

Deploying a Node.js App Using Minikube Kubernetes

Installing Node.js

```
einfochips@AHMLPT1707: ~  
Removing node-gyp (8.4.1-1) ...  
Removing node-mime-types (2.1.33-1) ...  
Removing node-mime (3.0.0+dfsg+~cs3.96.1-1) ...  
Removing node-tar (6.1.11+ds1+~cs6.0.6-1) ...  
Removing node-mkdirp (1.0.4+~1.0.2-1) ...  
Removing node-nopt (5.0.0-2) ...  
Removing node-opener (1.5.2+~1.4.0-1) ...  
Removing node-which (2.0.2+~cs1.3.2-2) ...  
Removing node-ws (8.5.0+~cs13.3.3-2) ...  
Removing nodejs-doc (12.22.9~dfsg-1ubuntu3.6) ...  
(Reading database ... 219454 files and directories currently installed.)  
Preparing to unpack .../nodejs_22.4.1-1nodesource1_amd64.deb ...  
Unpacking nodejs (22.4.1-1nodesource1) over (12.22.9~dfsg-1ubuntu3.6) ...  
dpkg: error processing archive /var/cache/apt/archives/nodejs_22.4.1-1nodesource1_amd64.deb (--unpack):  
trying to overwrite '/usr/include/node/common.gypi', which is also in package libnode-dev 12.22.9~dfsg-1ubuntu3.6  
dpkg-deb: error: paste subprocess was killed by signal (Broken pipe)  
Errors were encountered while processing:  
/var/cache/apt/archives/nodejs_22.4.1-1nodesource1_amd64.deb  
E: Sub-process /usr/bin/dpkg returned an error code (1)  
einfochips@AHMLPT1707:~$ node -v  
v12.22.9  
einfochips@AHMLPT1707:~$
```

1. Set Up Git Version Control

Initialize a Git Repository

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project  
trying to overwrite '/usr/include/node/common.gypi', which is also in package libnode-dev 12.22.9~dfsg-1ubuntu3.6  
dpkg-deb: error: paste subprocess was killed by signal (Broken pipe)  
Errors were encountered while processing:  
/var/cache/apt/archives/nodejs_22.4.1-1nodesource1_amd64.deb  
E: Sub-process /usr/bin/dpkg returned an error code (1)  
einfochips@AHMLPT1707:~$ node -v  
v12.22.9  
einfochips@AHMLPT1707:~$ mkdir nodejs-k8s-project  
einfochips@AHMLPT1707:~$ cd nodejs-k8s-project  
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git init  
hint: Using 'master' as the name for the initial branch. This default branch name  
hint: is subject to change. To configure the initial branch name to use in all  
hint: of your new repositories, which will suppress this warning, call:  
hint:  
hint: git config --global init.defaultBranch <name>  
hint:  
hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and  
hint: 'development'. The just-created branch can be renamed via this command:  
hint:  
hint: git branch -m <name>  
Initialized empty Git repository in /home/einfochips/nodejs-k8s-project/.git/  
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Create a Node.js Application

Install express.js

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
{
  "name": "nodejs-k8s-project",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC"
}

einfochips@AHMLPT1707:~/nodejs-k8s-project$ npm install express

added 64 packages, and audited 65 packages in 4s

12 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Commit the Initial Code

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
{
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC"
}

einfochips@AHMLPT1707:~/nodejs-k8s-project$ npm install express

added 64 packages, and audited 65 packages in 4s

12 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano index.js
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano .gitignore
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git add .
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Commit the changes

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
"license": "ISC"
}

einfochips@AHMLPT1707:~/nodejs-k8s-project$ npm install express

added 64 packages, and audited 65 packages in 4s

12 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano index.js
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano .gitignore
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git add .
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git commit -m "Initial commit with Node.js app"
[master (root-commit) 644dd03] Initial commit with Node.js app
 4 files changed, 1214 insertions(+)
 create mode 100644 .gitignore
 create mode 100644 index.js
 create mode 100644 package-lock.json
 create mode 100644 package.json
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Branching and Fast-Forward Merge

Creating a new branch

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project

einfochips@AHMLPT1707:~/nodejs-k8s-project$ npm install express

added 64 packages, and audited 65 packages in 4s

12 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano index.js
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano .gitignore
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git add .
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git commit -m "Initial commit with Node.js app"
[master (root-commit) 644dd03] Initial commit with Node.js app
 4 files changed, 1214 insertions(+)
 create mode 100644 .gitignore
 create mode 100644 index.js
 create mode 100644 package-lock.json
 create mode 100644 package.json
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout -b feature/add-route
Switched to a new branch 'feature/add-route'
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```


Implement a new route and commit new changes.

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project

12 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano index.js
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano .gitignore
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git add .
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git commit -m "Initial commit with Node.js app"
[master (root-commit) 644dd03] Initial commit with Node.js app
 4 files changed, 1214 insertions(+)
 create mode 100644 .gitignore
 create mode 100644 index.js
 create mode 100644 package-lock.json
 create mode 100644 package.json
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout -b feature/add-route
Switched to a new branch 'feature/add-route'
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano index.js
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git add .
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git commit -m "Add new route"
[feature/add-route 6d0882e] Add new route
 1 file changed, 3 insertions(+)
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Merge the Branch Using Fast-Forward

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project

ode.js app"
[master (root-commit) 644dd03] Initial commit with Node.js app
 4 files changed, 1214 insertions(+)
 create mode 100644 .gitignore
 create mode 100644 index.js
 create mode 100644 package-lock.json
 create mode 100644 package.json
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout -b feature/add-route
Switched to a new branch 'feature/add-route'
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano index.js
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git add .
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git commit -m "Add new route"
[feature/add-route 6d0882e] Add new route
 1 file changed, 3 insertions(+)
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout main
error: pathspec 'main' did not match any file(s) known to git
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout main
error: pathspec 'main' did not match any file(s) known to git
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git branch
* feature/add-route
  master
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout master
Switched to branch 'master'
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

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

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
create mode 100644 package.json
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout -b feature/add-route
Switched to a new branch 'feature/add-route'
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano index.js
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git add .
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git commit -m "Add new route"
[feature/add-route 6d0882e] Add new route
1 file changed, 3 insertions(+)
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout main
error: pathspec 'main' did not match any file(s) known to git
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout main
error: pathspec 'main' did not match any file(s) known to git
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git branch
* feature/add-route
  master
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout master
Switched to branch 'master'
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git merge --ff-only feature/add-route
Updating 644dd03..6d0882e
Fast-forward
 index.js | 3 +++
1 file changed, 3 insertions(+)
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Delete the feature branch:

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
Switched to a new branch 'feature/add-route'
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano index.js
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git add .
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git commit -m "Add new route"
[feature/add-route 6d0882e] Add new route
1 file changed, 3 insertions(+)
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout main
error: pathspec 'main' did not match any file(s) known to git
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout main
error: pathspec 'main' did not match any file(s) known to git
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git branch
* feature/add-route
  master
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout master
Switched to branch 'master'
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git merge --ff-only feature/add-route
Updating 644dd03..6d0882e
Fast-forward
 index.js | 3 +++
1 file changed, 3 insertions(+)
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git branch -d feature/add-route
Deleted branch feature/add-route (was 6d0882e).
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```


Containerize the Node.js Application

Create a dockerfile

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
GNU nano 6.2 Dockerfile
FROM node:14
WORKDIR /app
COPY package*.json ./
RUN npm install
COPY . .
EXPOSE 3000
CMD ["node", "index.js"]

[ Wrote 7 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut      ^T Execute  ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify  ^_ Go To Line
```

Build and Test the Docker Image

Building the image

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
npm WARN nodejs-k8s-project@1.0.0 No repository field.

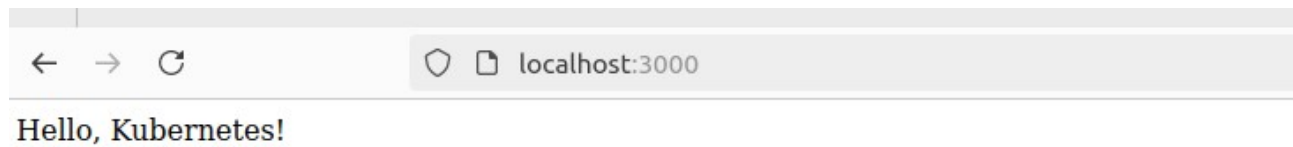
added 64 packages from 41 contributors and audited 64 packages in 17.06s

12 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Removing intermediate container 8052273dc4f8
---> 5f9c6362ce91
Step 5/7 : COPY . .
---> 855e6c2bc381
Step 6/7 : EXPOSE 3000
---> Running in dd23cd5e7fcd
Removing intermediate container dd23cd5e7fcd
---> 3c523a90c9d2
Step 7/7 : CMD ["node", "index.js"]
---> Running in 56ebd265269b
Removing intermediate container 56ebd265269b
---> b9fbd44d707b
Successfully built b9fbd44d707b
Successfully tagged nodejs-k8s-app:latest
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Run the Docker container to test:



```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
12 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Removing intermediate container 8052273dc4f8
---> 5f9c6362ce91
Step 5/7 : COPY . .
---> 855e6c2bc381
Step 6/7 : EXPOSE 3000
---> Running in dd23cd5e7fcd
Removing intermediate container dd23cd5e7fcd
---> 3c523a90c9d2
Step 7/7 : CMD ["node", "index.js"]
---> Running in 56ebd265269b
Removing intermediate container 56ebd265269b
---> b9fbd44d707b
Successfully built b9fbd44d707b
Successfully tagged nodejs-k8s-app:latest
einfochips@AHMLPT1707:~/nodejs-k8s-project$ sudo docker run -p 3000:3000 nodejs-k8s-app
App running at http://localhost:3000
```

Deploying to Minikube Kubernetes

Start minikube

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
einfochips@AHMLPT1707:~/nodejs-k8s-project$ minikube start
🐳 minikube v1.33.1 on Ubuntu 22.04
🌟 Using the docker driver based on existing profile

💣 Exiting due to PROVIDER_DOCKER_NEWGRP: "docker version --format <no value>--<no value>:<no value>" exit status 1: permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/version": dial unix /var/run/docker.sock: connect: permission denied
💡 Suggestion: Add your user to the 'docker' group: 'sudo usermod -aG docker $USER && newgrp docker'
📖 Documentation: https://docs.docker.com/engine/install/linux-postinstall/

einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

created service.yaml

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
GNU nano 6.2 service.yaml
apiVersion: v1
kind: Service
metadata:
  name: nodejs-service
spec:
  selector:
    app: nodejs-app
  ports:
    - protocol: TCP
      port: 80
      targetPort: 3000
  type: ClusterIP

[ Read 12 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_ Go To Line
```


Create service-nodeport.yaml

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
GNU nano 6.2 service-nodeport.yaml *
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

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_ Go To Line
```

Apply Manifests to Minikube

Applied deployment, ClusterIP, NodePort

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
🐻 minikube v1.33.1 on Ubuntu 22.04
🌟 Using the docker driver based on existing profile
💣 Exiting due to PROVIDER_DOCKER_NEWGRP: "docker version --format <no value>--<no value>:<no value>" exit status 1: permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/version": dial unix /var/run/docker.sock: connect: permission denied
💡 Suggestion: Add your user to the 'docker' group: 'sudo usermod -aG docker $USER && newgrp docker'
📖 Documentation: https://docs.docker.com/engine/install/linux-postinstall/

einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano deployment.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano service.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano service.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano service-nodeport.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$ kubectl apply -f deployment.yaml
deployment.apps/nodejs-app created
einfochips@AHMLPT1707:~/nodejs-k8s-project$ kubectl apply -f service.yaml
service/nodejs-service created
einfochips@AHMLPT1707:~/nodejs-k8s-project$ kubectl apply -f service-nodeport.yaml
service/nodejs-service-nodeport created
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Making Changes to the Node.js Application

Create a New Branch for Changes

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
o the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/version": dial unix /var/run/docker.sock: connect: permission denied
💡 Suggestion: Add your user to the 'docker' group: 'sudo usermod -aG docker $USER && newgrp docker'
📄 Documentation: https://docs.docker.com/engine/install/linux-postinstall/

einfochips@AHMLPT1707:~/nodejs-k8s-project$ minikube ip

❌ Exiting due to GUEST_STATUS: Unable to get control-plane node minikube host status: state: unknown state "minikube": docker container inspect minikube --format={{.State.Status}}: exit status 1
stdout:

stderr:
permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/containers/minikube/json": dial unix /var/run/docker.sock: connect: permission denied

einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout -b feature/update-message
Switched to a new branch 'feature/update-message'
```

Modify index.js

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
GNU nano 6.2 index.js
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}`);
});

[ Wrote 15 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_ Go To Line
```

Commit the changes

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
mat={ {.State.Status}}: exit status 1
stdout:

stderr:
permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/containers/mikube/json": dial unix /var/run/docker.sock: connect: permission denied

einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout -b feature/update-message
Switched to a new branch 'feature/update-message'
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano index.js
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git add .
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git commit -m "Update main route message"
[feature/update-message b8d83af] Update main route message
 5 files changed, 57 insertions(+), 5 deletions(-)
 create mode 100644 Dockerfile
 create mode 100644 deployment.yaml
 create mode 100644 service-nodeport.yaml
 create mode 100644 service.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Merge the Changes and Rebuild the Docker Image

Merge the feature branch

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
 create mode 100644 Dockerfile
 create mode 100644 deployment.yaml
 create mode 100644 service-nodeport.yaml
 create mode 100644 service.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git branch
* feature/update-message
  master
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout master
Switched to branch 'master'
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git merge --ff-only feature/update-message
Updating 6d0882e..b8d83af
Fast-forward
 Dockerfile      | 7 ++++++
 deployment.yaml | 20 ++++++
 index.js        | 10 +++++-
 service-nodeport.yaml | 13 ++++++
 service.yaml    | 12 ++++++
 5 files changed, 57 insertions(+), 5 deletions(-)
 create mode 100644 Dockerfile
 create mode 100644 deployment.yaml
 create mode 100644 service-nodeport.yaml
 create mode 100644 service.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Delete the feature branch


```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
create mode 100644 service-nodeport.yaml
create mode 100644 service.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git branch
* feature/update-message
  master
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git checkout master
Switched to branch 'master'
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git merge --ff-only feature/update-m
essage
Updating 6d0882e..b8d83af
Fast-forward
 Dockerfile           | 7 ++++++
 deployment.yaml      | 20 ++++++
 index.js             | 10 +++++-
 service-nodeport.yaml | 13 ++++++
 service.yaml         | 12 ++++++
 5 files changed, 57 insertions(+), 5 deletions(-)
 create mode 100644 Dockerfile
 create mode 100644 deployment.yaml
 create mode 100644 service-nodeport.yaml
 create mode 100644 service.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$ git branch -d feature/update-message
Deleted branch feature/update-message (was b8d83af).
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Rebuild the Docker Image

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
Step 1/7 : FROM node:14
--> 1d12470fa662
Step 2/7 : WORKDIR /app
--> Using cache
--> 175153c2631d
Step 3/7 : COPY package*.json ./
--> Using cache
--> 5706ce7b6389
Step 4/7 : RUN npm install
--> Using cache
--> 5f9c6362ce91
Step 5/7 : COPY . .
--> 3af41e2ff422
Step 6/7 : EXPOSE 3000
--> Running in 6f62c74465fe
Removing intermediate container 6f62c74465fe
--> 6203301d3adc
Step 7/7 : CMD ["node", "index.js"]
--> Running in cb5f9a371b63
Removing intermediate container cb5f9a371b63
--> 378f0b8c695d
Successfully built 378f0b8c695d
Successfully tagged nodejs-k8s-app:v2
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Update the Kubernetes Deployment updating the deployment manifest

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
GNU nano 6.2 deployment.yaml
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
[ Read 20 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_ Go To Line
```

Apply the update manifest

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
---> Using cache
---> 5706ce7b6389
Step 4/7 : RUN npm install
---> Using cache
---> 5f9c6362ce91
Step 5/7 : COPY . .
---> 3af41e2ff422
Step 6/7 : EXPOSE 3000
---> Running in 6f62c74465fe
Removing intermediate container 6f62c74465fe
---> 6203301d3adc
Step 7/7 : CMD ["node", "index.js"]
---> Running in cb5f9a371b63
Removing intermediate container cb5f9a371b63
---> 378f0b8c695d
Successfully built 378f0b8c695d
Successfully tagged nodejs-k8s-app:v2
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano deployment.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$ node -v
v12.22.9
einfochips@AHMLPT1707:~/nodejs-k8s-project$ nano deployment.yaml
einfochips@AHMLPT1707:~/nodejs-k8s-project$ kubectl apply -f deployment.yaml
deployment.apps/nodejs-app configured
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

```
einfochips@AHMLPT1707: ~/nodejs-k8s-project
---> Using cache
---> 5706ce7b6389
Step 4/7 : RUN npm install
---> Using cache
---> 5f9c6362ce91
Step 5/7 : COPY . .
---> 08381336787e
Step 6/7 : EXPOSE 3000
---> Running in fb4fd4583181
Removing intermediate container fb4fd4583181
---> 3e0b1bf3350c
Step 7/7 : CMD ["node", "index.js"]
---> Running in 1f800b78216c
Removing intermediate container 1f800b78216c
---> d37f4234ce69
Successfully built d37f4234ce69
Successfully tagged nodejs-k8s-app:v2
einfochips@AHMLPT1707:~/nodejs-k8s-project$ sudo docker pull yashmahio4/nodejs-k
8s-app:v2
v2: Pulling from yashmahio4/nodejs-k8s-app
Digest: sha256:d3a261f2e84f29707cdaf20ff1312f8a52fce2935fe59cf44619c269fd14f8d9
Status: Image is up to date for yashmahio4/nodejs-k8s-app:v2
docker.io/yashmahio4/nodejs-k8s-app:v2
einfochips@AHMLPT1707:~/nodejs-k8s-project$
```

Project 2

Create a new directory for the project:

```
einfochips@AHMLPT1707: ~/flask-k8s-project
einfochips@AHMLPT1707:~$ mkdir flask-k8s-project
einfochips@AHMLPT1707:~$ cd flask-k8s-project
einfochips@AHMLPT1707:~/flask-k8s-project$ git init
hint: Using 'master' as the name for the initial branch. This default branch nam
e
hint: is subject to change. To configure the initial branch name to use in all
hint: of your new repositories, which will suppress this warning, call:
hint:
hint:   git config --global init.defaultBranch <name>
hint:
hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and
hint: 'development'. The just-created branch can be renamed via this command:
hint:
hint:   git branch -m <name>
Initialized empty Git repository in /home/einfochips/flask-k8s-project/.git/
einfochips@AHMLPT1707:~/flask-k8s-project$ python -m venv venv
Command 'python' not found, did you mean:
  command 'python3' from deb python3
  command 'python' from deb python-is-python3
einfochips@AHMLPT1707:~/flask-k8s-project$ python3 -m venv venv
The virtual environment was not created successfully because ensurepip is not
available. On Debian/Ubuntu systems, you need to install the python3-venv
package using the following command.
```


Create a Python Flask Application

```
einfochips@AHMLPT1707: ~/flask-k8s-project
Get:4 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 python3.10-venv amd64 3.10.12-1~22.04.4 [5,712 B]
Fetched 2,612 kB in 12s (216 kB/s)
Selecting previously unselected package python3-distutils.
(Reading database ... 221536 files and directories currently installed.)
Preparing to unpack .../python3-distutils_3.10.8-1~22.04_all.deb ...
Unpacking python3-distutils (3.10.8-1~22.04) ...
Selecting previously unselected package python3-pip-whl.
Preparing to unpack .../python3-pip-whl_22.0.2+dfsg-1ubuntu0.4_all.deb ...
Unpacking python3-pip-whl (22.0.2+dfsg-1ubuntu0.4) ...
Selecting previously unselected package python3-setuptools-whl.
Preparing to unpack .../python3-setuptools-whl_59.6.0-1.2ubuntu0.22.04.1_all.deb ...
Unpacking python3-setuptools-whl (59.6.0-1.2ubuntu0.22.04.1) ...
Selecting previously unselected package python3.10-venv.
Preparing to unpack .../python3.10-venv_3.10.12-1~22.04.4_amd64.deb ...
Unpacking python3.10-venv (3.10.12-1~22.04.4) ...
Setting up python3-distutils (3.10.8-1~22.04) ...
Setting up python3-setuptools-whl (59.6.0-1.2ubuntu0.22.04.1) ...
Setting up python3-pip-whl (22.0.2+dfsg-1ubuntu0.4) ...
Setting up python3.10-venv (3.10.12-1~22.04.4) ...
einfochips@AHMLPT1707:~/flask-k8s-project$ python3 -m venv venv
einfochips@AHMLPT1707:~/flask-k8s-project$ source venv/bin/activate
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$
```

Install flask

```
einfochips@AHMLPT1707: ~/flask-k8s-project
Downloading flask-3.0.3-py3-none-any.whl (101 kB)
101.7/101.7 KB 1.6 MB/s eta 0:00:00
Collecting blinker>=1.6.2
Downloading blinker-1.8.2-py3-none-any.whl (9.5 kB)
Collecting Jinja2>=3.1.2
Downloading jinja2-3.1.4-py3-none-any.whl (133 kB)
133.3/133.3 KB 9.3 MB/s eta 0:00:00
Collecting Werkzeug>=3.0.0
Downloading werkzeug-3.0.3-py3-none-any.whl (227 kB)
227.3/227.3 KB 12.2 MB/s eta 0:00:00
Collecting click>=8.1.3
Downloading click-8.1.7-py3-none-any.whl (97 kB)
97.9/97.9 KB 7.8 MB/s eta 0:00:00
Collecting itsdangerous>=2.1.2
Downloading itsdangerous-2.2.0-py3-none-any.whl (16 kB)
Collecting MarkupSafe>=2.0
Downloading MarkupSafe-2.1.5-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (25 kB)
Installing collected packages: MarkupSafe, itsdangerous, click, blinker, Werkzeug, Jinja2, Flask
Successfully installed Flask-3.0.3 Jinja2-3.1.4 MarkupSafe-2.1.5 Werkzeug-3.0.3 blinker-1.8.2 click-8.1.7 itsdangerous-2.2.0
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano app.py
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$
```

Git add and commit

```
einfochips@AHMLPT1707: ~/flask-k8s-project
Collecting click>=8.1.3
  Downloading click-8.1.7-py3-none-any.whl (97 kB)
  97.9/97.9 KB 7.8 MB/s eta 0:00:00
Collecting itsdangerous>=2.1.2
  Downloading itsdangerous-2.2.0-py3-none-any.whl (16 kB)
Collecting MarkupSafe>=2.0
  Downloading MarkupSafe-2.1.5-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (25 kB)
Installing collected packages: MarkupSafe, itsdangerous, click, blinker, Werkzeug, Jinja2, Flask
Successfully installed Flask-3.0.3 Jinja2-3.1.4 MarkupSafe-2.1.5 Werkzeug-3.0.3 blinker-1.8.2 click-8.1.7 itsdangerous-2.2.0
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano app.py
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano requirements.txt
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano .gitignore
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git add .
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git commit -m "Initial commit with Flask app"
[master (root-commit) bc0e293] Initial commit with Flask app
 3 files changed, 12 insertions(+)
 create mode 100644 .gitignore
 create mode 100644 app.py
 create mode 100644 requirements.txt
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$
```

Branching and Fast-Forward Merge

```
einfochips@AHMLPT1707: ~/flask-k8s-project
Collecting itsdangerous>=2.1.2
  Downloading itsdangerous-2.2.0-py3-none-any.whl (16 kB)
Collecting MarkupSafe>=2.0
  Downloading MarkupSafe-2.1.5-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (25 kB)
Installing collected packages: MarkupSafe, itsdangerous, click, blinker, Werkzeug, Jinja2, Flask
Successfully installed Flask-3.0.3 Jinja2-3.1.4 MarkupSafe-2.1.5 Werkzeug-3.0.3 blinker-1.8.2 click-8.1.7 itsdangerous-2.2.0
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano app.py
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano requirements.txt
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano .gitignore
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git add .
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git commit -m "Initial commit with Flask app"
[master (root-commit) bc0e293] Initial commit with Flask app
 3 files changed, 12 insertions(+)
 create mode 100644 .gitignore
 create mode 100644 app.py
 create mode 100644 requirements.txt
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git checkout -b feature/add-route
Switched to a new branch 'feature/add-route'
```


Modify in app.py

```
einfochips@AHMLPT1707: ~/flask-k8s-project
GNU nano 6.2 app.py
from flask import Flask

app = Flask(__name__)

@app.route('/')
def hello_world():
    return 'Hello, Kubernetes!'

if __name__ == '__main__':
    app.run(host='0.0.0.0', port=5000)

@app.route('/newroute')
def new_route():
    return 'This is a new route!'

[ Read 14 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_ Go To Line
```

committing the changes

```
einfochips@AHMLPT1707: ~/flask-k8s-project
g, Jinja2, Flask
Successfully installed Flask-3.0.3 Jinja2-3.1.4 MarkupSafe-2.1.5 Werkzeug-3.0.3
blinker-1.8.2 click-8.1.7 itsdangerous-2.2.0
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano app.py
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano requirements.txt
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano .gitignore
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git add .
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git commit -m "Initial commit
with Flask app"
[master (root-commit) bc0e293] Initial commit with Flask app
 3 files changed, 12 insertions(+)
 create mode 100644 .gitignore
 create mode 100644 app.py
 create mode 100644 requirements.txt
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git checkout -b feature/add-ro
ute
Switched to a new branch 'feature/add-route'
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano app.py
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano app.py
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git add .
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git commit -m "Add new route"
[feature/add-route 0597a91] Add new route
 1 file changed, 4 insertions(+)
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$
```


Merge the Branch Using Fast-Forward

```
einfochips@AHMLPT1707: ~/flask-k8s-project
create mode 100644 requirements.txt
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git checkout -b feature/add-route
Switched to a new branch 'feature/add-route'
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano app.py
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano app.py
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git add .
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git commit -m "Add new route"
[feature/add-route 0597a91] Add new route
 1 file changed, 4 insertions(+)
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git checkout main
error: pathspec 'main' did not match any file(s) known to git
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git checkout master
Switched to branch 'master'
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git merge --ff-only feature/add-route
Updating bc0e293..0597a91
Fast-forward
 app.py | 4 ++++
 1 file changed, 4 insertions(+)
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git branch -d feature/add-route
Deleted branch feature/add-route (was 0597a91).
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$
```

Containerize the Flask Application

```
einfochips@AHMLPT1707: ~/flask-k8s-project
GNU nano 6.2 Dockerfile
FROM python:3.8-slim

WORKDIR /app

COPY requirements.txt requirements.txt
RUN pip install -r requirements.txt

COPY . .

EXPOSE 5000

CMD ["python", "app.py"]

[ Read 12 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^/ Go To Line
```

Build and Test the Docker Image

```
einfochips@AHMLPT1707: ~/flask-k8s-project
Successfully installed Flask-3.0.3 Jinja2-3.1.4 MarkupSafe-2.1.5 Werkzeug-3.0.3
blinker-1.8.2 click-8.1.7 importlib-metadata-8.0.0 itsdangerous-2.2.0 zipp-3.19.
2
WARNING: Running pip as the 'root' user can result in broken permissions and con
flicting behaviour with the system package manager. It is recommended to use a v
irtual environment instead: https://pip.pypa.io/warnings/venv

[notice] A new release of pip is available: 23.0.1 -> 24.1.2
[notice] To update, run: pip install --upgrade pip
Removing intermediate container e55e17314730
---> 4b5e55f401dc
Step 5/7 : COPY . .
---> d959efd5a40b
Step 6/7 : EXPOSE 5000
---> Running in dd15cb640ba5
Removing intermediate container dd15cb640ba5
---> b58abde75a7f
Step 7/7 : CMD ["python", "app.py"]
---> Running in 53ecbe79042b
Removing intermediate container 53ecbe79042b
---> 0074c9547749
Successfully built 0074c9547749
Successfully tagged flask-k8s-app:latest
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$
```

Testing

```
← → ↻ 127.0.0.1:5000
Hello, Kubernetes!
```

Deploying to Minikube Kubernetes

minikube start

Create Kubernetes Deployment and Service Manifests

```
GNU nano 6.2 deployment.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: flask-app
spec:
  replicas: 2
  selector:
    matchLabels:
      app: flask-app
  template:
    metadata:
      labels:
        app: flask-app
    spec:
      containers:
      - name: flask-app
        image: flask-k8s-app:latest
        ports:
        - containerPort: 5000
[ Wrote 19 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute  ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify  ^/ Go To Line
```

service.yaml

```
GNU nano 6.2 service.yaml *
apiVersion: v1
kind: Service
metadata:
  name: flask-service
spec:
  selector:
    app: flask-app
  ports:
  - protocol: TCP
    port: 80
    targetPort: 5000
  type: ClusterIP
```


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

```
GNU nano 6.2 service-nodeport.yaml
apiVersion: v1
kind: Service
metadata:
  name: flask-service-nodeport
spec:
  selector:
    app: flask-app
  ports:
  - protocol: TCP
    port: 80
    targetPort: 5000
    nodePort: 30001
  type: NodePort

[ Wrote 13 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_ Go To Line
```

Apply Manifests to Minikube

```
172.17.0.1 - - [16/Jul/2024 16:37:18] "GET / HTTP/1.1" 200 -
172.17.0.1 - - [16/Jul/2024 16:37:18] "GET /favicon.ico HTTP/1.1" 404 -
^C(venv) einfochips@AHMLPT1707: ~/flask-k8s-project$
(venv) einfochips@AHMLPT1707: ~/flask-k8s-project$ minikube start
🐹 minikube v1.33.1 on Ubuntu 22.04
🌟 Using the docker driver based on existing profile
👍 Starting "minikube" primary control-plane node in "minikube" cluster
📦 Pulling base image v0.0.44 ...
🔄 Restarting existing docker container for "minikube" ...
🔧 Preparing Kubernetes v1.30.0 on Docker 26.1.1 ...
🔍 Verifying Kubernetes components...
   ■ Using image gcr.io/k8s-minikube/storage-provisioner:v5
🌟 Enabled addons: default-storageclass, storage-provisioner
🏡 Done! kubectl is now configured to use "minikube" cluster and "default" name
space by default
(venv) einfochips@AHMLPT1707: ~/flask-k8s-project$ nano deployment.yaml
(venv) einfochips@AHMLPT1707: ~/flask-k8s-project$ nano service.yaml
(venv) einfochips@AHMLPT1707: ~/flask-k8s-project$ nano service-nodeport.yaml
(venv) einfochips@AHMLPT1707: ~/flask-k8s-project$ kubectl apply -f deployment.ya
ml
deployment.apps/flask-app created
(venv) einfochips@AHMLPT1707: ~/flask-k8s-project$ kubectl apply -f service.yaml
service/flask-service created
(venv) einfochips@AHMLPT1707: ~/flask-k8s-project$
```

Access the Application

```
einfochips@AHMLPT1707: ~/flask-k8s-project
Verifying Kubernetes components...
■ Using image gcr.io/k8s-minikube/storage-provisioner:v5
🌟 Enabled addons: default-storageclass, storage-provisioner
🚀 Done! kubectl is now configured to use "minikube" cluster and "default" name
space by default
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ nano deployment.yaml
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ nano service.yaml
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ nano service-nodeport.yaml
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ kubectl apply -f deployment.ya
ml
deployment.apps/flask-app created
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ kubectl apply -f service.yaml
service/flask-service created
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ kubectl apply -f service-nodep
ort.yaml
The Service "flask-service-nodeport" is invalid: spec.ports[0].nodePort: Invalid
value: 30001: provided port is already allocated
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ nano service-nodeport.yaml
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ kubectl apply -f service-nodep
ort.yaml
service/flask-service-nodeport created
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ minikube ip
192.168.49.2
(env) einfochips@AHMLPT1707:~/flask-k8s-project$
```

Clean up

```
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ minikube stop
🔥 Stopping node "minikube" ...
🔥 Powering off "minikube" via SSH ...
🔥 1 node stopped.
(env) einfochips@AHMLPT1707:~/flask-k8s-project$
```

```
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ minikube delete
🔥 Deleting "minikube" in docker ...
🔥 Deleting container "minikube" ...
🔥 Removing /home/einfochips/.minikube/machines/minikube ...
💀 Removed all traces of the "minikube" cluster.
(env) einfochips@AHMLPT1707:~/flask-k8s-project$
```

Making Changes to the Flask Application

```
🔥 Removing /home/einfochips/.minikube/machines/minikube ...
💀 Removed all traces of the "minikube" cluster.
(env) einfochips@AHMLPT1707:~/flask-k8s-project$ git checkout -b feature/update
-message
Switched to a new branch 'feature/update-message'
(env) einfochips@AHMLPT1707:~/flask-k8s-project$
```

Update the Application


```
einfochips@AHMLPT1707: ~/flask-k8s-project
GNU nano 6.2 app.py *
@app.route('/')
def hello_world():
    return 'Hello, Kubernetes!'

if __name__ == '__main__':
    app.run(host='0.0.0.0', port=5000)

@app.route('/newroute')
def new_route():
    return 'This is a new route!'

@app.route('/')
def hello_world():
    return 'Hello, Kubernetes! Updated version.'

@app.route('/newroute')
def new_route():
    return 'This is a new route!'

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^_ Go To Line
```

Commit the Changes

```
einfochips@AHMLPT1707: ~/flask-k8s-project
fused
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ minikube stop
🔥 Stopping node "minikube" ...
🔥 Powering off "minikube" via SSH ...
🔥 1 node stopped.
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ minikube delete
🔥 Deleting "minikube" in docker ...
🔥 Deleting container "minikube" ...
🔥 Removing /home/einfochips/.minikube/machines/minikube ...
💀 Removed all traces of the "minikube" cluster.
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git checkout -b feature/update
-message
Switched to a new branch 'feature/update-message'
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ nano app.py
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git add .
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git commit -m "Update main rou
te message"
[feature/update-message 65d30fd] Update main route message
5 files changed, 65 insertions(+)
create mode 100644 Dockerfile
create mode 100644 deployment.yaml
create mode 100644 service-nodeport.yaml
create mode 100644 service.yaml
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$
```


Merge the Changes and Rebuild the Docker Image

```
einfochips@AHMLPT1707: ~/flask-k8s-project
create mode 100644 service-nodeport.yaml
create mode 100644 service.yaml
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git checkout main
error: pathspec 'main' did not match any file(s) known to git
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git checkout master
Switched to branch 'master'
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git merge --ff-only feature/update-message
Updating 0597a91..65d30fd
Fast-forward
 Dockerfile          | 12 ++++++++
 app.py              | 9 ++++++
 deployment.yaml     | 19 ++++++++
 service-nodeport.yaml | 13 ++++++++
 service.yaml        | 12 ++++++++
 5 files changed, 65 insertions(+)
 create mode 100644 Dockerfile
 create mode 100644 deployment.yaml
 create mode 100644 service-nodeport.yaml
 create mode 100644 service.yaml
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ git branch -d feature/update-message
Deleted branch feature/update-message (was 65d30fd).
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$
```

Rebuild the docker image

```
einfochips@AHMLPT1707: ~/flask-k8s-project
Deleted branch feature/update-message (was 65d30fd).
(venv) einfochips@AHMLPT1707:~/flask-k8s-project$ docker build -t flask-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 21.25MB
Step 1/7 : FROM python:3.8-slim
--> aa3d4ef002c9
Step 2/7 : WORKDIR /app
--> Using cache
--> 89a28ad8cb0c
Step 3/7 : COPY requirements.txt requirements.txt
--> Using cache
--> 546b09cc1fe0
Step 4/7 : RUN pip install -r requirements.txt
--> Using cache
--> 4b5e55f401dc
Step 5/7 : COPY . .
--> b3dfcfbee7cf
Step 6/7 : EXPOSE 5000
--> Running in 2f3bbe094548
```

Update Kubernetes Deployment

```
einfochips@AHMLPT1707: ~/flask-k8s-project
GNU nano 6.2 deployment.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: flask-app
spec:
  replicas: 2
  selector:
    matchLabels:
      app: flask-app
  template:
    metadata:
      labels:
        app: flask-app
    spec:
      containers:
      - name: flask-app
        image: flask-k8s-app:v2
        ports:
        - containerPort: 5000
[ Wrote 19 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut      ^T Execute  ^C Location
^X Exit      ^R Read File ^\ Replace  ^U Paste    ^J Justify  ^/ Go To Line
```