**Project Steps**

## 1. Set Up Git Version Control

### 1.1. Initialize a Git Repository

Create a new directory for your project:

```
mkdir nodejs-k8s-project
```

```
cd nodejs-k8s-project
```

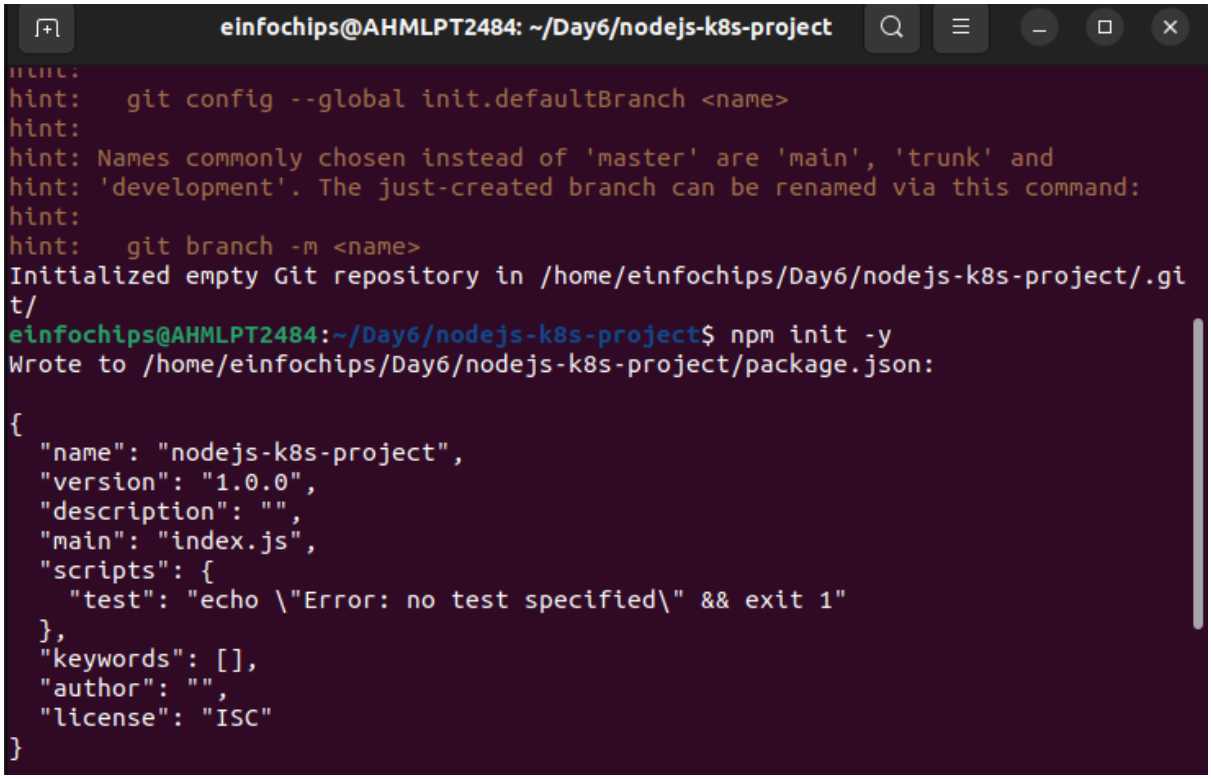
Initialize a Git repository:

```
git init
```

### 1.2. Create a Node.js Application

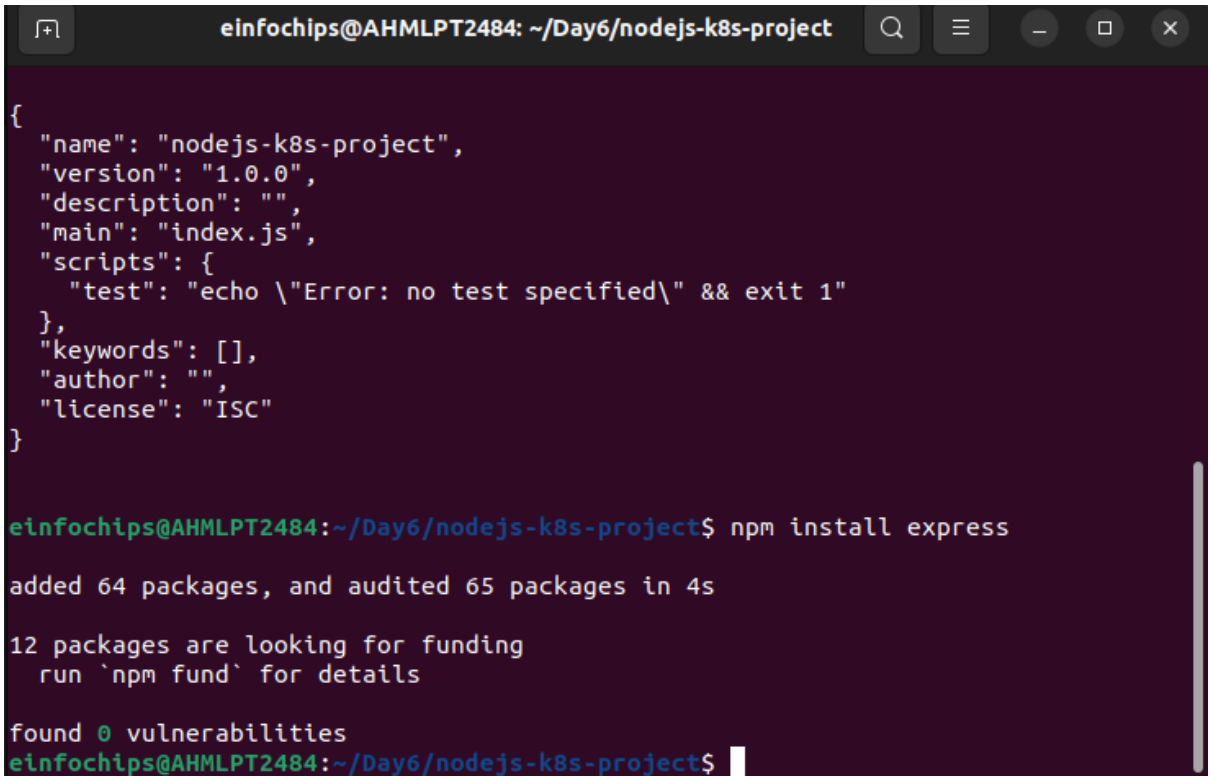
Initialize a Node.js project:

```
npm init -y
```



Install Express.js:

```
npm install express
```



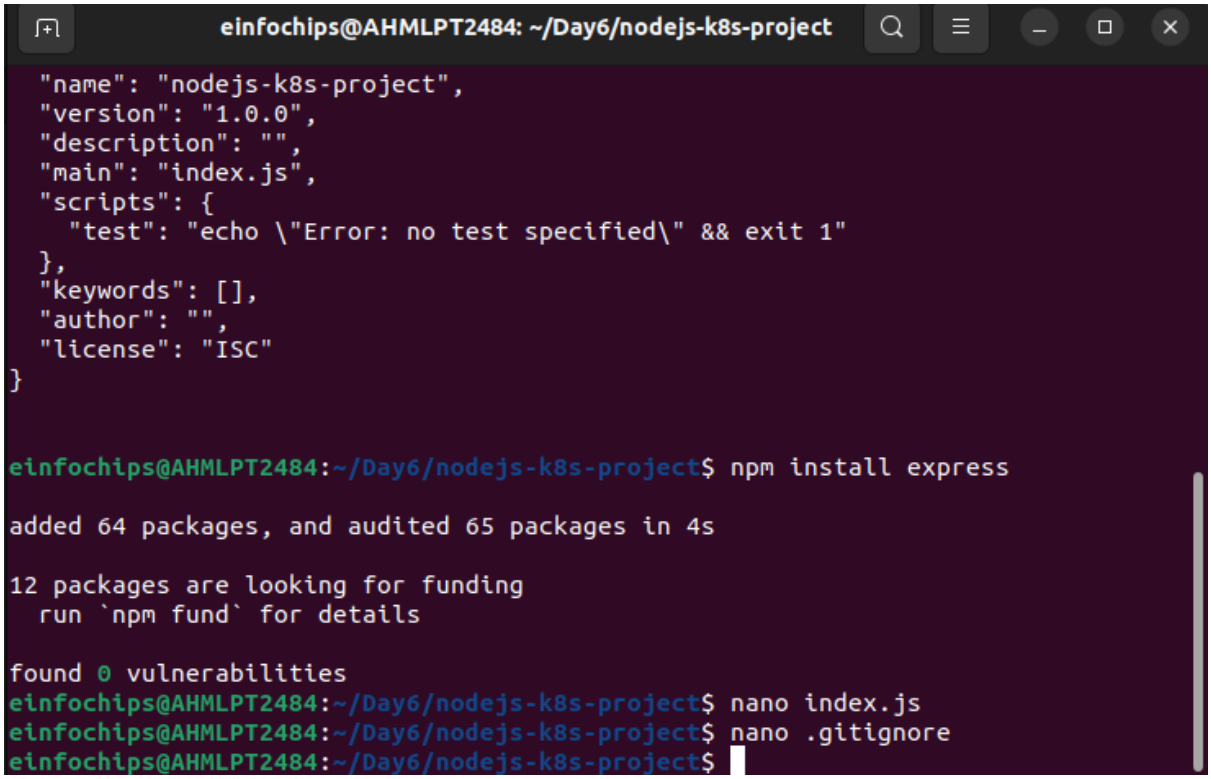

Create an `index.js` file with the following content:

```
const express = require('express');

const app = express();

const port = 3000;

app.get('/', (req, res) => {

    res.send('Hello, Kubernetes!');

});

app.listen(port, () => {

    console.log(`App running at http://localhost:${port}`);
```

```
});
```

Create a `.gitignore` file to ignore `node_modules`:

```
node_modules
```



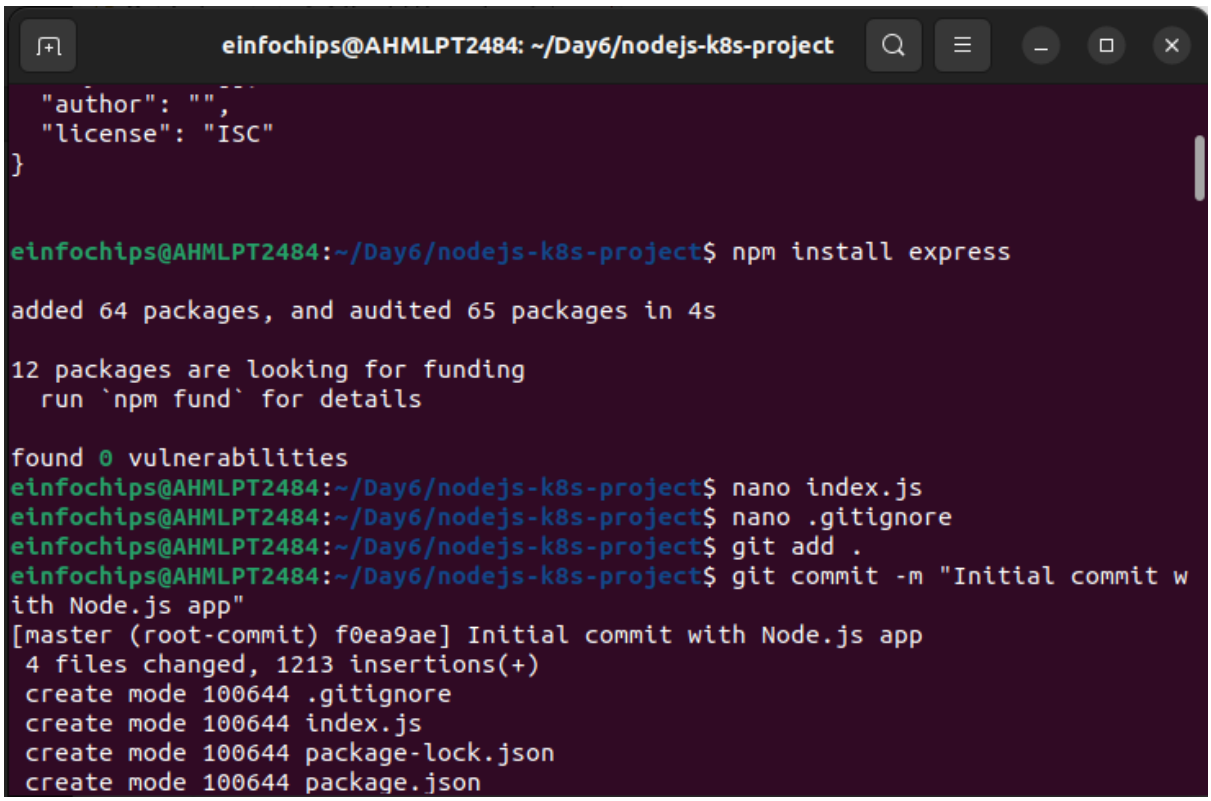

### 1.3. Commit the Initial Code

Add files to Git:

```
git add .
```

Commit the changes:

```
git commit -m "Initial commit with Node.js app"
```




## 2. Branching and Fast-Forward Merge

### 2.1. Create a New Branch

Create and switch to a new branch `feature/add-route`:

```
git checkout -b feature/add-route
```

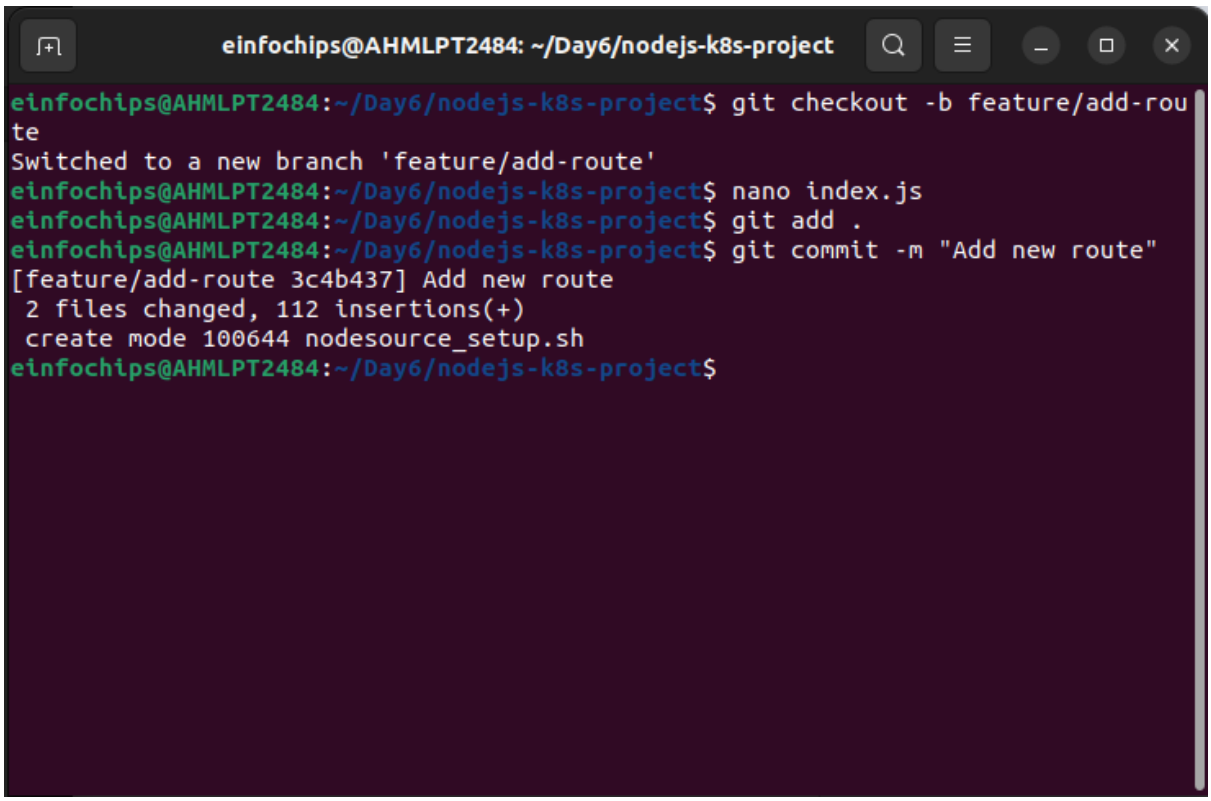
### 2.2. Implement a New Route

Modify `index.js` to add a new route:

```
app.get('/newroute', (req, res) => {

    res.send('This is a new route!');

});
```

Commit the changes:

```
git add .

git commit -m "Add new route"
```




### 2.3. Merge the Branch Using Fast-Forward

Switch back to the `main` branch:

```
git checkout main
```

Merge the `feature/add-route` branch using fast-forward:

```
git merge --ff-only feature/add-route
```

Delete the feature branch:

```
git branch -d feature/add-route
```

## 3. Containerize the Node.js Application

### 3.1. Create a Dockerfile

Create a `Dockerfile` with the following content:

```
FROM node:14

WORKDIR /app
```

```
COPY package*.json ./

RUN npm install

COPY . .

EXPOSE 3000

CMD ["node", "index.js"]
```

### 3.2. Build and Test the Docker Image

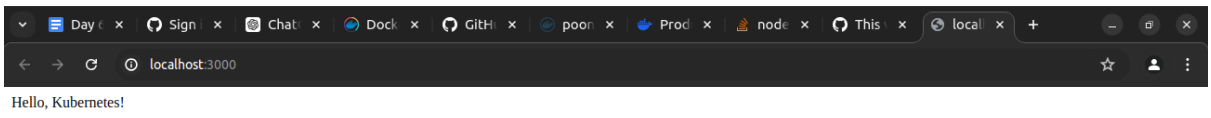
Build the Docker image:

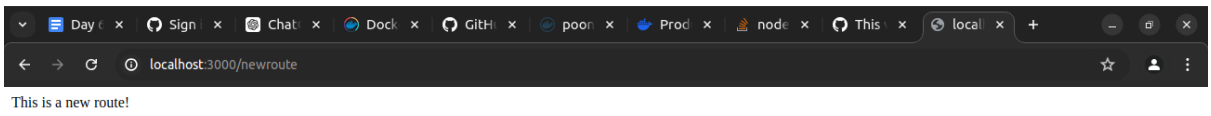
```
docker build -t nodejs-k8s-app .
```

Run the Docker container to test:

```
docker run -p 3000:3000 nodejs-k8s-app
```

1. Access `http://localhost:3000` to see the app running.






## 4. Deploying to Minikube Kubernetes

### 4.1. Start Minikube

Start Minikube:
`minikube start`

### 4.2. Create Kubernetes Deployment and Service Manifests

Create a `deployment.yaml` file:

```
apiVersion: apps/v1

kind: Deployment

metadata:

  name: nodejs-app

spec:

  replicas: 2
```

```
  selector:
    matchLabels:
      app: nodejs-app
  template:
    metadata:
      labels:
        app: nodejs-app
    spec:
      containers:
      - name: nodejs-app
        image: nodejs-k8s-app:latest
        ports:
        - containerPort: 3000
```

Create a `service.yaml` file for ClusterIP:

```
apiVersion: v1
kind: Service
metadata:
  name: nodejs-service
spec:
```

```
  selector:
    app: nodejs-app
  ports:
  - protocol: TCP
    port: 80
    targetPort: 3000
  type: ClusterIP
```

Create a `service-nodeport.yaml` file for NodePort:

```
apiVersion: v1
kind: Service
metadata:
  name: nodejs-service-nodeport
spec:
  selector:
    app: nodejs-app
  ports:
  - protocol: TCP
    port: 80
    targetPort: 3000
```

```
    nodePort: 30001

  type: NodePort
```

### 4.3. Apply Manifests to Minikube

Apply the deployment:

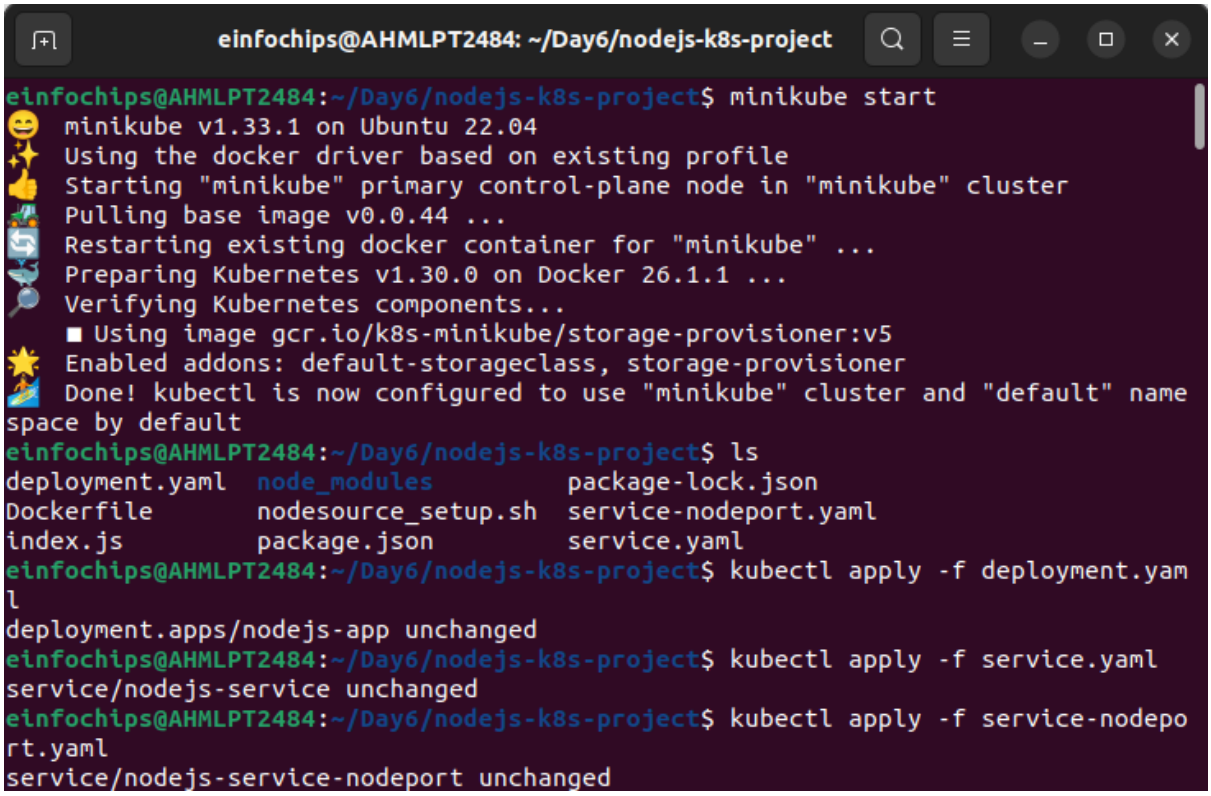
```
kubectl apply -f deployment.yaml
```

Apply the ClusterIP service:

```
kubectl apply -f service.yaml
```

Apply the NodePort service:

```
kubectl apply -f service-nodeport.yaml
```



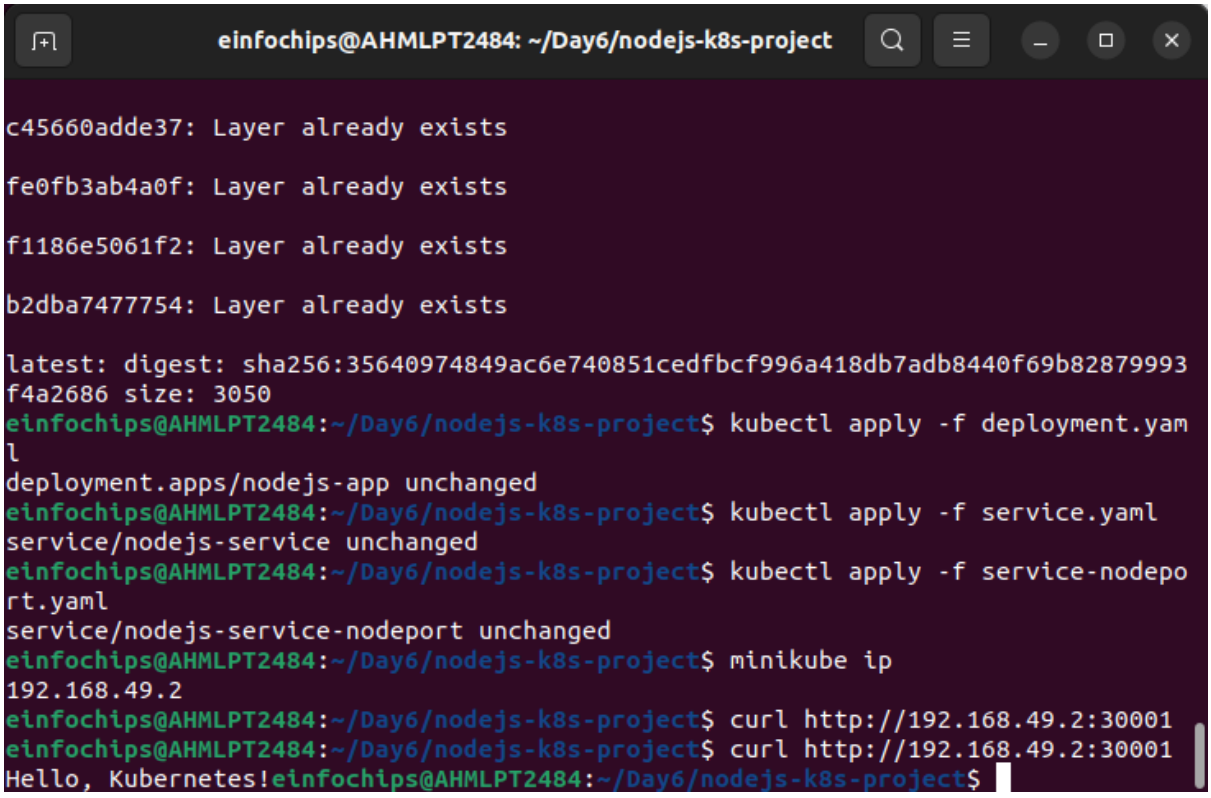

### 4.4. Access the Application

Get the Minikube IP:

```
minikube ip
```

1. Access the application using the NodePort:

   ```
   curl http://<minikube-ip>:30001
   ```




## Making Changes to the App and Redeploying Using Kubernetes

## 6. Making Changes to the Node.js Application

### 6.1. Create a New Branch for Changes

Create and switch to a new branch `feature/update-message`:

```
git checkout -b feature/update-message
```

### 6.2. Update the Application

Modify `index.js` to change the message:

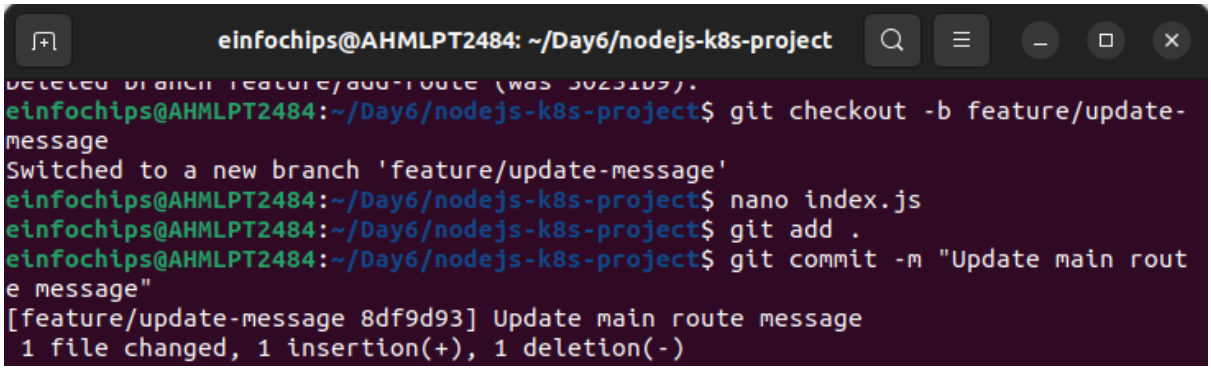
```
const express = require('express');

const app = express();

const port = 3000;
```

```
app.get('/', (req, res) => {

    res.send('Hello, Kubernetes! Updated version.');

});

app.get('/newroute', (req, res) => {

    res.send('This is a new route!');

});

app.listen(port, () => {

    console.log(`App running at http://localhost:${port}`);

});
```

### 6.3. Commit the Changes

Add and commit the changes:

```
git add .

git commit -m "Update main route message"
```




## 7. Merge the Changes and Rebuild the Docker Image

### 7.1. Merge the Feature Branch

Switch back to the `main` branch:

```
git checkout main
```

Merge the `feature/update-message` branch:

```
git merge --ff-only feature/update-message
```

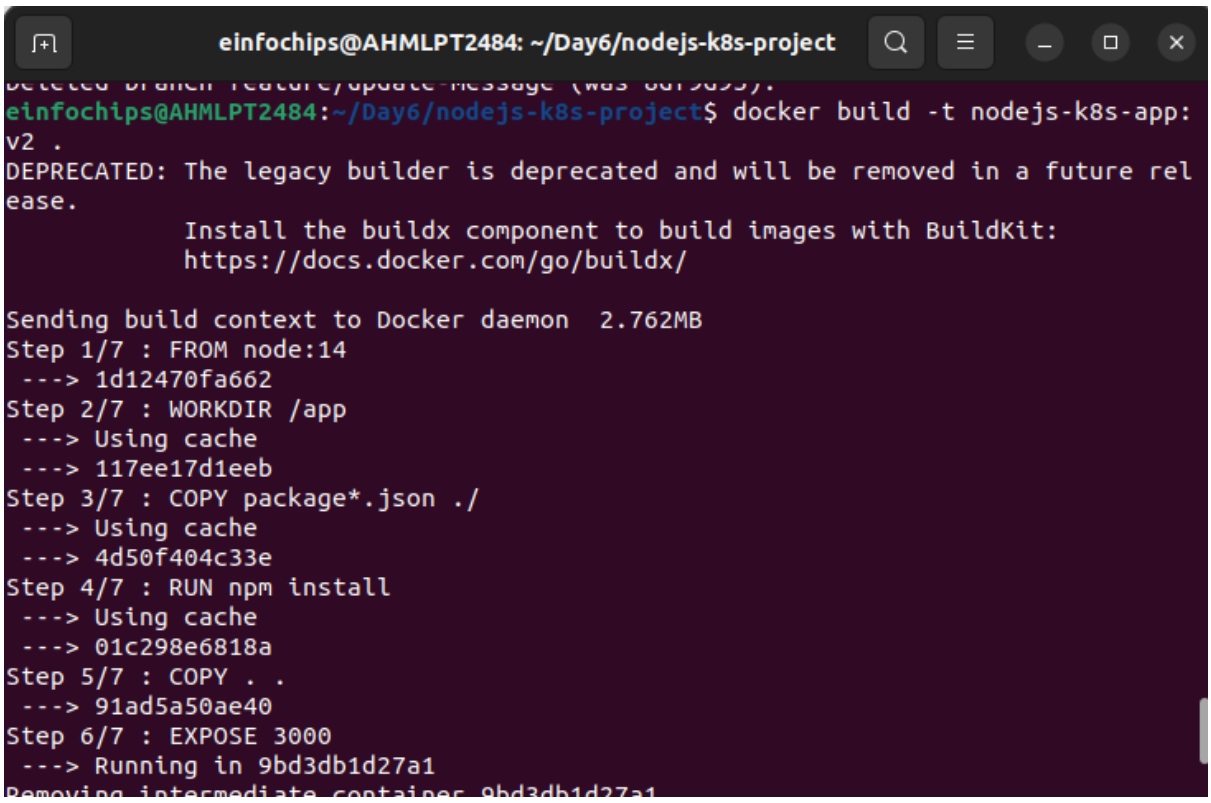
Delete the feature branch:

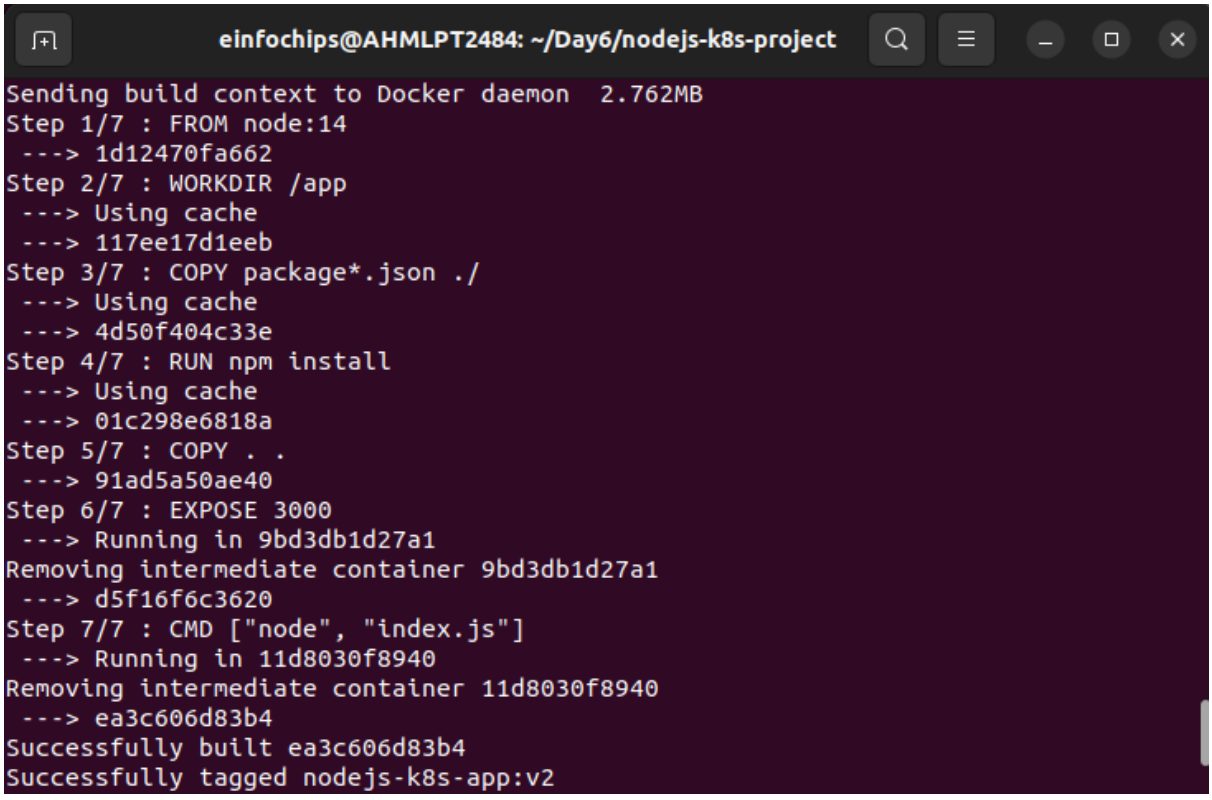
```
git branch -d feature/update-message
```


### 7.2. Rebuild the Docker Image

Rebuild the Docker image with a new tag:

```
docker build -t nodejs-k8s-app:v2 .
```


einfochips@AHMLPT2484: ~/Day6/nodejs-k8s-project
einfochips@AHMLPT2484:~/Day6/nodejs-k8s-project$ docker build -t nodejs-k8s-app:v2 .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
Install the buildx component to build images with BuildKit:
https://docs.docker.com/go/buildx/
Sending build context to Docker daemon 2.762MB
Step 1/7 : FROM node:14
---> 1d12470fa662
Step 2/7 : WORKDIR /app
---> Using cache
---> 117ee17d1eeb
Step 3/7 : COPY package*.json ./
---> Using cache
---> 4d50f404c33e
Step 4/7 : RUN npm install
---> Using cache
---> 01c298e6818a
Step 5/7 : COPY . .
---> 91ad5a50ae40
Step 6/7 : EXPOSE 3000
---> Running in 9bd3db1d27a1


einfochips@AHMLPT2484: ~/Day6/nodejs-k8s-project
Sending build context to Docker daemon 2.762MB
Step 1/7 : FROM node:14
---> 1d12470fa662
Step 2/7 : WORKDIR /app
---> Using cache
---> 117ee17d1eeb
Step 3/7 : COPY package*.json ./
---> Using cache
---> 4d50f404c33e
Step 4/7 : RUN npm install
---> Using cache
---> 01c298e6818a
Step 5/7 : COPY . .
---> 91ad5a50ae40
Step 6/7 : EXPOSE 3000
---> Running in 9bd3db1d27a1
Removing intermediate container 9bd3db1d27a1
---> d5f16f6c3620
Step 7/7 : CMD ["node", "index.js"]
---> Running in 11d8030f8940
Removing intermediate container 11d8030f8940
---> ea3c606d83b4
Successfully built ea3c606d83b4
Successfully tagged nodejs-k8s-app:v2

## 8. Update Kubernetes Deployment

### 8.1. Update the Deployment Manifest

Modify `deployment.yaml` to use the new image version:

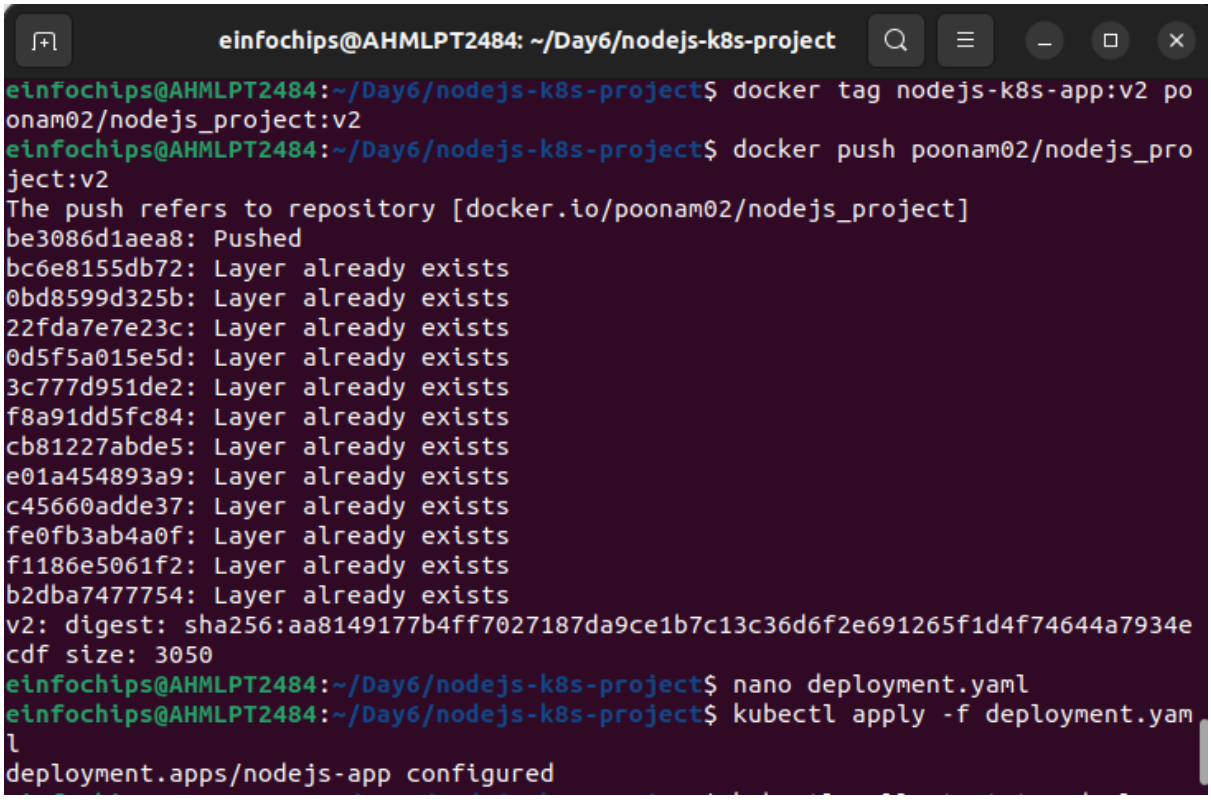
```
apiVersion: apps/v1

kind: Deployment

metadata:

  name: nodejs-app

spec:

  replicas: 2

  selector:

    matchLabels:

      app: nodejs-app

  template:

    metadata:

      labels:

        app: nodejs-app

    spec:

      containers:

      - name: nodejs-app

        image: nodejs-k8s-app:v2
```

```
        ports:

        - containerPort: 3000
```

### 8.2. Apply the Updated Manifest

Apply the updated deployment:

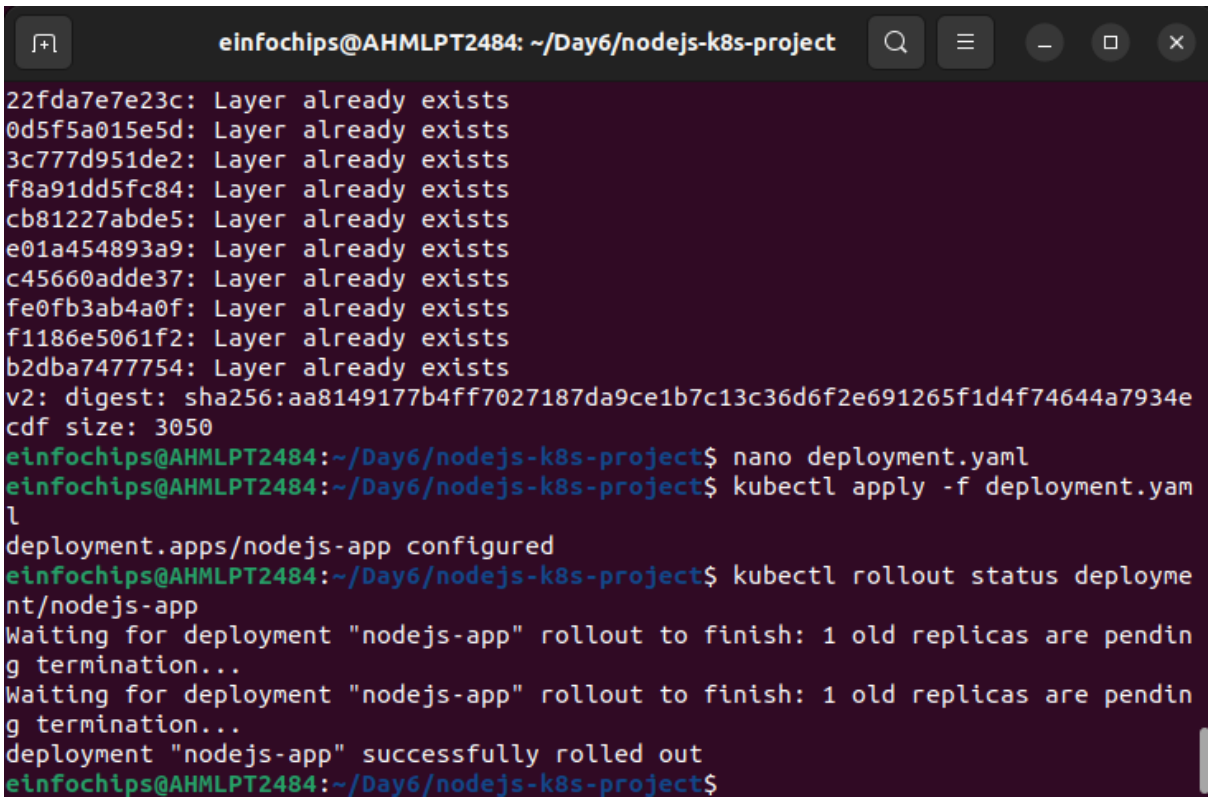
```
kubectl apply -f deployment.yaml
```




### 8.3. Verify the Update

Check the status of the deployment:

```
kubectl rollout status deployment/nodejs-app
```



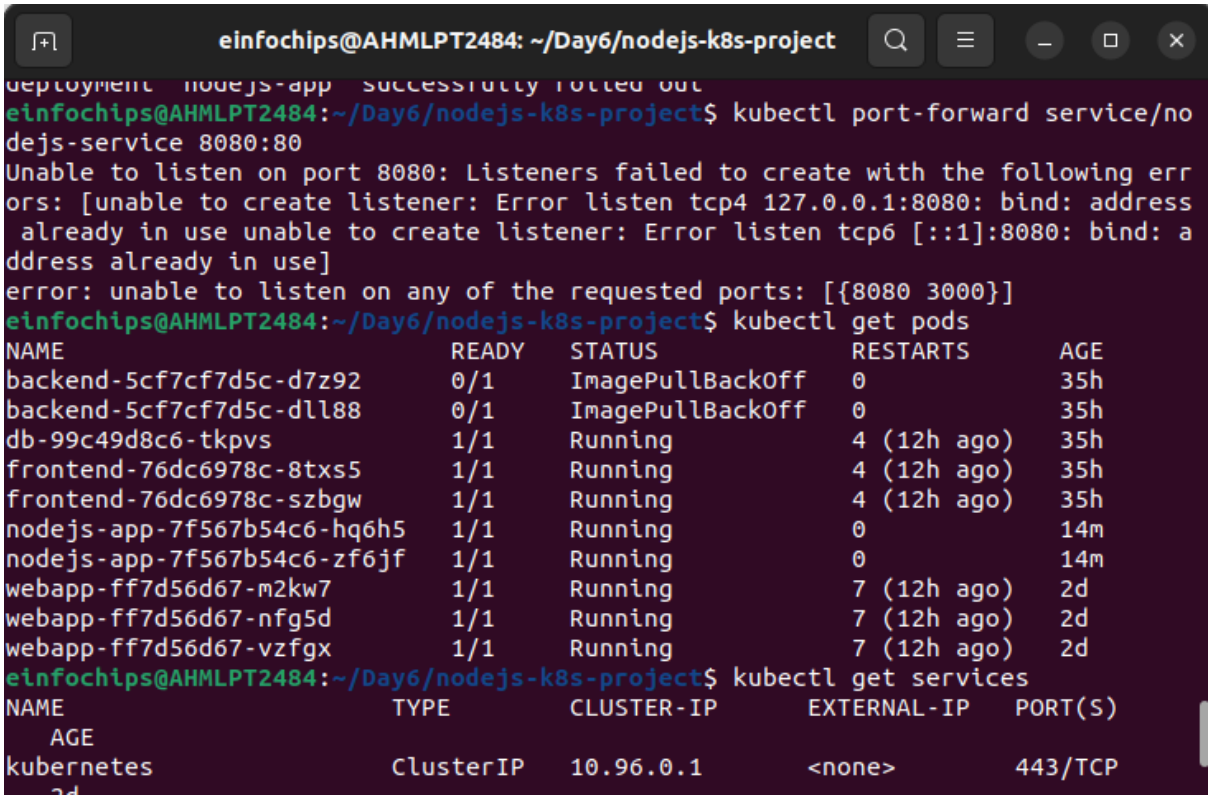

## 9. Access the Updated Application

### 9.1. Access Through ClusterIP Service

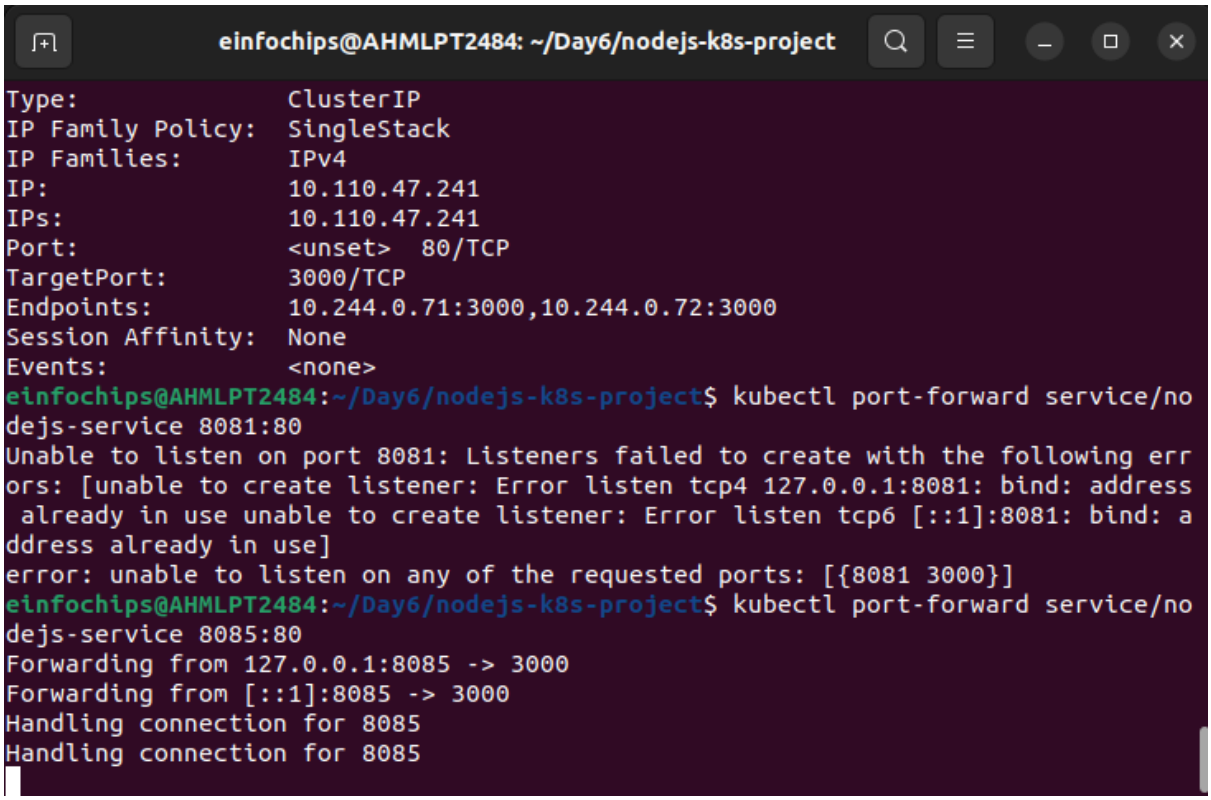
Forward the port to access the ClusterIP service:

```
kubectl port-forward service/nodejs-service 8080:80
```

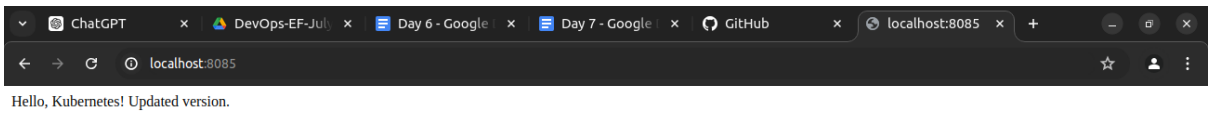
1. Open your browser and navigate to `http://localhost:8080` to see the updated message.




Didn’t run on 8080 so changed the port to 8085.



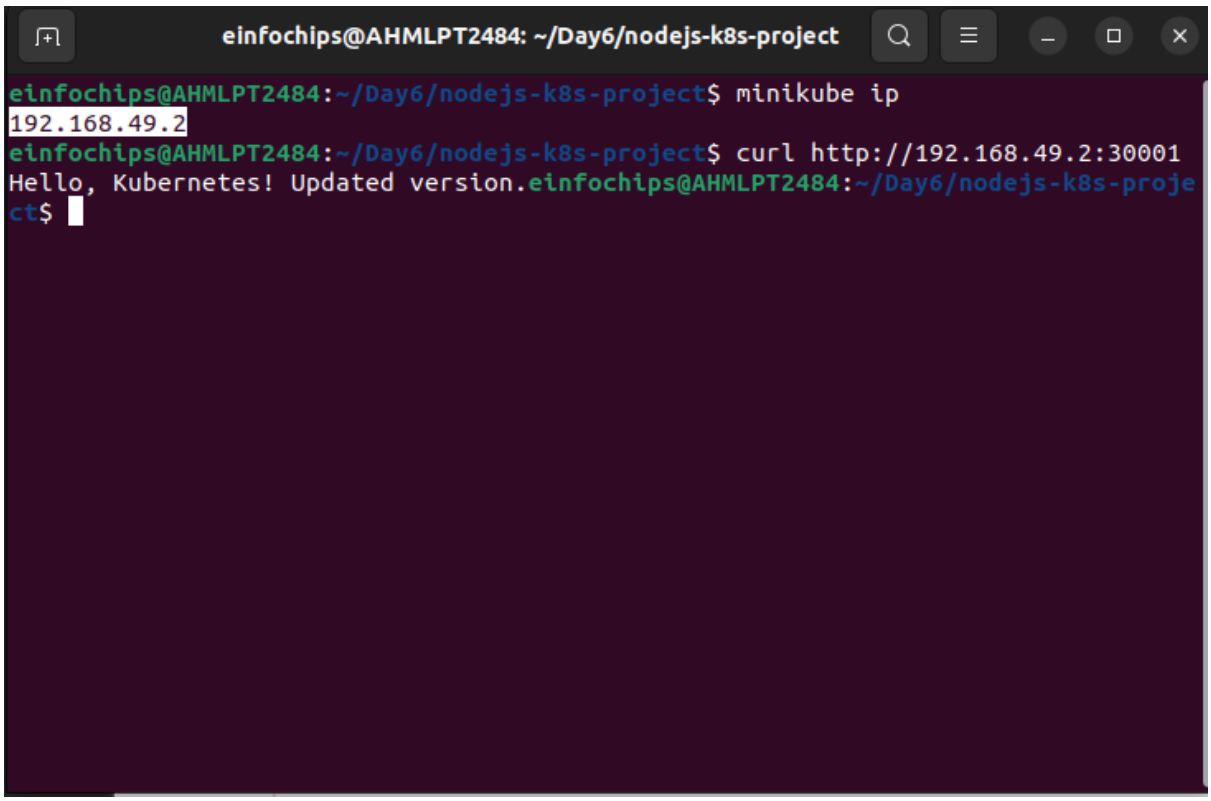
Output:




### 9.2. Access Through NodePort Service

1. Access the application using the NodePort:

   ```
   curl http://<minikube-ip>:30001
   ```


einfochips@AHMLPT2484: ~/Day6/nodejs-k8s-project
einfochips@AHMLPT2484:~/Day6/nodejs-k8s-project$ minikube ip
192.168.49.2
einfochips@AHMLPT2484:~/Day6/nodejs-k8s-project$ curl http://192.168.49.2:30001
Hello, Kubernetes! Updated version.einfochips@AHMLPT2484:~/Day6/nodejs-k8s-proje
ct$