the quotes-ui container

Starting lab.
```




```
student@workstation:~ -- /home/student/.venv/labs/bin/python /home/student/.v...
Hint: Check NGINX mappings
✖ 6. Version v2 of the quotes application should be accessible from the host browser
  Cannot connect to http://localhost:3000/api/v2/quotes
  Hint: Check that the application is working and that is accessible from the host
0 passing
0 failing
[21:08:50] Watching troubleshooting-lab

✓ 1. Expected running containers: quotes-api-v1, quotes-api-v2, quotes-ui
✓ 2. Containers should be attached to the specified networks
✓ 3. quotes-ui should have the right environment variables
✓ 4. quotes-ui should have /home/student/D0188/labs/troubleshooting-lab/nginx.conf accessible in the container at /etc/nginx/nginx.conf
✓ 5. The quotes-ui container can reach v2
✓ 6. Version v2 of the quotes application should be accessible from the host browser
0 passing
0 failing

You have successfully completed the exercise.
Would you like to run 'lab finish' (default: y) ? (this will clean up resources) [y]n

}
Fnu Pratchi>podman rm -f quotes-ui
quotes-ui
Fnu Pratchi>podman run -d \
> --name quotes-ui \
> -p 3000:8080 \
> -e QUOTES_API_VERSION=v2 \
> --net troubleshooting-lab \
> -v ~/D0188/labs/troubleshooting-lab/nginx.conf:/etc/nginx/nginx.conf:Z \
> registry.ocp4.example.com:8443/redhattraining/quotes-ui-versioning:1.0
1e3d980ec011d862527c7ac5ff03a938514fd881ce2975b1ab9f9330ac22b68
Fnu Pratchi>lab finish troubleshooting-lab

Finishing lab.

SUCCESS Verifying if Podman is installed
SUCCESS Stopping and removing specified containers
SUCCESS Removing specified networks
SUCCESS Pruning images
Fnu Pratchi>
```

Chapter 7. Multi-container Applications with Compose

Lab: Multi-container Applications with Compose

```
Red Hat
Activities Applications Terminal
student@workstation:~
[student@workstation ~]$ PS1="Fnu pratichi>"
Fnu pratichi>lab start compose-lab
SUCCESS Verifying cluster state
SUCCESS Verifying if Podman is installed
SUCCESS Copy exercise files
SUCCESS Authenticating Podman with classroom registry

Starting lab.
```


vnc-na150.ole.redhat.com/?token=5E60700CD19F3BFE30D3570E4C1A009B38C6A6E695A1820729F7BE0D50515270&GUAC_DATA_SOURCE=jwt&G...

Red Hat

Activities Applications Firefox Dec 2 21:50

student@workstation:~ — /home/student/.venv/labs/bin/python /home/student/v...

student@workstation:~/D0188/labs/compose-

React App

localhost:3000

Customer Portal Red Hat Red Hat Products Doc... Red Hat Enterprise Lin... Red Hat Developer Por... Red Hat Container Cat... Red Hat Hybrid Cloud ...

Quotes App

I live my daydreams in music.
- Albert Einstein

The best way to predict the future is to create it.
- Abraham Lincoln

Happiness never decreases by being shared.
- Lord Buddha

Life is a festival only to the wise.
- Ralph Waldo Emerson

The mind is not a vessel to be filled but a fire to be kindled.
- Plutarch

3 pass
3 fail

1. E
2. q
n the
3. c
4. c
5. E
6. c

6 pass
0 fail

You ha
Would

[21:49:53] Watching Compose Lab

✓ 1. Expected running containers: quotes-api, quotes-provider, quotes-ui

✓ 2. quotes-provider should have /home/student/D0188/labs/compose-lab/wiremock/stubs accessible in the container at /home/wiremock

✓ 3. Container quotes-api should have published ports

✓ 4. Containers should be attached to the specified networks

✓ 5. Expect quotes-api to consume quotes-provider

✓ 6. Container quotes-ui should have published ports

6 passing
0 failing

You have successfully completed the exercise.
Would you like to run 'lab finish' (default: y) ? (this will clean up resources) [y|n]

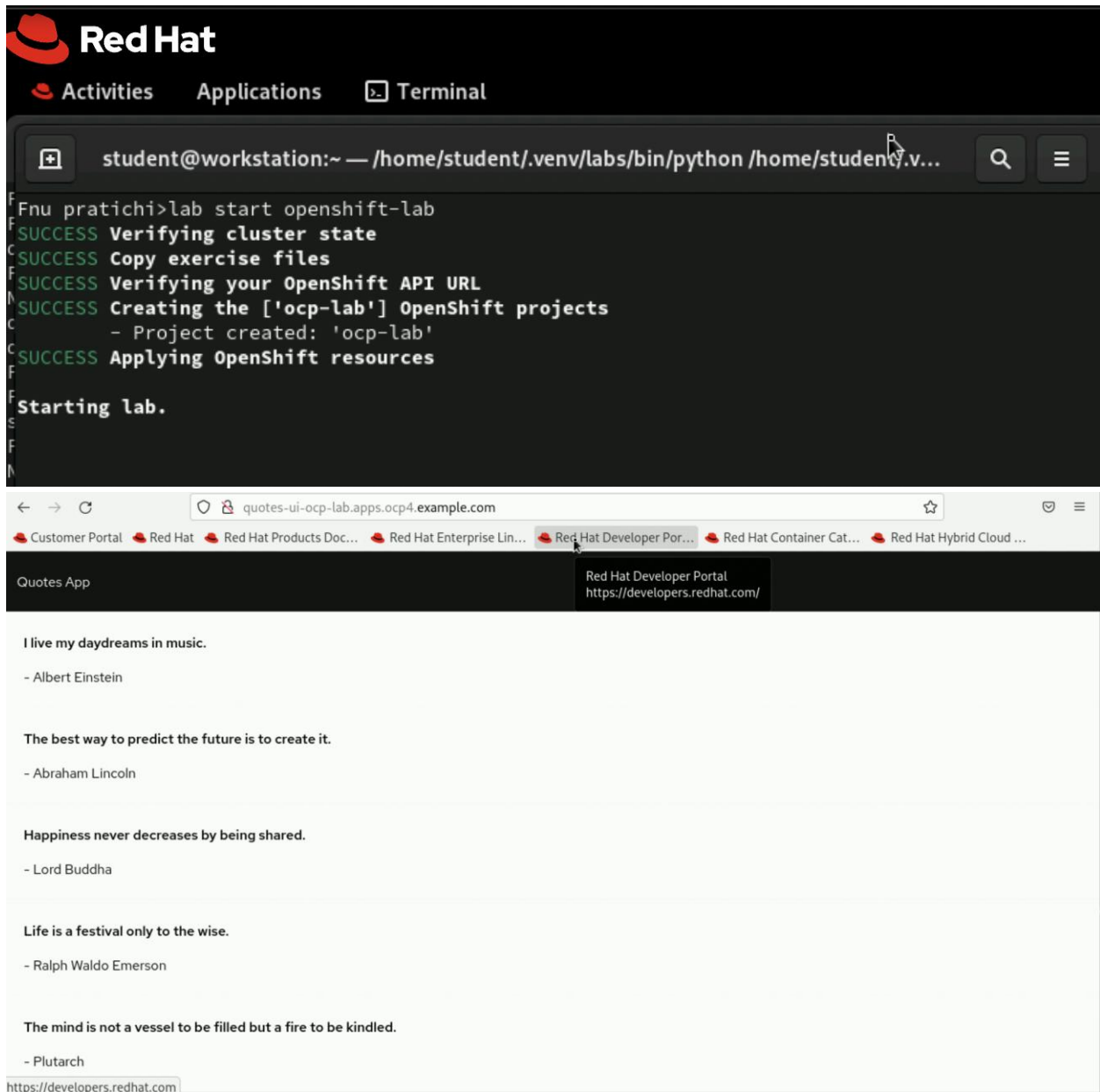
Finishing lab.

SUCCESS Verifying if Podman is installed
SUCCESS Stopping and removing specified containers
SUCCESS Removing specified networks
SUCCESS Pruning images

Fnu pratichi>
Fnu pratichi>

Chapter 8. Container Orchestration with OpenShift and Kubernetes

Lab: Container Orchestration with Kubernetes and OpenShift



The screenshot displays a Red Hat workstation environment. At the top, the Red Hat logo and name are visible. Below the logo, there are tabs for 'Activities', 'Applications', and 'Terminal'. The terminal window is active, showing the command prompt 'student@workstation:~' and the command 'lab start openshift-lab'. The output of the command is as follows:

```
Fnu pratichi>lab start openshift-lab
SUCCESS Verifying cluster state
SUCCESS Copy exercise files
SUCCESS Verifying your OpenShift API URL
SUCCESS Creating the ['ocp-lab'] OpenShift projects
- Project created: 'ocp-lab'
SUCCESS Applying OpenShift resources

Starting lab.
```

Below the terminal window, a web browser is open, displaying the 'quotes-ui-ocp-lab.apps.ocp4.example.com' page. The browser's address bar shows the URL, and the page content includes a list of quotes:

- I live my daydreams in music.
- Albert Einstein
- The best way to predict the future is to create it.
- Abraham Lincoln
- Happiness never decreases by being shared.
- Lord Buddha
- Life is a festival only to the wise.
- Ralph Waldo Emerson
- The mind is not a vessel to be filled but a fire to be kindled.
- Plutarch

The browser's taskbar at the bottom shows several open tabs, including 'Customer Portal', 'Red Hat', 'Red Hat Products Doc...', 'Red Hat Enterprise Lin...', 'Red Hat Developer Por...', 'Red Hat Container Cat...', and 'Red Hat Hybrid Cloud ...'. The 'Red Hat Developer Portal' tab is currently selected, showing the URL 'https://developers.redhat.com/'.

```
[21:59:34] Watching OpenShift Lab

✓ 1. quotes-api pod is online
✓ 2. quotes-api service exists
✓ 3. quotes-api has correct port
✓ 4. quotes-api routes to quotes-api
✓ 5. http://quotes-ui-ocp-lab.apps.ocp4.example.com:80/ should be reachable on the host

5 passing
0 failing

You have successfully completed the exercise.
Would you like to run 'lab finish' (default: y) ? (this will clean up resources) [y|n]

Fnu Pratichi>lab finish openshift-lab
SUCCESS Verifying cluster state

Finishing lab.

SUCCESS Verifying your OpenShift API URL
SUCCESS Deleting OpenShift projects
- Project deleted: 'ocp-lab'

Fnu Pratichi>
```

Chapter 9. Comprehensive Review

Lab: Comprehensive Review

→ ↻ 🔍 vnc-na150.ole.redhat.com/?token=5E60700CD19F3BFE30D3570E4C1A0



Activities Applications Terminal



student@

```
Fnu Pratichi>lab start comprehensive-review
SUCCESS Verifying cluster state
SUCCESS Copy exercise files
SUCCESS Verifying if Podman is installed
SUCCESS Verifying port 8080 is not in use
SUCCESS Authenticating Podman with classroom registry
```

Starting lab.



student@workstation:~/DO188/labs/comprehensive-review/bee

```
3/3.7/commons-lang3-3.7.jar (500 kB at 922 kB/s)
Downloaded from internal-repository: http://nexus-infra.apps.ocp4.example.com/repository
roid/guava-28.2-android.jar (2.6 MB at 4.4 MB/s)
[INFO] Replacing main artifact with repackaged archive
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 01:10 min
[INFO] Finished at: 2024-12-03T03:12:15Z
[INFO] -----
--> cc6df287133
[2/2] STEP 1/3: FROM registry.ocp4.example.com:8443/ubi8/openjdk-17-runtime:1.12
Trying to pull registry.ocp4.example.com:8443/ubi8/openjdk-17-runtime:1.12...
Getting image source signatures
Copying blob 54e56e6f8572 skipped: already exists
Copying blob 4f8ddd7f5a75 skipped: already exists
Copying blob 9790122be13e done
Copying config a7113ef97b done
Writing manifest to image destination
Storing signatures
[2/2] STEP 2/3: COPY --from=builder /home/jboss/target/beeper-1.0.0.jar .
--> f6b616cc0e0
[2/2] STEP 3/3: ENTRYPOINT ["java", "-jar", "beeper-1.0.0.jar"]
[2/2] COMMIT beeper-api:v1
--> 60c053ac766
Successfully tagged localhost/beeper-api:v1
60c053ac766ac469eb06398c57a0d592e07f6916f6da634d42d3f3e97377aa1a
Fnu Pratichi>podman run -d \
> --name beeper-api --net beeper-backend,beeper-frontend \
> -e DB_HOST=beeper-db beeper-api:v1
1b0e72f48ee94c8690aeeba29e793d99e5492f71207a778ece18ac0181804c64
Fnu Pratichi>cd \
> ~/DO188/labs/comprehensive-review/beeper-ui
Fnu Pratichi>vim Containerfile
Fnu Pratichi>podman build -t beeper-ui:v1 .
[1/2] STEP 1/4: FROM registry.ocp4.example.com:8443/ubi9/nodejs-18:1 AS builder
Trying to pull registry.ocp4.example.com:8443/ubi9/nodejs-18:1...
Getting image source signatures
Copying blob ed459618bd73 skipped: already exists
Copying blob a20d5f0bec2b skipped: already exists
```

[22:17:44] Watching comprehensive review

- ✓ 1. Expected running containers: beeper-db
- ✓ 2. beeper-db should have the expected environment variables
- ✓ 3. beeper-db should be connected to the correct networks
- ✓ 4. beeper-db should have volume beeper-data accessible in the container at /var/lib/pgsql/data
- ✓ 5. Expected running containers: beeper-api
- ✓ 6. beeper-api should have the expected environment variables
- ✓ 7. beeper-api should respond to requests
- ✓ 8. beeper-api should be connected to the correct networks
- ✓ 9. Expected running containers: beeper-ui
- ✓ 10. beeper-ui should be connected to the correct networks
- ✓ 11. Container beeper-ui should have published ports
- ✓ 12. http://localhost:8080/ should be reachable on the host
- ✓ 13. The API should be available via the UI container

13 passing

0 failing

You have successfully completed the exercise.

Would you like to run 'lab finish' (default: y) ? (this will clean up resources) [y|n]

Finishing lab.

SUCCESS Verifying if Podman is installed
SUCCESS Stopping and removing specified containers
SUCCESS Removing specified networks
SUCCESS Removing specified volumes ['beeper-data']
SUCCESS Pruning images

Fnu Pratchi>