CENG 495 - Cloud Computing
2023 - 2
HW - 2

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1 Installation

I've installed minikube and scaffold with homebrew in macOS. I did not face with a problem during installation.
I've used docker as driver for minikube. Docker desktop has already been installed in my machine.
I've decided to use this project

2 First Deployment

2.1 Minikube Start

I've run minikube start command.

Figure 1: Minikube Start

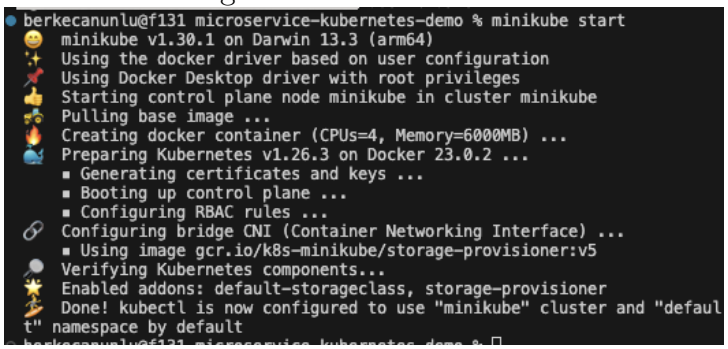
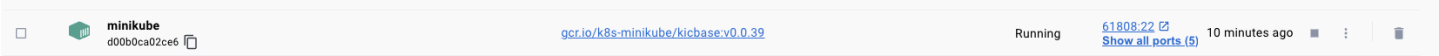


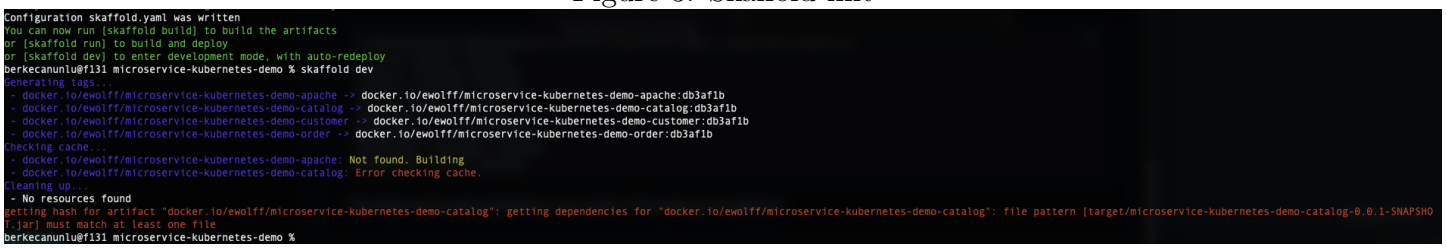
Figure 2: Docker view of Minikube



2.2 Skaffold init/dev

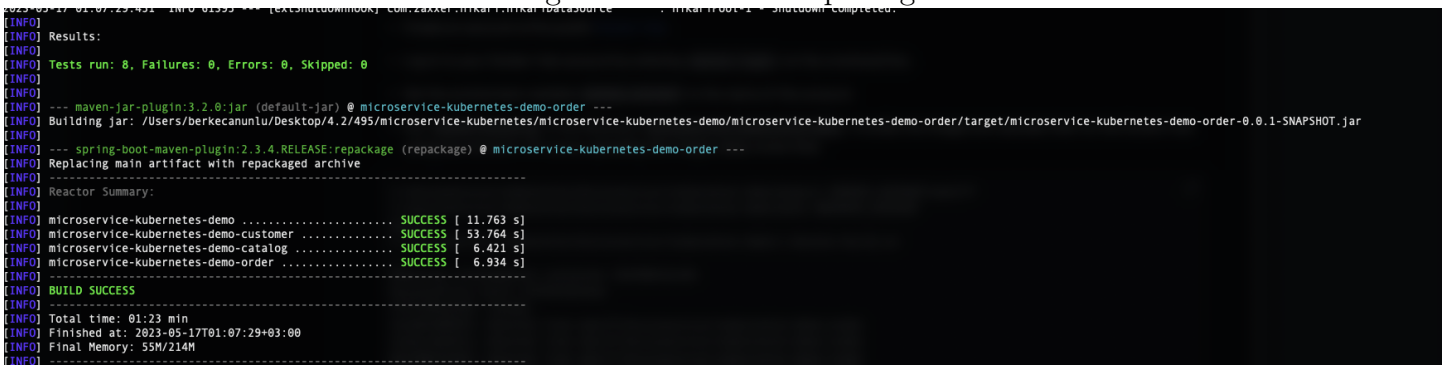
Then, I've run skaffold init to create "**skaffold.yaml**" file to run skaffold dev command.
I've selected docker files inside the repository as builders in the first question.
I've selected pom.xml files to create kubernetes resources.
I've faced with an error as shown in below when I've run skaffold dev after skaffold init.

Figure 3: Skaffold init



The example is implemented in Java. Also, dockerfiles get JAR files so I had to run "**./mvnw clean package**" command to build the project. It is stated in the **readme file of the repository**.

Figure 4: mvnw clean package



Then, I've reinitialized skaffold.yaml and selected builders. After that, I've run skaffold dev and microservices become available.

Figure 5: Skaffold init

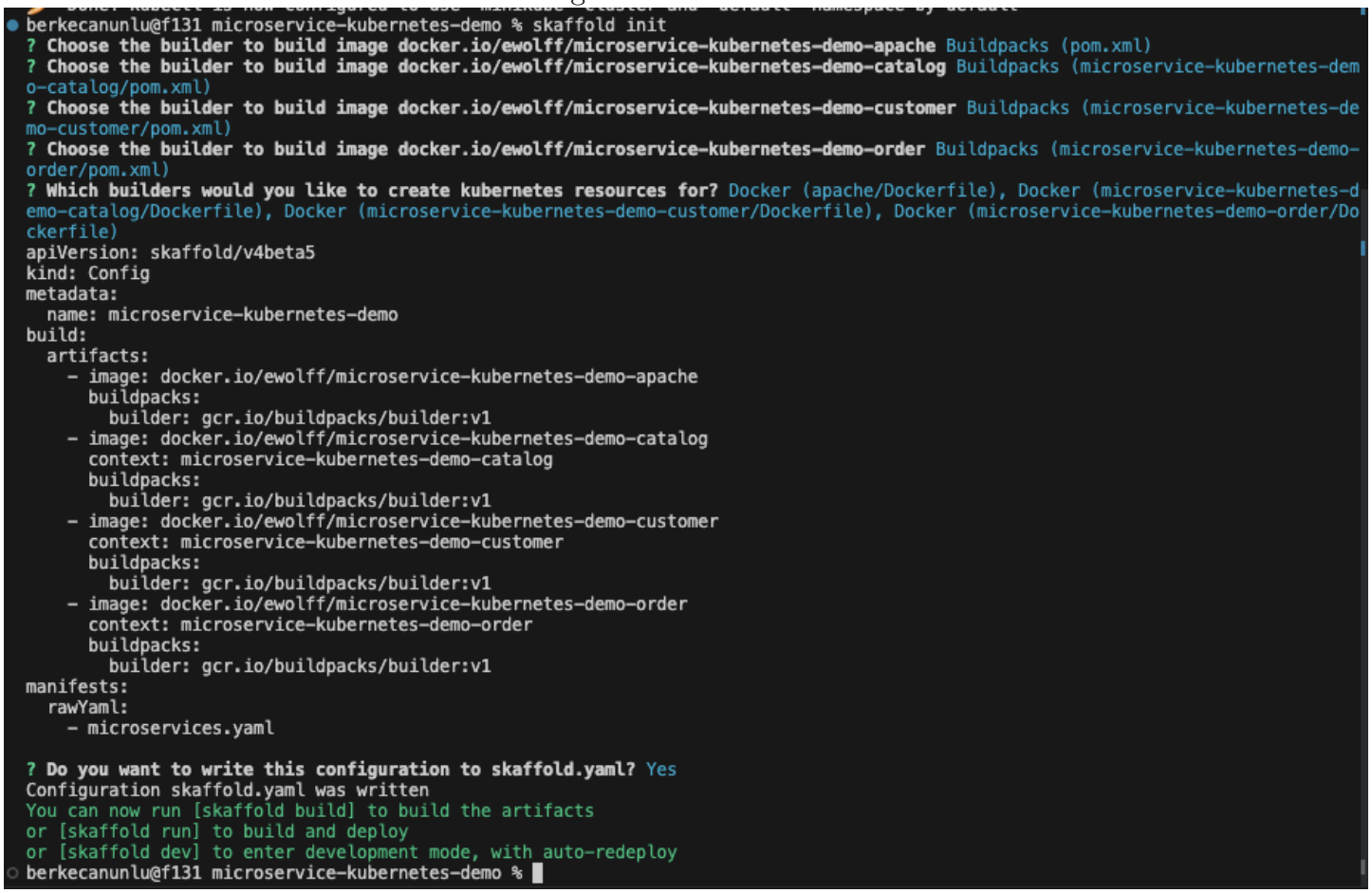


Figure 6: Skaffold dev builds

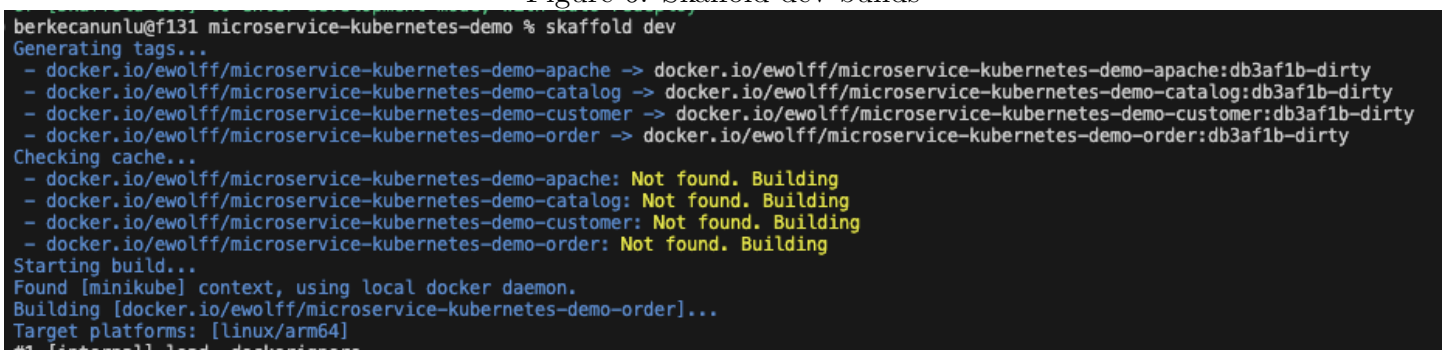
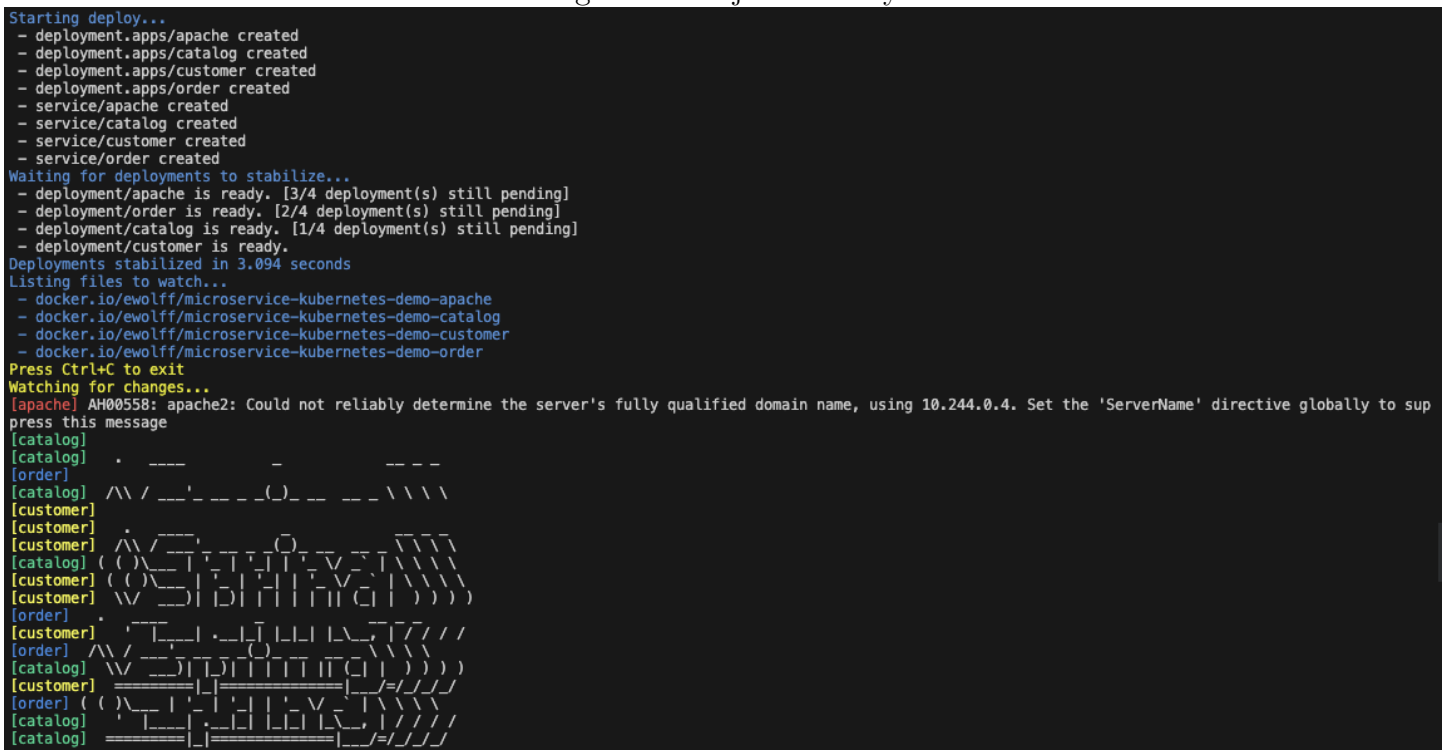


Figure 7: Project is ready



When I tried to access localhost:8080 nothing came to the web browser. Then, I've followed the **readme of the repository again**. It is stated that "**Run kubectl port-forward deployment/apache 8081:80** to create a proxy to the Apache httpd server on your local machine. Then open http://localhost:8081 to see the web page of the Apache httpd server in the web browser."

Figure 8: Project is ready

```
berkecanunlu@f131 microservice-kubernetes-demo % kubectl port-forward deployment/apache 8081:80
Forwarding from 127.0.0.1:8081 -> 80
Forwarding from [::1]:8081 -> 80
Handling connection for 8081
Handling connection for 8081
Handling connection for 8081
Handling connection for 8081
```

When I did this, localhost:8081 become available and I saw the web page.

Figure 9: Skaffold init

2.3 kubectl get

Figure 10: Services running

```
[berkecanunlu@f131 microservice-kubernetes-demo % kubectl get services
NAME         TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
apache       LoadBalancer   10.96.14.74      <pending>     80:30969/TCP     4m45s
catalog      LoadBalancer   10.103.162.69    <pending>     8080:31578/TCP   4m45s
customer     LoadBalancer   10.105.82.3      <pending>     8080:31106/TCP   4m45s
kubernetes   ClusterIP      10.96.0.1        <none>        443/TCP          19m
order        LoadBalancer   10.103.226.204   <pending>     8080:30740/TCP   4m45s
```

Figure 11: Pods

```
berkecanunlu@f131 microservice-kubernetes-demo % kubectl get pods
NAME                        READY   STATUS    RESTARTS   AGE
apache-7674df88f7-krwlf     1/1     Running   0          3m41s
catalog-6695d6648c-j6sjn    1/1     Running   0          3m41s
customer-79f9b765f5-wvqz4   1/1     Running   0          3m41s
order-685f575955-nxjrl      1/1     Running   0          3m41s
```

Figure 12: Deployment

```
[berkecanunlu@f131 microservice-kubernetes-demo % kubectl get deployments
NAME       READY   UP-TO-DATE   AVAILABLE   AGE
apache     1/1     1            1           5m10s
catalog    1/1     1            1           5m10s
customer   1/1     1            1           5m10s
order      1/1     1            1           5m10s
```

3 Configuring Frontend

I've changed index.html with bootstrap.

Figure 13: Index after changes

Figure 14: kubectl get after index change

```
berkecanunlu@f131 microservice-kubernetes-demo % kubectl get pods
NAME                        READY   STATUS    RESTARTS   AGE
apache-868bdb997-6zt2s      1/1     Running   0          97s
catalog-67c7c758c-274pb     1/1     Running   0          37m
customer-687d496bf6-bsrcg   1/1     Running   0          37m
order-58c79ffb4b-mrxc5      1/1     Running   0          37m
berkecanunlu@f131 microservice-kubernetes-demo % kubectl get services
NAME         TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
apache       LoadBalancer   10.97.120.160    <pending>     80:31623/TCP     38m
catalog      LoadBalancer   10.103.227.228   <pending>     8080:30288/TCP   38m
customer     LoadBalancer   10.111.116.97    <pending>     8080:31164/TCP   38m
kubernetes   ClusterIP      10.96.0.1        <none>        443/TCP          49m
order        LoadBalancer   10.104.44.29     <pending>     8080:31611/TCP   38m
berkecanunlu@f131 microservice-kubernetes-demo % kubectl get endpoints
NAME         ENDPOINTS           AGE
apache       10.244.0.8:80       38m
catalog      10.244.0.5:8080     38m
customer     10.244.0.7:8080     38m
kubernetes   192.168.49.2:8443   49m
order        10.244.0.6:8080     38m
berkecanunlu@f131 microservice-kubernetes-demo % kubectl get deployments
NAME       READY   UP-TO-DATE   AVAILABLE   AGE
apache     1/1     1            1           38m
catalog    1/1     1            1           38m
customer   1/1     1            1           38m
order      1/1     1            1           38m
```

When I tried to change the customer/catalog/order pages, I've noticed that changes cannot be applied. When I looked into Dockerfile of these services, it copies JAR file. Then, I've run **./mvnw clean package** to build the project again. When I run it, skaffold built the images again and changes are applied.

Also, whenever a change is occured in the containers, port forwarding becomes broken so I had to run the "**kubectl port-forward deployment/apache 8081:80**" command again.

Figure 15: Customer page changes

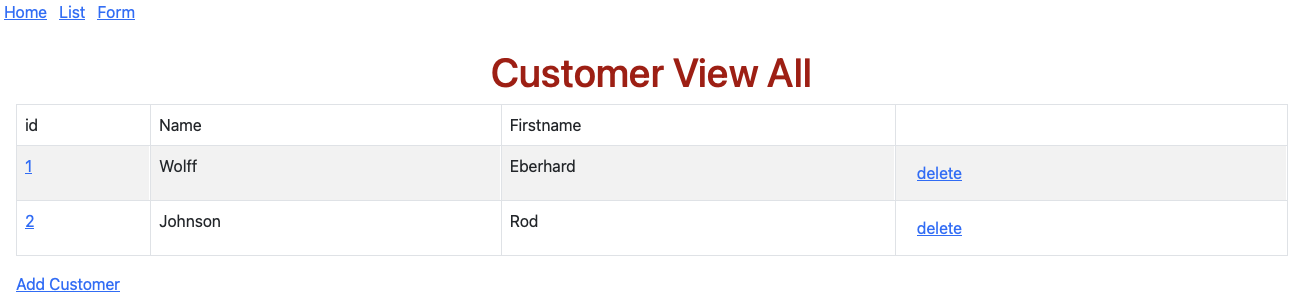


Figure 16: Order page changes

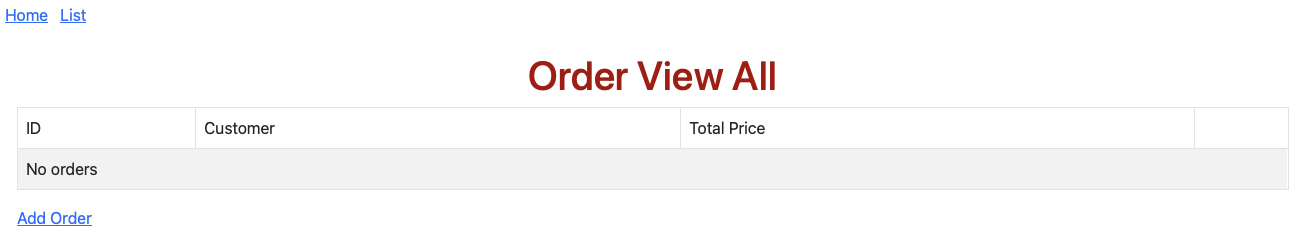


Figure 17: Item page changes

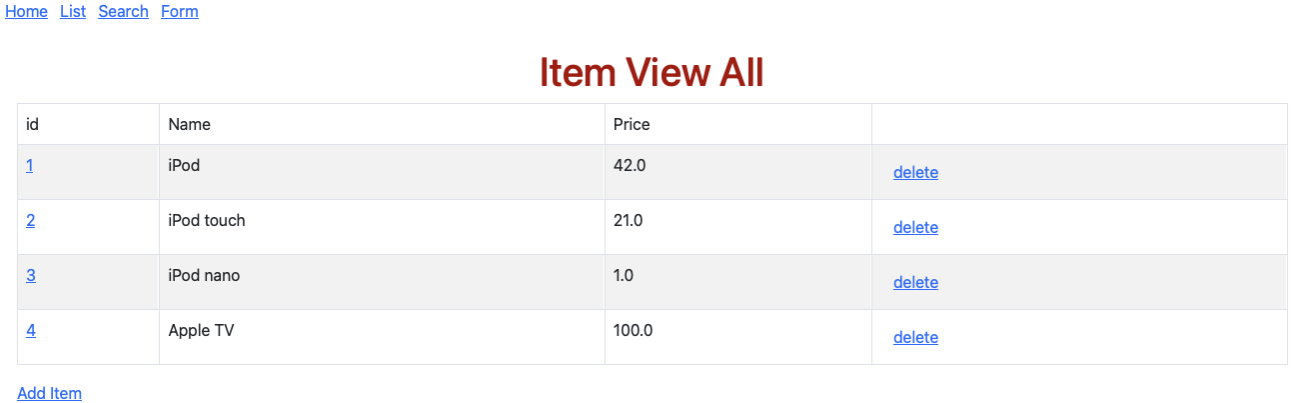


Figure 18: kubectl get after other pages changes'

```
berkecanunlu@f131 microservice-kubernetes-demo % kubectl get pods
NAME                          READY   STATUS    RESTARTS   AGE
apache-786d7d46f9-zthbc       1/1     Running   0          21s
catalog-694b7f6597-vcvcr      1/1     Running   0          21s
customer-658cdb9c7c-7rtqp     1/1     Running   0          21s
order-77758b98cf-2rgt7        1/1     Running   0          21s
berkecanunlu@f131 microservice-kubernetes-demo % kubectl get services
NAME         TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
apache       LoadBalancer   10.110.175.249   <pending>     80:30663/TCP     25s
catalog      LoadBalancer   10.109.60.50     <pending>     8080:32531/TCP   25s
customer     LoadBalancer   10.111.74.239    <pending>     8080:30867/TCP   25s
kubernetes   ClusterIP      10.96.0.1        <none>        443/TCP          55m
order        LoadBalancer   10.103.212.131   <pending>     8080:32471/TCP   25s
berkecanunlu@f131 microservice-kubernetes-demo % kubectl get endpoints
NAME         ENDPOINTS           AGE
apache       10.244.0.9:80       31s
catalog      10.244.0.10:8080    31s
customer     10.244.0.12:8080    31s
kubernetes   192.168.49.2:8443   55m
order        10.244.0.11:8080    31s
berkecanunlu@f131 microservice-kubernetes-demo % kubectl get deployments
NAME       READY   UP-TO-DATE   AVAILABLE   AGE
apache     1/1     1            1           40s
catalog    1/1     1            1           40s
customer   1/1     1            1           40s
order      1/1     1            1           40s
berkecanunlu@f131 microservice-kubernetes-demo %
```