Final Lab SCD

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Department of Computer Science

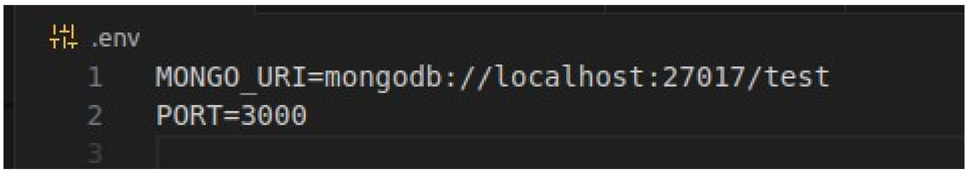
FAST – National University of Computer & Emerging Science

LINK GITHUB REPO

https://github.com/Muhammad-Bin-Tariq/i228761_SCD_Final

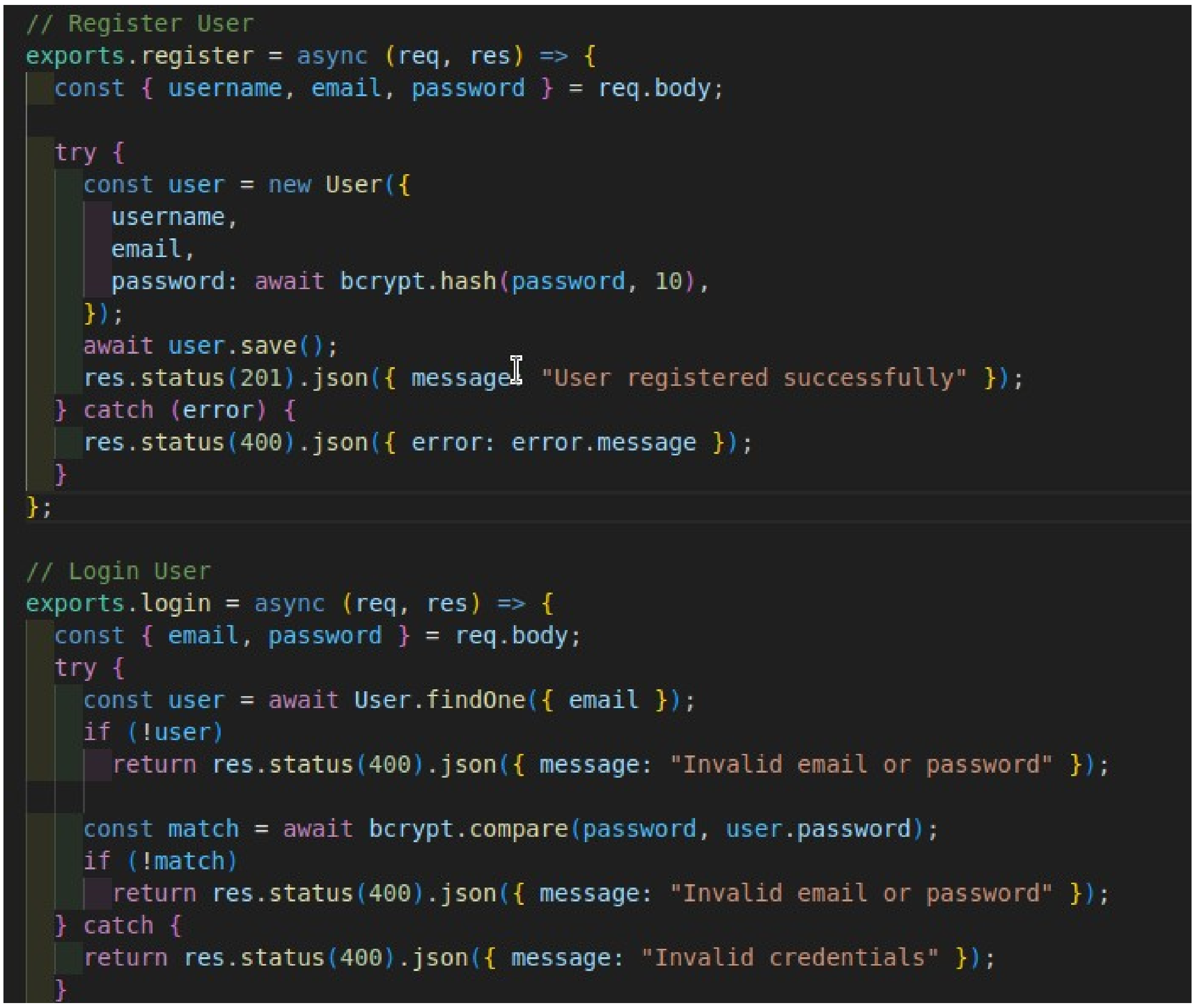
Question 1:

- Start the service by defining the Mongo Url and port in .env file.

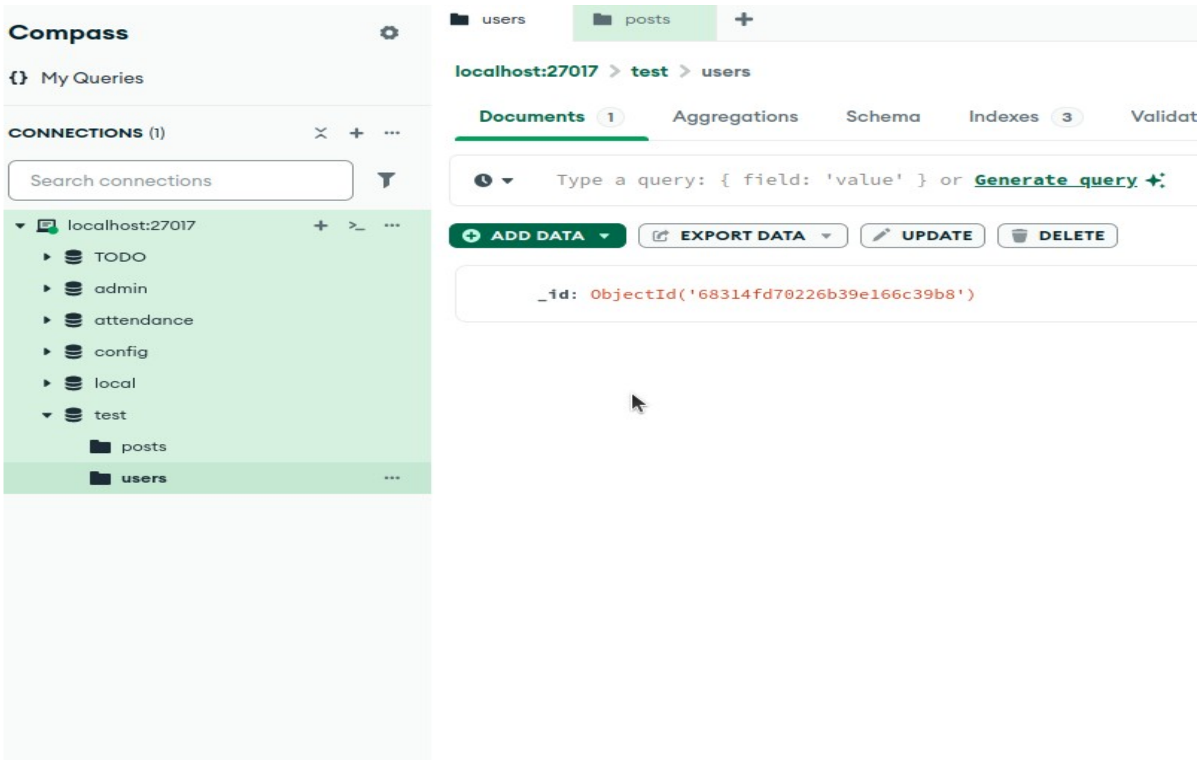


.env
```
MONGO_URI=mongodb://localhost:27017/test
PORT=3000
```

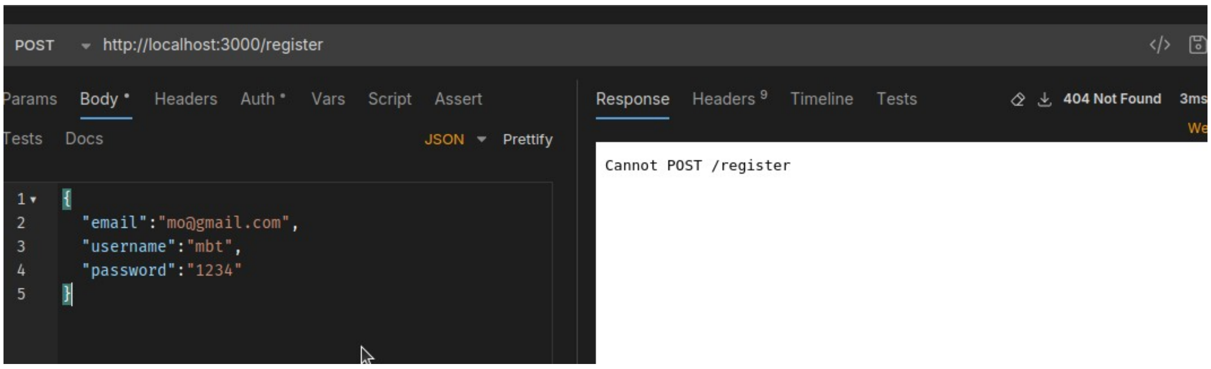
Auth Service:



```
// Register User
exports.register = async (req, res) => {
  const { username, email, password } = req.body;

  try {
    const user = new User({
      username,
      email,
      password: await bcrypt.hash(password, 10),
    });
    await user.save();
    res.status(201).json({ message: "User registered successfully" });
  } catch (error) {
    res.status(400).json({ error: error.message });
  }
};

// Login User
exports.login = async (req, res) => {
  const { email, password } = req.body;
  try {
    const user = await User.findOne({ email });
    if (!user)
      return res.status(400).json({ message: "Invalid email or password" });

    const match = await bcrypt.compare(password, user.password);
    if (!match)
      return res.status(400).json({ message: "Invalid email or password" });
  } catch {
    return res.status(400).json({ message: "Invalid credentials" });
  }
```



```
_id: ObjectId('68314fd70226b39e166c39b8')
```

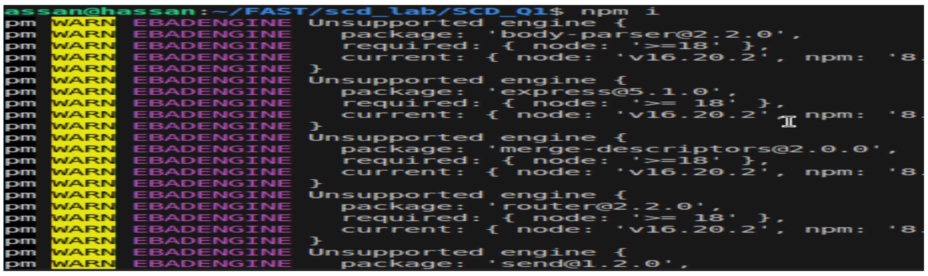


```
POST http://localhost:3000/register
```

```
{
  "email":"mo@gmail.com",
  "username":"mbt",
  "password":"1234"
}
```

```
Cannot POST /register
```

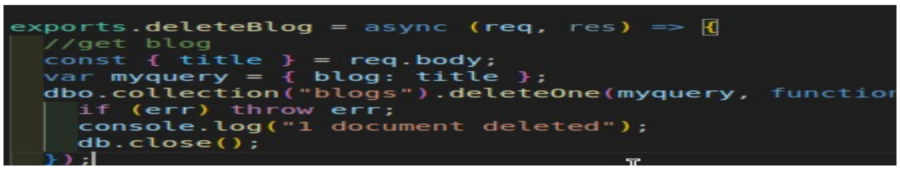
NOTE: This is not posting. Tried everything maybe its due to my node version i.e 16



```
assan@hassan:~/FAST/scd_lab/SCD_Q1$ npm i
pm WARN EBADENGINE Unsupported engine {
pm WARN EBADENGINE   package: 'body-parser@2.2.0',
pm WARN EBADENGINE   required: { node: '>=18' },
pm WARN EBADENGINE   current: { node: 'v16.20.2', npm: '8.
pm WARN EBADENGINE }
pm WARN EBADENGINE Unsupported engine {
pm WARN EBADENGINE   package: 'express@5.1.0',
pm WARN EBADENGINE   required: { node: '>= 18' },
pm WARN EBADENGINE   current: { node: 'v16.20.2', npm: '8.
pm WARN EBADENGINE }
pm WARN EBADENGINE Unsupported engine {
pm WARN EBADENGINE   package: 'merge-descriptors@2.0.0',
pm WARN EBADENGINE   required: { node: '>=18' },
pm WARN EBADENGINE   current: { node: 'v16.20.2', npm: '8.
pm WARN EBADENGINE }
pm WARN EBADENGINE Unsupported engine {
pm WARN EBADENGINE   package: 'router@2.2.0',
pm WARN EBADENGINE   required: { node: '>= 18' },
pm WARN EBADENGINE   current: { node: 'v16.20.2', npm: '8.
pm WARN EBADENGINE }
pm WARN EBADENGINE Unsupported engine {
pm WARN EBADENGINE   package: 'send@1.2.0',
```

Blog Service:

created a deleted function, create and view were already present.

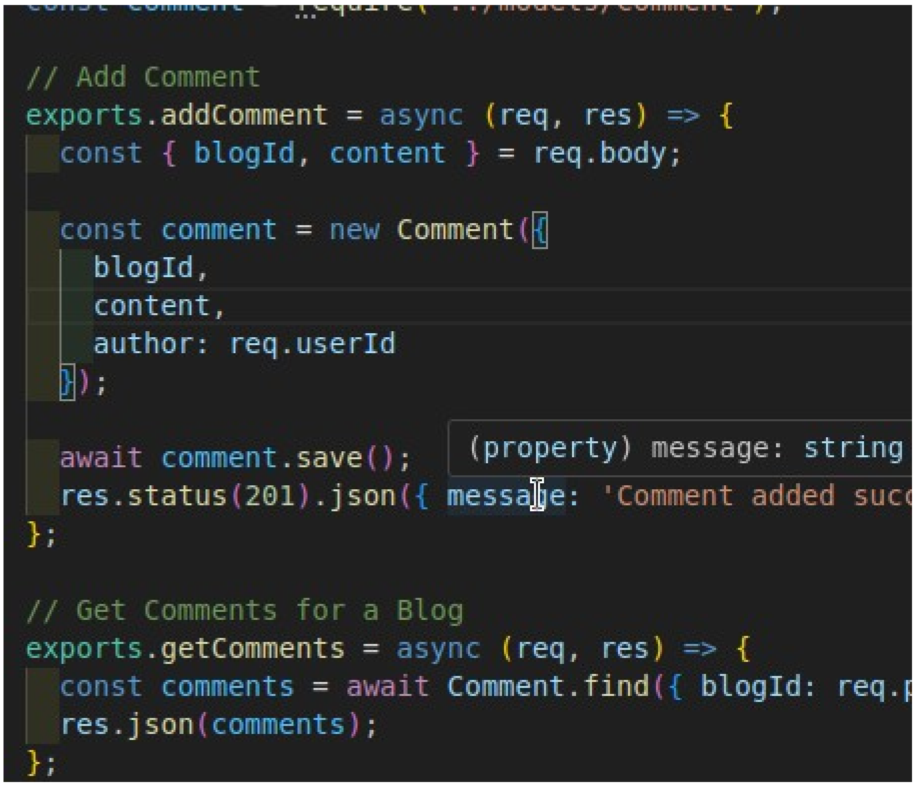


```
exports.deleteBlog = async (req, res) => {
    //get blog
    const { title } = req.body;
    var myquery = { blog: title };
    dbo.collection("blogs").deleteOne(myquery, functio
        if (err) throw err;
        console.log("1 document deleted");
        db.close();
    });
```

Comment Service:

Functionality implemented

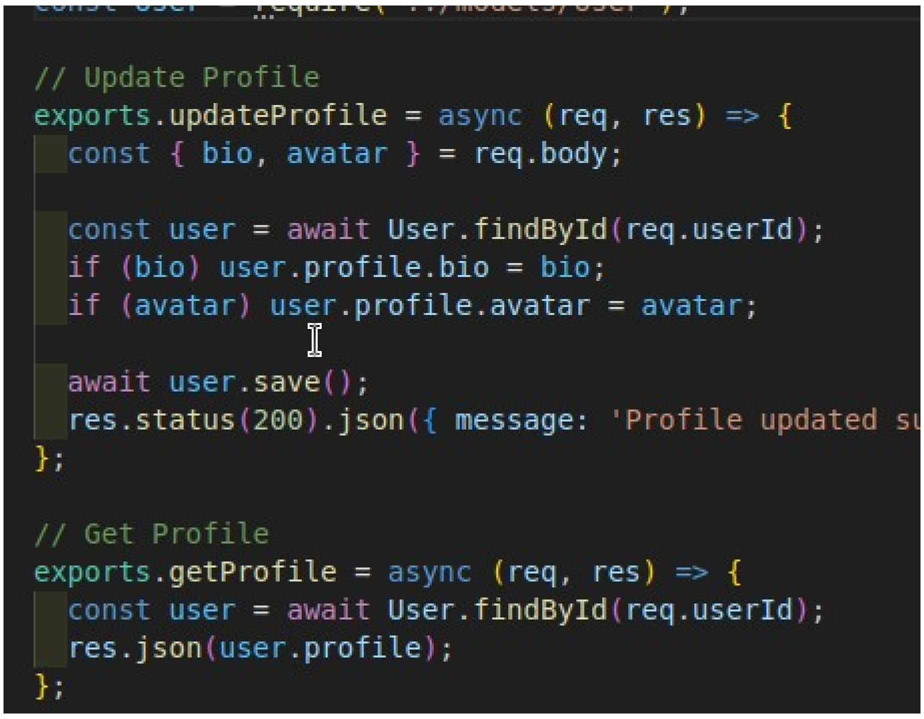
JWT is required to login so incorrect login would automatically not upload comment



```
const Comment = require('../models/Comment');

// Add Comment
exports.addComment = async (req, res) => {
  const { blogId, content } = req.body;

  const comment = new Comment({
    blogId,
    content,
    author: req.userId
  });

  await comment.save();      (property) message: string
  res.status(201).json({ message: 'Comment added succ
};

// Get Comments for a Blog
exports.getComments = async (req, res) => {
  const comments = await Comment.find({ blogId: req.p
  res.json(comments);
};
```

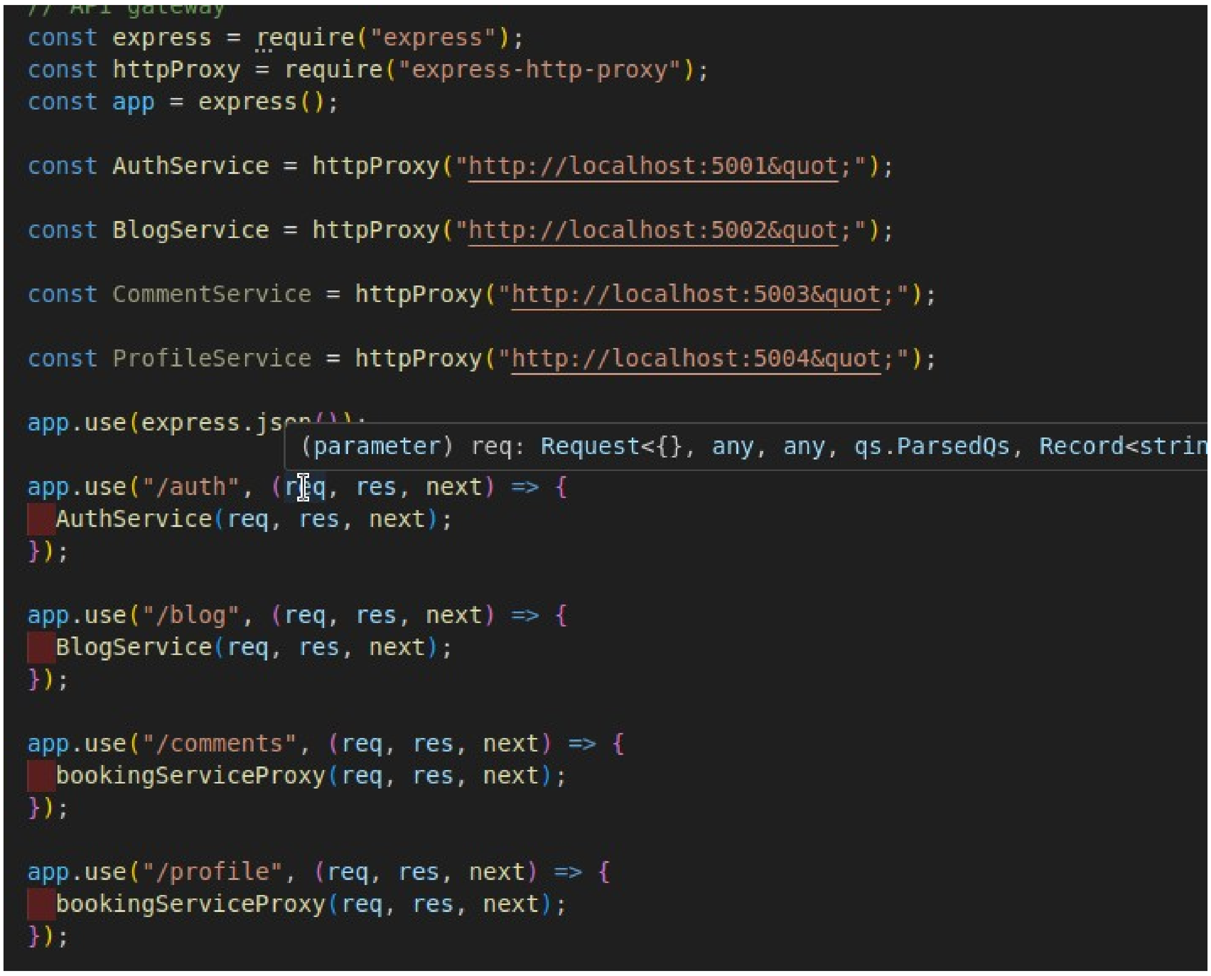
Profile Services:

Implemented already



```
const User = require('../models/User');

// Update Profile
exports.updateProfile = async (req, res) => {
  const { bio, avatar } = req.body;

  const user = await User.findById(req.userId);
  if (bio) user.profile.bio = bio;
  if (avatar) user.profile.avatar = avatar;

  await user.save();
  res.status(200).json({ message: 'Profile updated su
};

// Get Profile
exports.getProfile = async (req, res) => {
  const user = await User.findById(req.userId);
  res.json(user.profile);
};
```

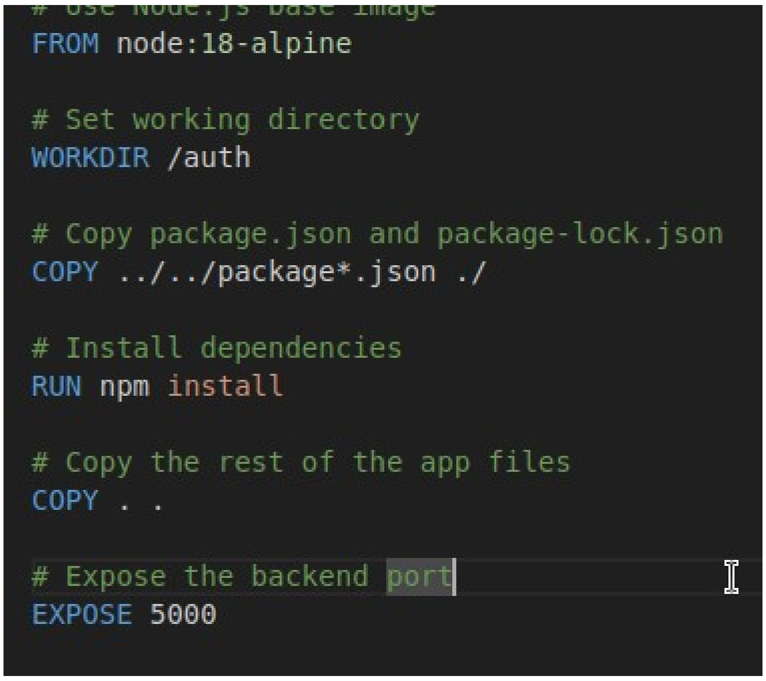
Api Gateway:



```
// API gateway
const express = require("express");
const httpProxy = require("express-http-proxy");
const app = express();

const AuthService = httpProxy("http://localhost:5001&quot;");

const BlogService = httpProxy("http://localhost:5002&quot;");

const CommentService = httpProxy("http://localhost:5003&quot;");

const ProfileService = httpProxy("http://localhost:5004&quot;");

app.use(express.json());
            (parameter) req: Request<{}, any, any, qs.ParsedQs, Record<strin
app.use("/auth", (req, res, next) => {
  AuthService(req, res, next);
});

app.use("/blog", (req, res, next) => {
  BlogService(req, res, next);
});

app.use("/comments", (req, res, next) => {
  bookingServiceProxy(req, res, next);
});

app.use("/profile", (req, res, next) => {
  bookingServiceProxy(req, res, next);
});
```

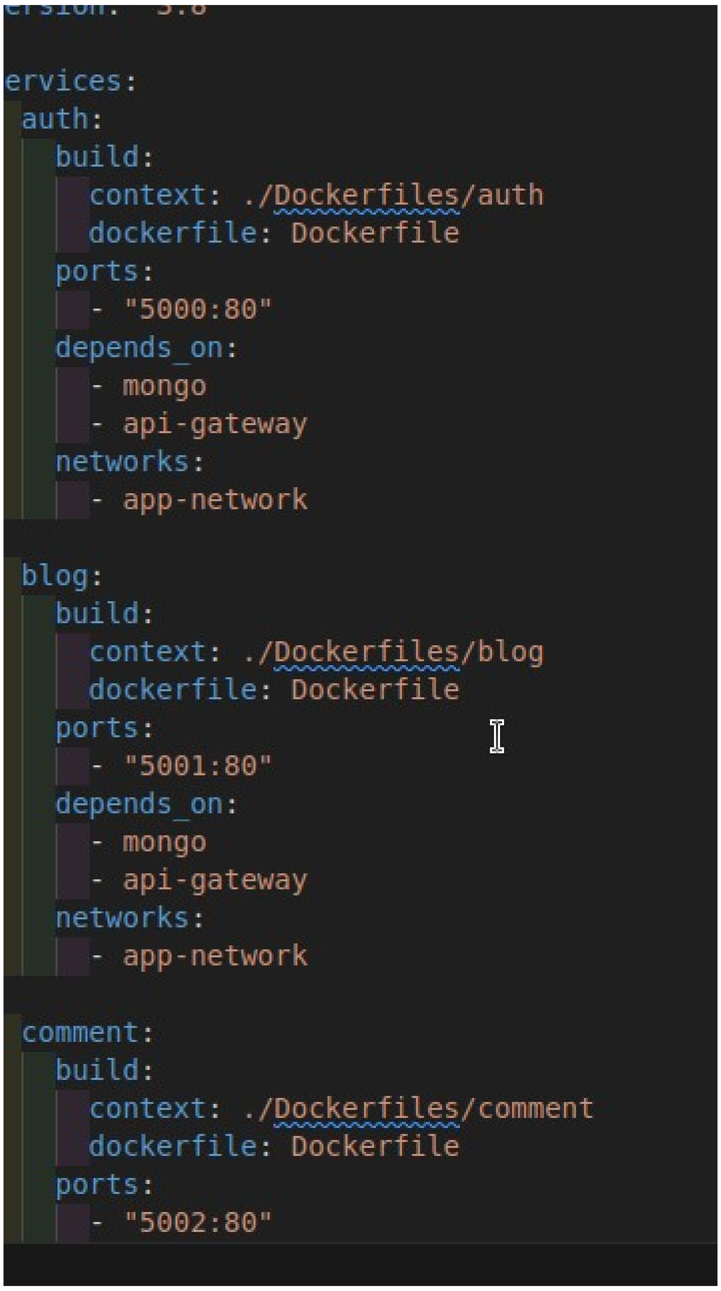
Part B

Dockerfiles of each services (only pasted one)



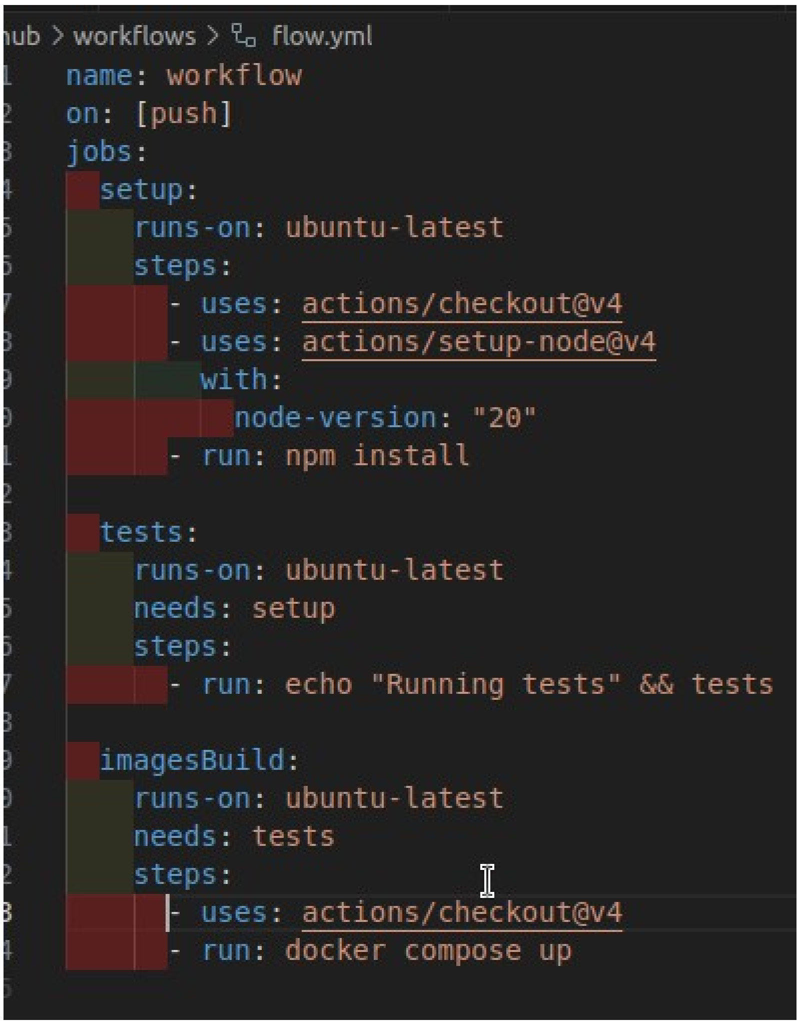
```
# Use Node.js base image
FROM node:18-alpine

# Set working directory
WORKDIR /auth

# Copy package.json and package-lock.json
COPY ../../package*.json ./

# Install dependencies
RUN npm install

# Copy the rest of the app files
COPY . .

# Expose the backend port
EXPOSE 5000
```

Docker compose



```yaml
ersion: "3.8"

ervices:
 auth:
   build:
     context: ./Dockerfiles/auth
     dockerfile: Dockerfile
   ports:
     - "5000:80"
   depends_on:
     - mongo
     - api-gateway
   networks:
     - app-network

 blog:
   build:
     context: ./Dockerfiles/blog
     dockerfile: Dockerfile
   ports:
     - "5001:80"
   depends_on:
     - mongo
     - api-gateway
   networks:
     - app-network

 comment:
   build:
     context: ./Dockerfiles/comment
     dockerfile: Dockerfile
   ports:
     - "5002:80"
```

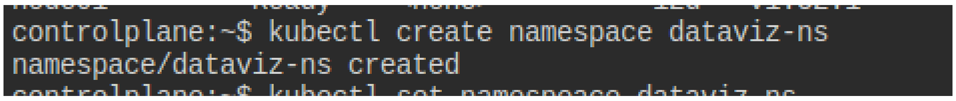
Part C:



```
ub > workflows > flow.yml
name: workflow
on: [push]
jobs:
  setup:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
      - uses: actions/setup-node@v4
        with:
          node-version: "20"
      - run: npm install

  tests:
    runs-on: ubuntu-latest
    needs: setup
    steps:
      - run: echo "Running tests" && tests

  imagesBuild:
    runs-on: ubuntu-latest
    needs: tests
    steps:
      - uses: actions/checkout@v4
      - run: docker compose up
```

Question 2:

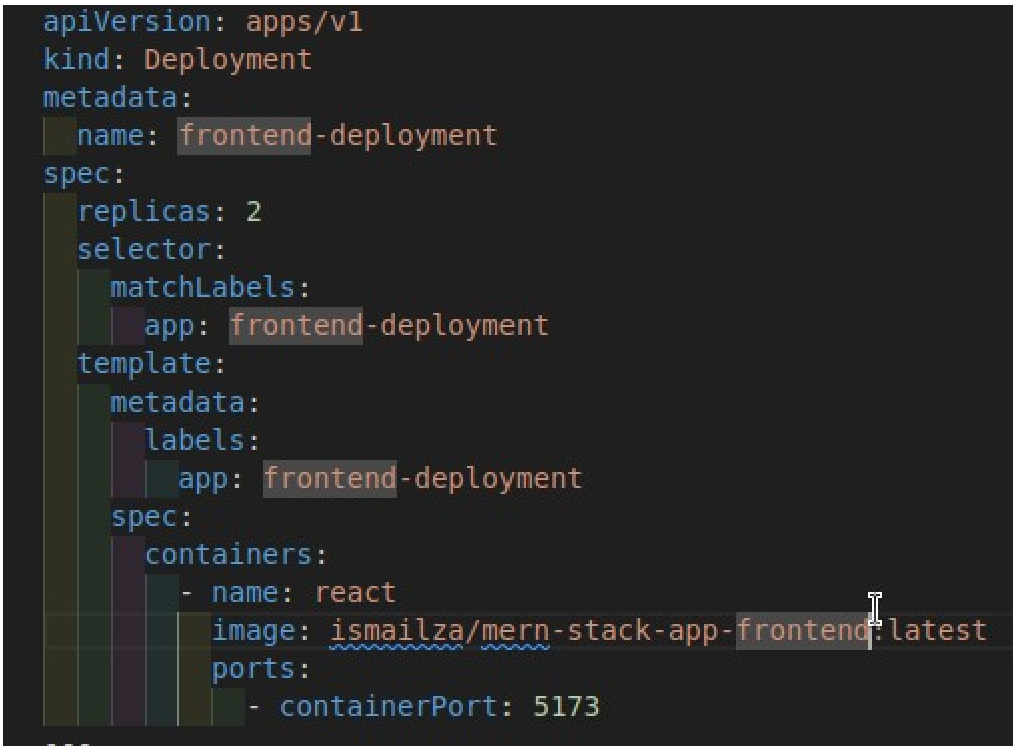
Task 1



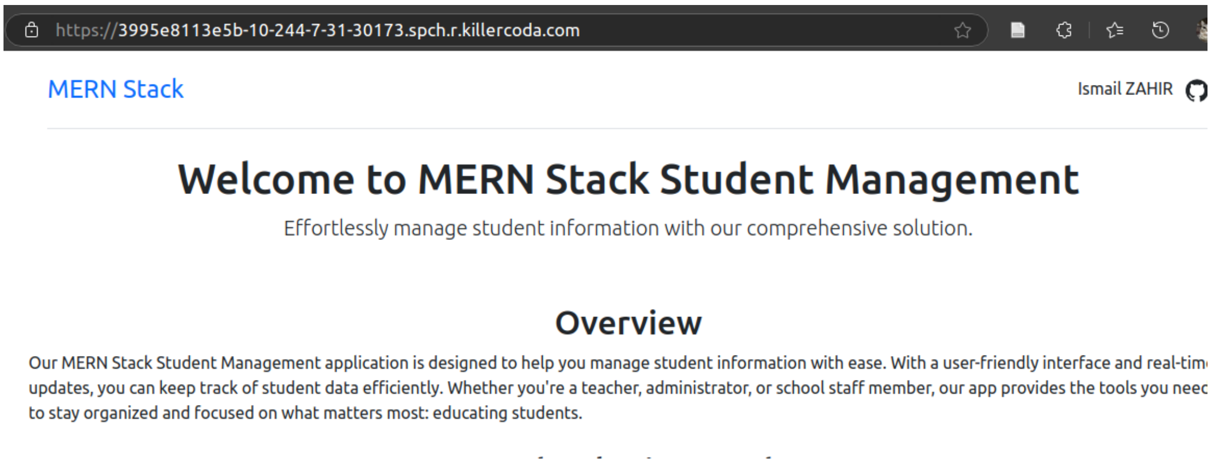
```
controlplane:~$ kubectl create namespace dataviz-ns
namespace/dataviz-ns created
```

Task 2

Frontend:



```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: frontend-deployment
spec:
  replicas: 2
  selector:
    matchLabels:
      app: frontend-deployment
  template:
    metadata:
      labels:
        app: frontend-deployment
    spec:
      containers:
        - name: react
          image: ismailza/mern-stack-app-frontend:latest
          ports:
            - containerPort: 5173
```



https://3995e8113e5b-10-244-7-31-30173.spch.r.killercoda.com

MERN Stack

Ismail ZAHIR

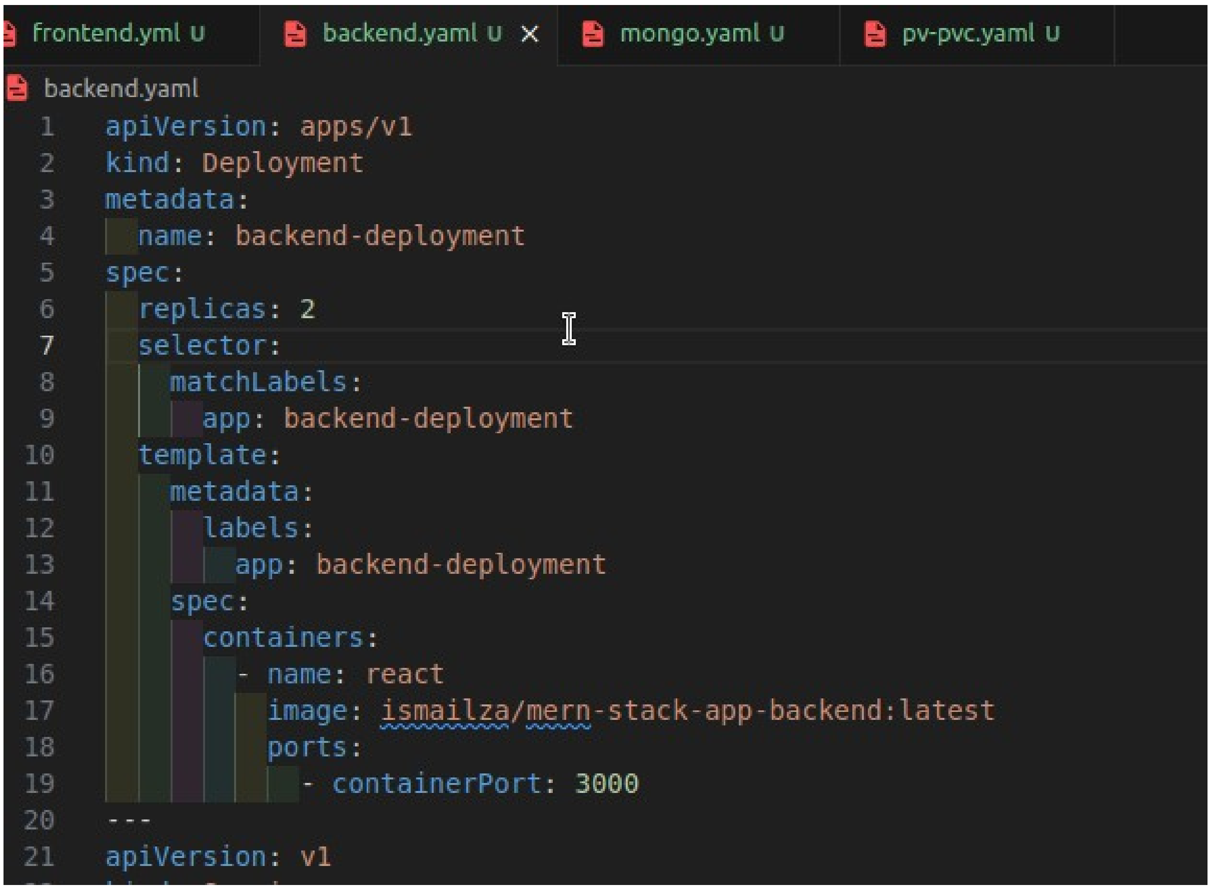
Welcome to MERN Stack Student Management

Effortlessly manage student information with our comprehensive solution.

Overview

Our MERN Stack Student Management application is designed to help you manage student information with ease. With a user-friendly interface and real-tim
updates, you can keep track of student data efficiently. Whether you're a teacher, administrator, or school staff member, our app provides the tools you neec
to stay organized and focused on what matters most: educating students.

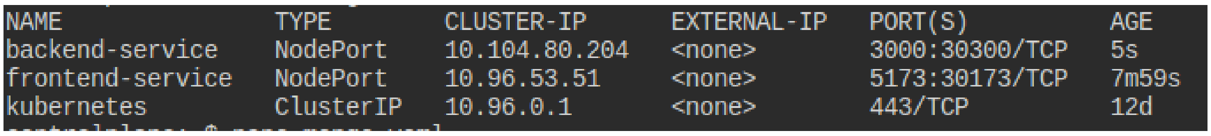
Backend:



frontend.yml U | backend.yaml U | mongo.yaml U | pv-pvc.yaml U

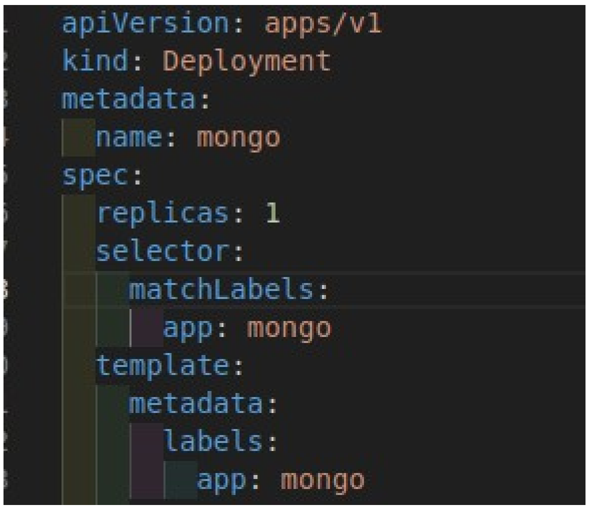
backend.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: backend-deployment
spec:
  replicas: 2
  selector:
    matchLabels:
      app: backend-deployment
  template:
    metadata:
      labels:
        app: backend-deployment
    spec:
      containers:
        - name: react
          image: ismailza/mern-stack-app-backend:latest
          ports:
            - containerPort: 3000
---
apiVersion: v1
```



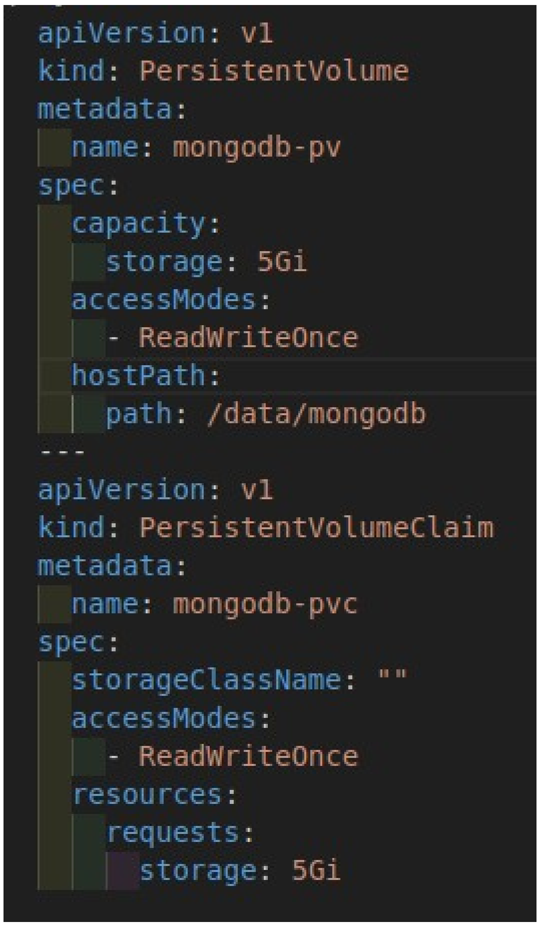
```
NAME               TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
backend-service    NodePort    10.104.80.204   <none>        3000:30300/TCP   5s
frontend-service   NodePort    10.96.53.51     <none>        5173:30173/TCP   7m59s
kubernetes         ClusterIP   10.96.0.1       <none>        443/TCP          12d
```

Mongo:

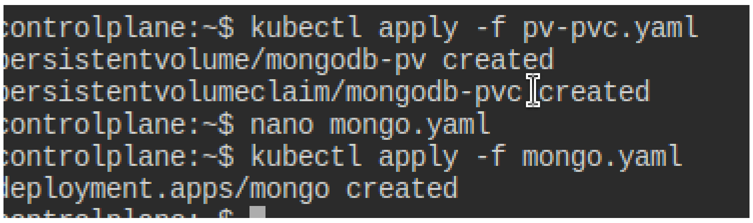


```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: mongo
spec:
  replicas: 1
  selector:
    matchLabels:
      app: mongo
  template:
    metadata:
      labels:
        app: mongo
```

PVC

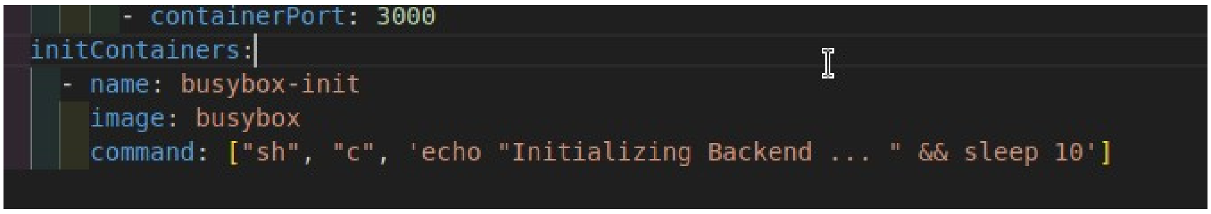


```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: mongodb-pv
spec:
  capacity:
    storage: 5Gi
  accessModes:
    - ReadWriteOnce
  hostPath:
    path: /data/mongodb
---
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: mongodb-pvc
spec:
  storageClassName: ""
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 5Gi
```



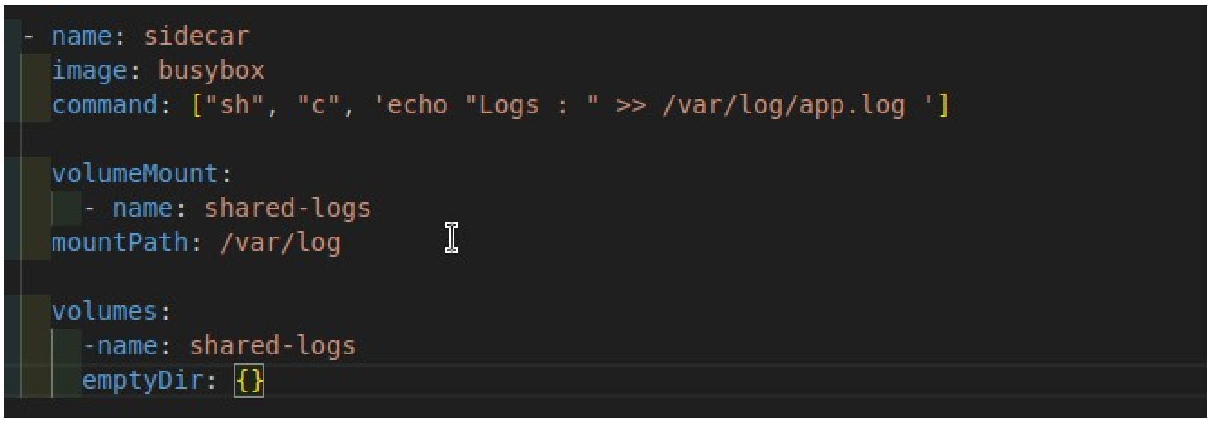
```
controlplane:~$ kubectl apply -f pv-pvc.yaml
persistentvolume/mongodb-pv created
persistentvolumeclaim/mongodb-pvc created
controlplane:~$ nano mongo.yaml
controlplane:~$ kubectl apply -f mongo.yaml
deployment.apps/mongo created
controlplane:~$
```

Task 3:



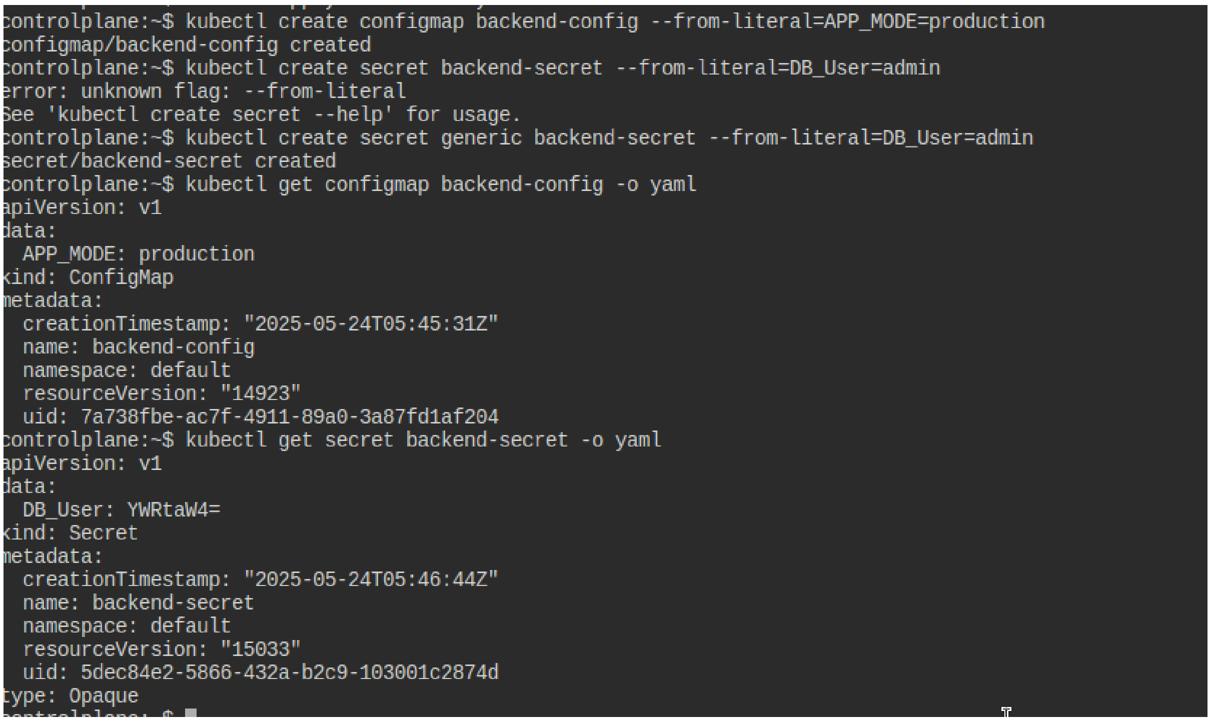
```
      - containerPort: 3000
initContainers:
  - name: busybox-init
    image: busybox
    command: ["sh", "c", 'echo "Initializing Backend ... " && sleep 10']
```

Task 4:



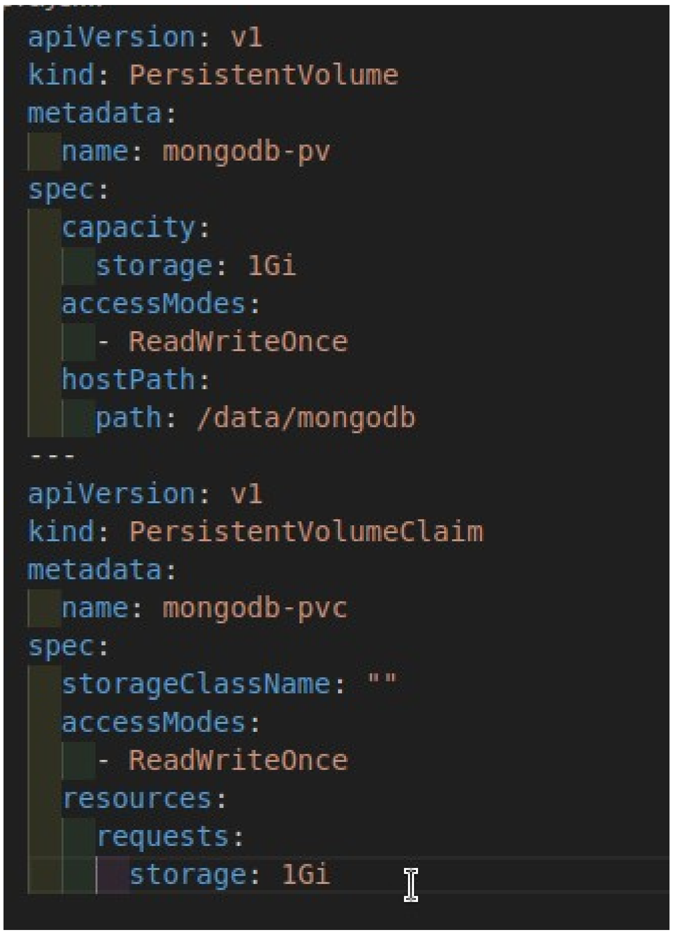
```
- name: sidecar
  image: busybox
  command: ["sh", "c", 'echo "Logs : " >> /var/log/app.log ']

  volumeMount:
    - name: shared-logs
  mountPath: /var/log

  volumes:
    -name: shared-logs
    emptyDir: {}
```

Task 5



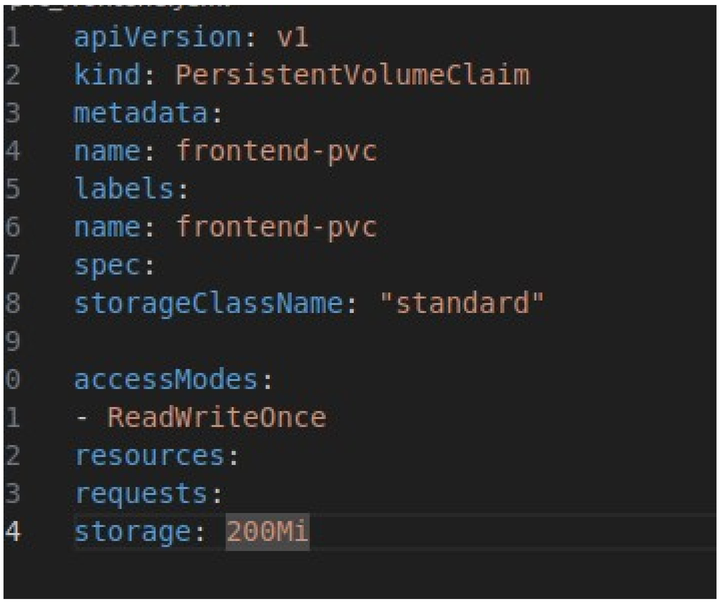
```
controlplane:~$ kubectl create configmap backend-config --from-literal=APP_MODE=production
configmap/backend-config created
controlplane:~$ kubectl create secret backend-secret --from-literal=DB_User=admin
error: unknown flag: --from-literal
See 'kubectl create secret --help' for usage.
controlplane:~$ kubectl create secret generic backend-secret --from-literal=DB_User=admin
secret/backend-secret created
controlplane:~$ kubectl get configmap backend-config -o yaml
apiVersion: v1
data:
  APP_MODE: production
kind: ConfigMap
metadata:
  creationTimestamp: "2025-05-24T05:45:31Z"
  name: backend-config
  namespace: default
  resourceVersion: "14923"
  uid: 7a738fbe-ac7f-4911-89a0-3a87fd1af204
controlplane:~$ kubectl get secret backend-secret -o yaml
apiVersion: v1
data:
  DB_User: YWRtaW4=
kind: Secret
metadata:
  creationTimestamp: "2025-05-24T05:46:44Z"
  name: backend-secret
  namespace: default
  resourceVersion: "15033"
  uid: 5dec84e2-5866-432a-b2c9-103001c2874d
type: Opaque
controlplane:~$
```

Task 6

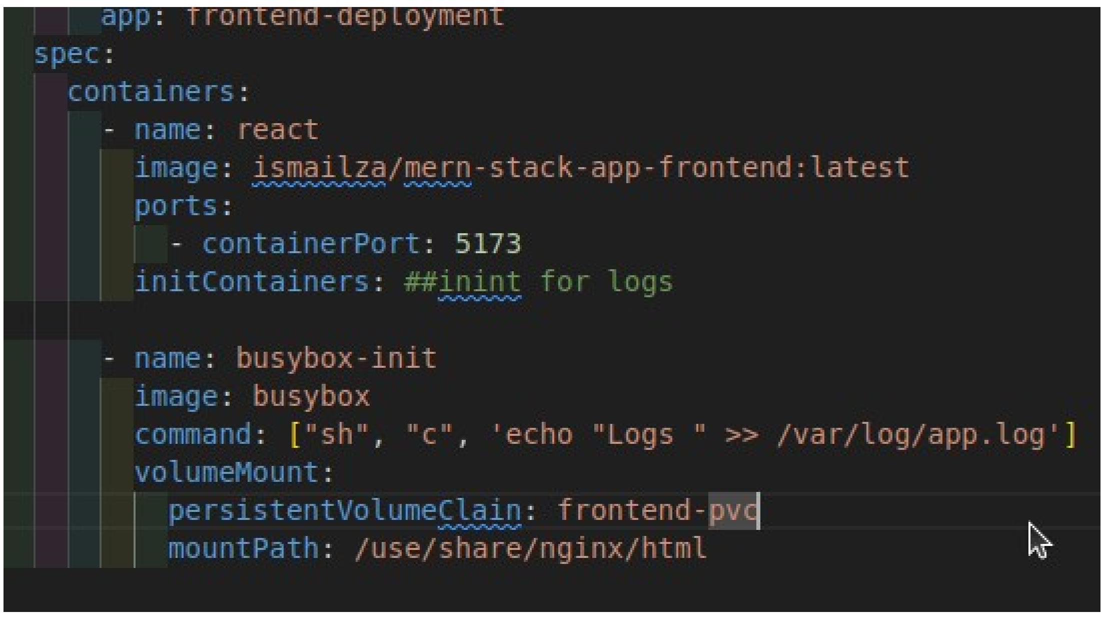


```yaml
apiVersion: v1
kind: PersistentVolume
metadata:
  name: mongodb-pv
spec:
  capacity:
    storage: 1Gi
  accessModes:
    - ReadWriteOnce
  hostPath:
    path: /data/mongodb
---
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: mongodb-pvc
spec:
  storageClassName: ""
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 1Gi
```

PVC for the frontend

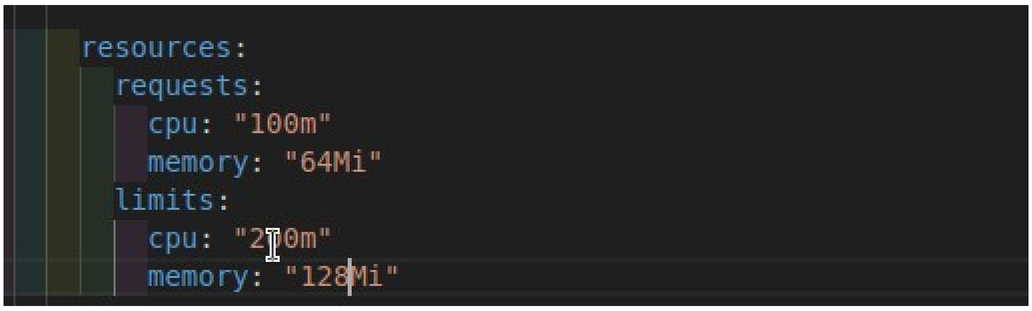


```yaml
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
name: frontend-pvc
labels:
name: frontend-pvc
spec:
storageClassName: "standard"

accessModes:
- ReadWriteOnce
resources:
requests:
storage: 200Mi
```



```yaml
    app: frontend-deployment
  spec:
    containers:
      - name: react
        image: ismailza/mern-stack-app-frontend:latest
        ports:
          - containerPort: 5173
        initContainers: ##inint for logs

      - name: busybox-init
        image: busybox
        command: ["sh", "c", 'echo "Logs " >> /var/log/app.log']
        volumeMount:
          persistentVolumeClain: frontend-pvc
          mountPath: /use/share/nginx/html
```

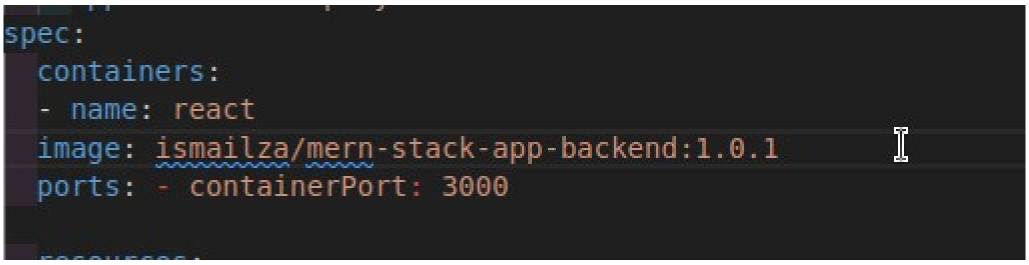
Task 7



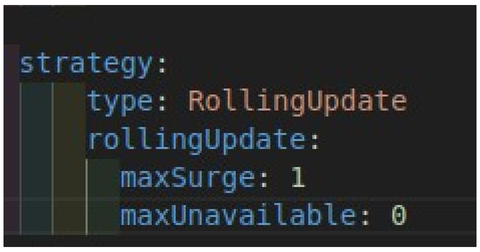
```yaml
    resources:
      requests:
        cpu: "100m"
        memory: "64Mi"
      limits:
        cpu: "200m"
        memory: "128Mi"
```

Task 8

NOTE: **Created a new session here**

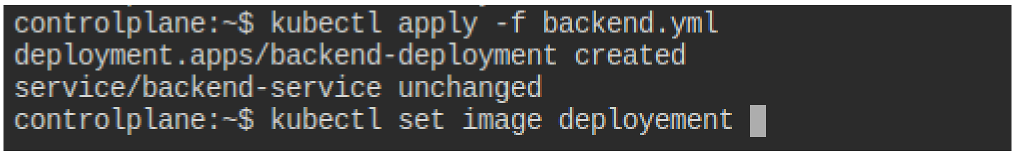


```
spec:
  containers:
  - name: react
  image: ismailza/mern-stack-app-backend:1.0.1
  ports: - containerPort: 3000
```



```
strategy:
    type: RollingUpdate
    rollingUpdate:
      maxSurge: 1
      maxUnavailable: 0
```

Applying



```
controlplane:~$ kubectl apply -f backend.yml
deployment.apps/backend-deployment created
service/backend-service unchanged
controlplane:~$ kubectl set image deployement
```