Bonus Lab

SCD LAB

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Task 1

Blog Service

index.js

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

const app = express();

app.use(express.json());



const posts = [

  { id: 1, title: 'First Post', content: 'This is the first blog post.' }

];



app.get('/posts', (req, res) => res.json(posts));

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

  const post = { id: posts.length + 1, ...req.body };

  posts.push(post);

  res.status(201).json(post);

});



const PORT = process.env.PORT || 3001;

app.listen(PORT, () => console.log(`Blog Service running on port ${PORT}`));
```

Dockerfile

```dockerfile
FROM node:18-alpine

WORKDIR /app

COPY package*.json ./

RUN npm install

COPY . .

EXPOSE 3001

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

Blogdeployment.yaml

```yaml
apiVersion: apps/v1

kind: Deployment

metadata:

  name: blog-deployment

spec:

  replicas: 2

  selector:

    matchLabels:

      app: blog

  template:

    metadata:

      labels:

        app: blog

    spec:

      containers:

      - name: blog
```

```yaml
        image: 22i2554/blog-service:latest

        ports:

        - containerPort: 3001

        env:

        - name: PORT

          valueFrom:

            configMapKeyRef:

              name: app-config

              key: BLOG_PORT
---

apiVersion: v1

kind: Service

metadata:

  name: blog-service

spec:

  selector:

    app: blog

  ports:

    - protocol: TCP

      port: 80

      targetPort: 3001

  type: ClusterIP
---

apiVersion: autoscaling/v2

kind: HorizontalPodAutoscaler
```

```yaml
metadata:
  name: blog-hpa
spec:
  scaleTargetRef:
    apiVersion: apps/v1
    kind: Deployment
    name: blog-deployment
  minReplicas: 2
  maxReplicas: 5
  metrics:
  - type: Resource
    resource:
      name: cpu
      target:
        type: Utilization
        averageUtilization: 70
```

Pushing on DockerHub

```
ERROR: failed to solve: process "/bin/sh -c npm install" did not complete successfully: exit code: 254
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\blog-service> docker build -t 22i2554/blog-service:latest .
[+] Building 9.5s (10/10) FINISHED
er:desktop-linux
 => [internal] load build definition from Dockerfile
         0.0s
 => => transferring dockerfile: 159B
         0.0s
 => [internal] load metadata for docker.io/library/node:18-alpine
         0.9s
 => [internal] load .dockerignore
         0.0s
 => => transferring context: 2B
         0.0s
 => [1/5] FROM docker.io/library/node:18-alpine@sha256:8d6421d663b4c28fd3ebc498332f249011d118945588d0a35cb9bc4b8ca09d9e
         0.0s
  0.0s
 => [internal] load build context
```

```
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\blog-service> docker push 22i2554/blog-service:latest
The push refers to repository [docker.io/22i2554/blog-service]
044c482ba3d9: Pushed
01cb838f70be: Pushed
3960921b0608: Pushed
02c6de5f099a: Pushed
82140d9a70a7: Mounted from 22i2554/todo-backend
f3b40b0cdb1c: Mounted from 22i2554/todo-backend
0b1f26057bd0: Mounted from 22i2554/todo-backend
08000c18d16d: Mounted from 22i2554/todo-frontend
latest: digest: sha256:dd31dc9418ca7d846b1d1ba38d8f0c6d2de39217bba68ab288bb43c25e979977 size: 1989
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\blog-service>
```

Auth Service

index.js

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

const jwt = require('jsonwebtoken');

const app = express();

app.use(express.json());



const SECRET_KEY = process.env.JWT_SECRET || 'my-secret-key';



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

  const { username } = req.body;

  if (!username) return res.status(400).json({ error: 'Username required'
});

  const token = jwt.sign({ username }, SECRET_KEY, { expiresIn: '1h' });

  res.json({ token });

});
```

```
const PORT = process.env.PORT || 3002;

app.listen(PORT, () => console.log(`Auth Service running on port
${PORT}`));
```

Dockerfile

```
FROM node:18-alpine

WORKDIR /app

COPY package*.json ./

RUN npm install

COPY . .

EXPOSE 3002

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

Auth service.deployment

```
apiVersion: apps/v1

kind: Deployment

metadata:

  name: auth-deployment

spec:

  replicas: 2

  selector:

    matchLabels:

      app: auth

  template:
```

```yaml
  metadata:
    labels:
      app: auth
  spec:
    containers:
    - name: auth
      image: 22i2554/auth-service:latest
      ports:
      - containerPort: 3002
      env:
      - name: PORT
        valueFrom:
          configMapKeyRef:
            name: app-config
            key: AUTH_PORT
      - name: JWT_SECRET
        valueFrom:
          secretKeyRef:
            name: app-secret
            key: JWT_SECRET
---
apiVersion: v1
kind: Service
metadata:
  name: auth-service
```

```yaml
spec:
  selector:
    app: auth
  ports:
    - protocol: TCP
      port: 80
      targetPort: 3002
  type: ClusterIP
---
apiVersion: autoscaling/v2
kind: HorizontalPodAutoscaler
metadata:
  name: auth-hpa
spec:
  scaleTargetRef:
    apiVersion: apps/v1
    kind: Deployment
    name: auth-deployment
  minReplicas: 2
  maxReplicas: 5
  metrics:
  - type: Resource
    resource:
      name: cpu
      target:
```

```
        type: Utilization

        averageUtilization: 70
```

Pushing on DockerHub

```
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\auth-service> docker build -t 22i2554/auth-service:latest .
[+] Building 10.4s (10/10) FINISHED
 => [internal] load build definition from Dockerfile
 => => transferring dockerfile: 159B
 => [internal] load metadata for docker.io/library/node:18-alpine
 => [internal] load .dockerignore
 => => transferring context: 2B
 => [1/5] FROM docker.io/library/node:18-alpine@sha256:8d6421d663b4c28fd3ebc498332f249011d118945588d0a35cb9bc4b8ca09d9e
 => [internal] load build context
 => => transferring context: 1.08kB
 => CACHED [2/5] WORKDIR /app
 => [3/5] COPY package*.json ./
 => [4/5] RUN npm install
 => [5/5] COPY . .
 => exporting to image
 => => exporting layers
```

```
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\auth-service> ^C
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\auth-service> docker push 22i2554/auth-service:latest
The push refers to repository [docker.io/22i2554/auth-service]
280491a92d6d: Pushed
6d5d73fc0f59: Pushed
550c94bafb56: Pushed
02c6de5f099a: Mounted from 22i2554/blog-service
82140d9a70a7: Mounted from 22i2554/blog-service
f3b40b0cdb1c: Mounted from 22i2554/blog-service
0b1f26057bd0: Mounted from 22i2554/blog-service
08000c18d16d: Mounted from 22i2554/blog-service
latest: digest: sha256:a6fa821f2c91544533307f82117f5f8174784d59712d3f58d70906012d1d8fb6 size: 1989
```

Apache Service

Dockerfile

```
FROM httpd:2.4

COPY httpd.conf /usr/local/apache2/conf/httpd.conf

EXPOSE 80
```

httpd.conf

```
LoadModule proxy_module modules/mod_proxy.so LoadModule proxy_http_module
modules/mod_proxy_http.so
```

```
<VirtualHost *:80> ServerName localhost ProxyPreserveHost On ProxyPass
/blog http://blog-service/ ProxyPassReverse /blog http://blog-service/
ProxyPass /auth http://auth-service/ ProxyPassReverse /auth
http://auth-service/
```

Apache Deployment.yaml

```yaml
apiVersion: apps/v1

kind: Deployment

metadata:

  name: apache-deployment

spec:

  replicas: 1

  selector:

    matchLabels:

      app: apache

  template:

    metadata:

      labels:

        app: apache

    spec:

      containers:

      - name: apache

        image: 22i2554/apache-reverse-proxy:latest

        ports:

        - containerPort: 80

---
```

```
apiVersion: v1

kind: Service

metadata:

  name: apache-service

spec:

  selector:

    app: apache

  ports:

    - protocol: TCP

      port: 80

      targetPort: 80

  type: LoadBalancer
```

Pushing on Docker Hub

```
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask> cd apache
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\apache> docker build -t 22i2554/apache-reverse-proxy:latest .
[+] Building 66.1s (8/8) FINISHED
 => [internal] load build definition from Dockerfile
 => => transferring dockerfile: 114B
 => [internal] load metadata for docker.io/library/httpd:2.4
 => [auth] library/httpd:pull token for registry-1.docker.io
 => [internal] load .dockerignore
 => => transferring context: 2B
 => [internal] load build context
 => => transferring context: 364B
 => [1/2] FROM docker.io/library/httpd:2.4@sha256:c11efd67f6308f2c25965e4e9d13ded15e7c45c0367b95f619a16e03c6c1e2b1
 => => resolve docker.io/library/httpd:2.4@sha256:c11efd67f6308f2c25965e4e9d13ded15e7c45c0367b95f619a16e03c6c1e2b1
 => => sha256:c11efd67f6308f2c25965e4e9d13ded15e7c45c0367b95f619a16e03c6c1e2b1 10.16kB / 10.16kB
 => => sha256:037e45eecda73cff19a3df764a0024c456cd94f3a51e47927660f20a08442d6f 2.10kB / 2.10kB
 => => sha256:0208f149a449a6a055f08add91cbbc004e486f78bf02a76554ff3cd235ced6fe 7.88kB / 7.88kB
 => => sha256:254e724d77862dc53abbd3bf0e27f9d2f64293909cdd3d0aad6a8fe5a6680659 28.23MB / 28.23MB
 => => sha256:10d01782dc02bd51ed36cf74adc34ab41cd244260519c9dcd57717690e10c221 145B / 145B
 => => sha256:4f4fb700ef54461cfa02571ae0db9a0dc1e0cdb5577484a6d75e68dc38e8acc1 32B / 32B
 => => sha256:4ceeea7b3d76a5391e2ba53e82e53490d15963cc468c7783f7e7b687064f107e 4.20MB / 4.20MB
```

```
 => => naming to docker.io/22i2554/apache-reverse-proxy:latest
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\apache> docker push 22i2554/apache-reverse-proxy:latest
The push refers to repository [docker.io/22i2554/apache-reverse-proxy]
f98c3ee4a664: Pushed
b8a02ae2749f: Mounted from library/httpd
9cdcd1e0b4a5: Mounted from library/httpd
ed62fe425167: Mounted from library/httpd
5f70bf18a086: Mounted from library/httpd
c5595525172f: Mounted from library/httpd
6c4c763d22d0: Mounted from library/httpd
latest: digest: sha256:7f9f8c10ce56f8aeb616656c129d293246591e30dd6c5c96b148c75a4fa2d256 size: 1779
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\apache>
```

Images Verification

```
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\apache> docker images | findstr 22i2554
22i2554/apache-reverse-proxy        latest                          55b9b6814fc1   2 minutes ago    148M
B
22i2554/auth-service                latest                          226e8c97780d   6 minutes ago    135M
B
22i2554/blog-service                latest                          0707281ee3c1   7 minutes ago    134M
B
22i2554/todo-backend                latest                          de14dc60acf8   11 days ago      145M
B
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\apache>
```

Kubernetes Deployments

```
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\blog-service> cd..
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask> kubectl apply -f k8s/
deployment.apps/apache-deployment created
service/apache-service created
deployment.apps/auth-deployment created
service/auth-service created
horizontalpodautoscaler.autoscaling/auth-hpa created
deployment.apps/blog-deployment created
service/blog-service created
horizontalpodautoscaler.autoscaling/blog-hpa created
configmap/app-config created
secret/app-secret created
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask>
```

```
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\apache> kubectl get pods
NAME                                READY    STATUS     RESTARTS    AGE
apache-deployment-c6655bb57-2bb7r   1/1      Running    0           22s
auth-deployment-5b9465c988-mgzr9    1/1      Running    0           21m
auth-deployment-5b9465c988-wjw6d    1/1      Running    0           21m
blog-deployment-76c484c4cf-9mjcl    1/1      Running    0           21m
blog-deployment-76c484c4cf-vfssh    1/1      Running    0           21m
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask\apache>
```

Kubernetes Services

```
blog-deployment-76c484c4cf-vfssh      1/1        Running                         0              66s
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask> kubectl get services
NAME             TYPE           CLUSTER-IP      EXTERNAL-IP     PORT(S)         AGE
apache-service   LoadBalancer   10.108.224.12   localhost       80:32665/TCP    79s
auth-service     ClusterIP      10.101.85.246   <none>          80/TCP          79s
blog-service     ClusterIP      10.107.10.104   <none>          80/TCP          78s
kubernetes       ClusterIP      10.96.0.1       <none>          443/TCP         7d4h
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask> kubectl get hpa
```

```
kubernetes       ClusterIP      10.96.0.1       <none>          443/TCP        7d4h
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask> kubectl get hpa
NAME       REFERENCE                     TARGETS             MINPODS   MAXPODS   REPLICAS   AGE
auth-hpa   Deployment/auth-deployment    cpu: <unknown>/70%  2         5         2          95s
blog-hpa   Deployment/blog-deployment    cpu: <unknown>/70%  2         5         2          94s
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask> kubectl logs apache-deployment-c6655bb57-7rdzg
```

Configmap.yaml

```yaml
apiVersion: v1

kind: ConfigMap

metadata:

  name: app-config

data:

  BLOG_PORT: "3001"

  AUTH_PORT: "3002"
```

Secret.yaml

```yaml
apiVersion: v1

kind: Secret

metadata:

  name: app-secret

type: Opaque

data:

  JWT_SECRET: bXktc2VjcmV0LWtleQ== # base64 encoded "my-secret-key"
```

```
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask> git init
Initialized empty Git repository in D:/FAST Stuff/Sem 6/SCD/SCD Lab/BonusTask/.git/
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask> git add .
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask> git commit -m "Initial commit of microservices project"
[master (root-commit) f83d98c] Initial commit of microservices project
 14 files changed, 293 insertions(+)
 create mode 100644 .github/workflows/cicd.yaml
 create mode 100644 K8s/apache-deployment.yaml
 create mode 100644 K8s/auth-deployment.yaml
 create mode 100644 K8s/blog-deployment.yaml
 create mode 100644 K8s/configmap.yaml
 create mode 100644 K8s/secret.yaml
 create mode 100644 apache/Dockerfile
 create mode 100644 apache/proxy.conf
 create mode 100644 auth-service/Dockerfile
 create mode 100644 auth-service/index.js
 create mode 100644 auth-service/package.json
 create mode 100644 blog-service/Dockerfile
 create mode 100644 blog-service/index.js
 create mode 100644 blog-service/package.json
PS D:\FAST Stuff\Sem 6\SCD\SCD Lab\BonusTask> git remote add origin https://github.com/Tayyab765/microservices-k8s.git
```