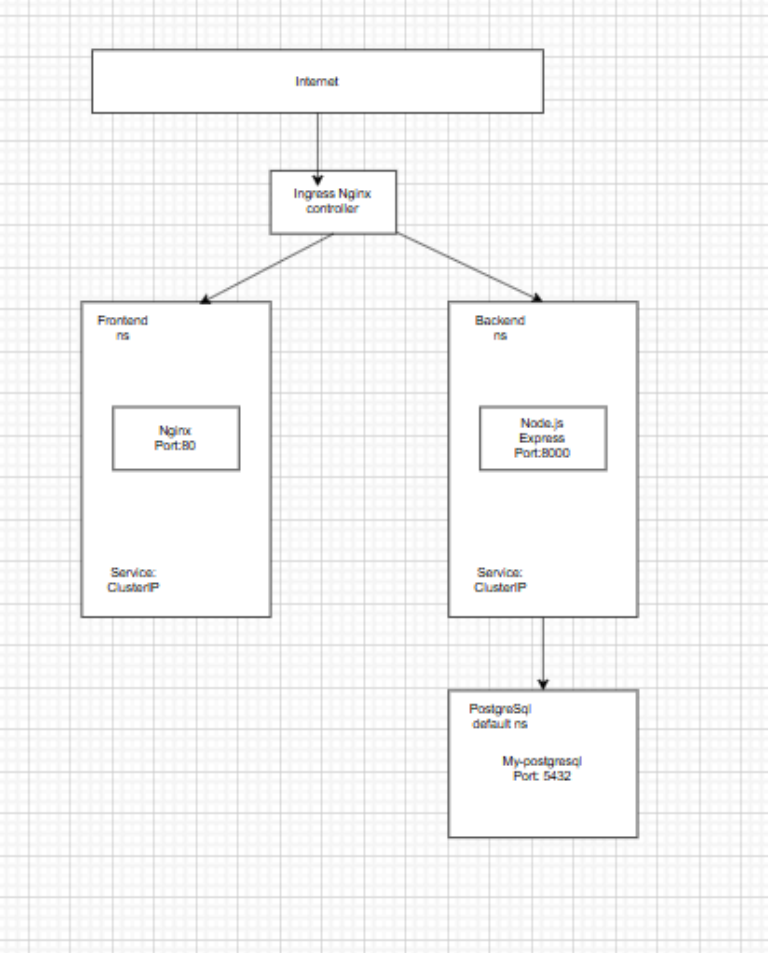
Assignment

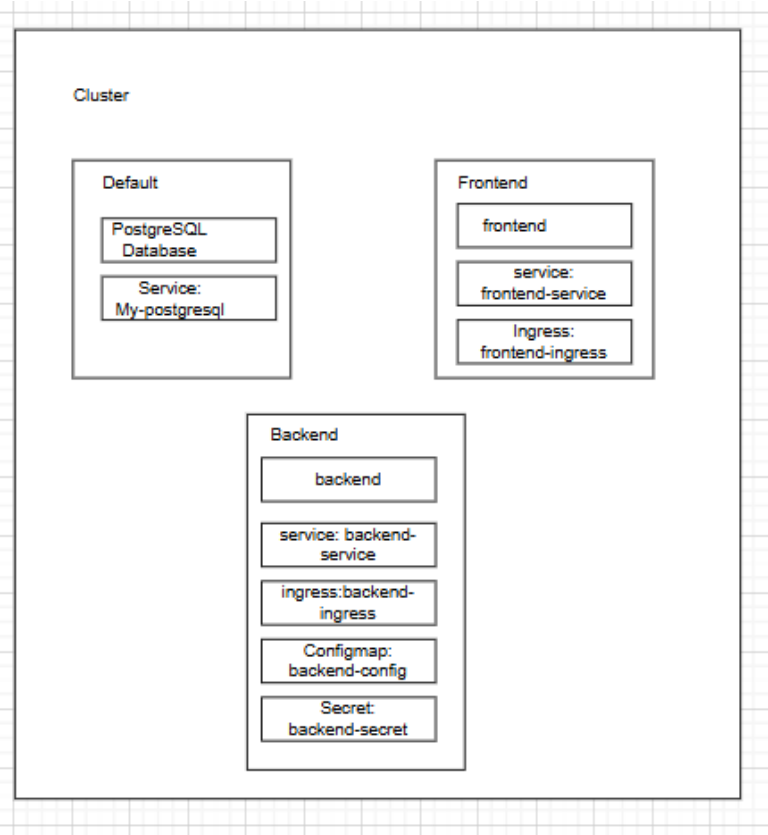
Created	@January 9, 2026 6:39 AM
Class	DevOps Fellowship
Last edited time	@January 9, 2026 5:28 PM

Architecture section:

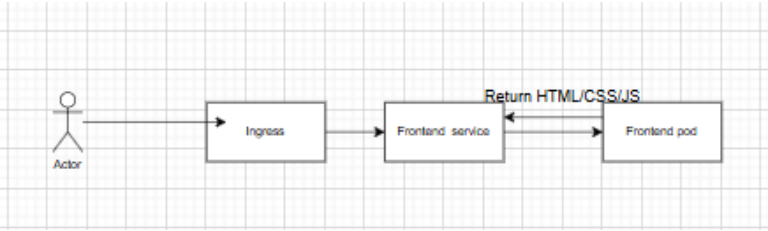
High-level architecture diagram or description:



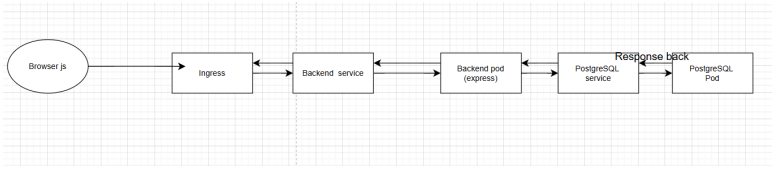
name space organization:



user flow:



network flow:

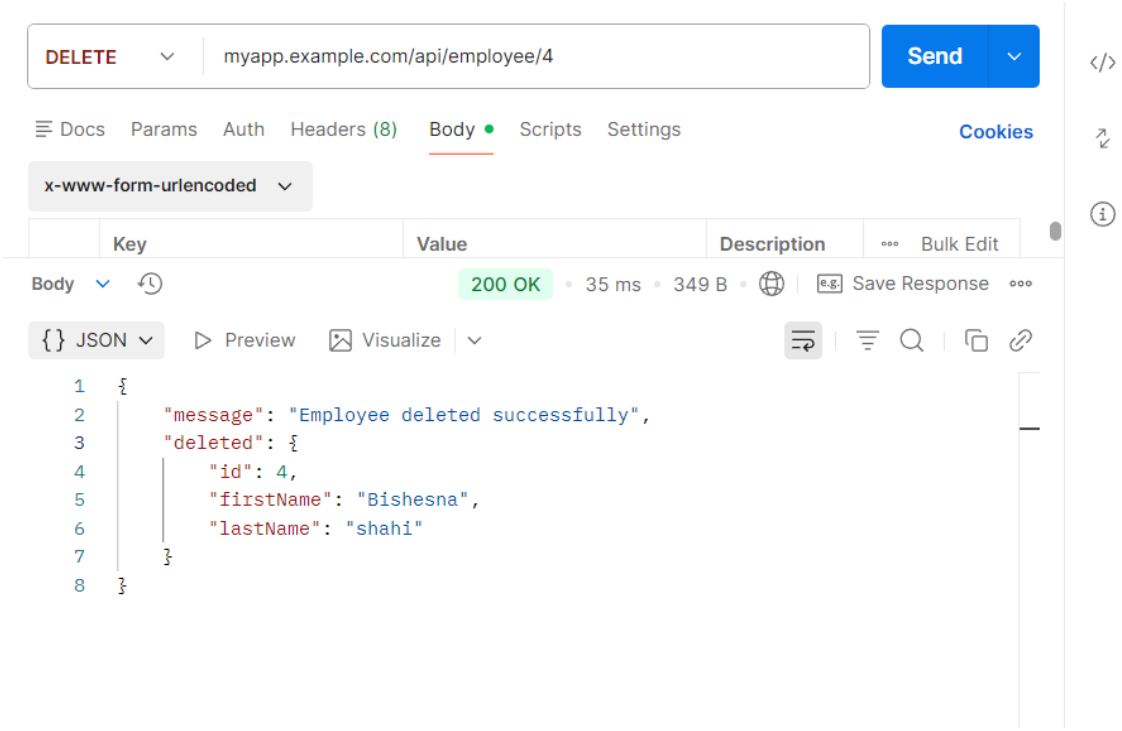


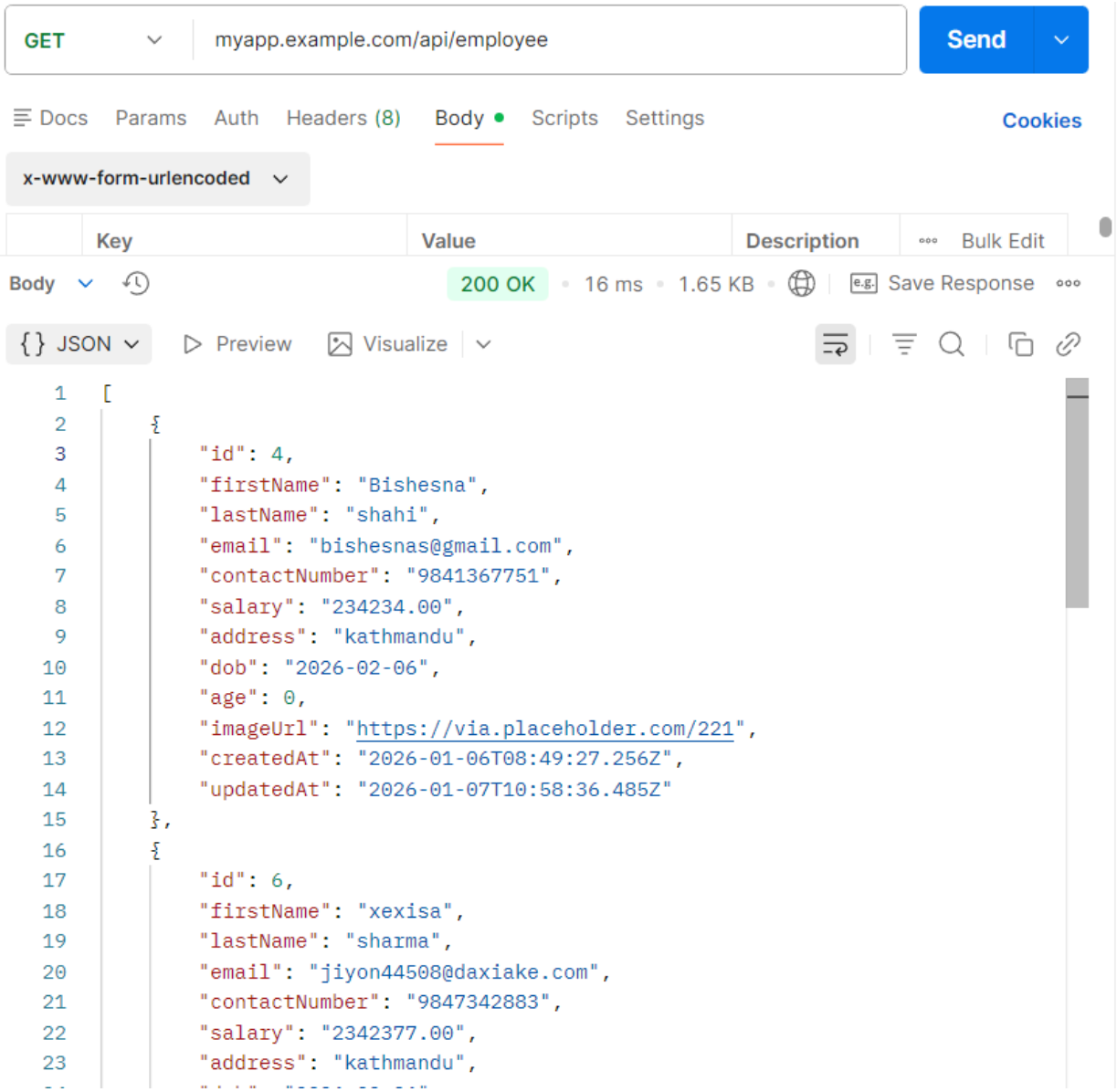
API Endpoints Section

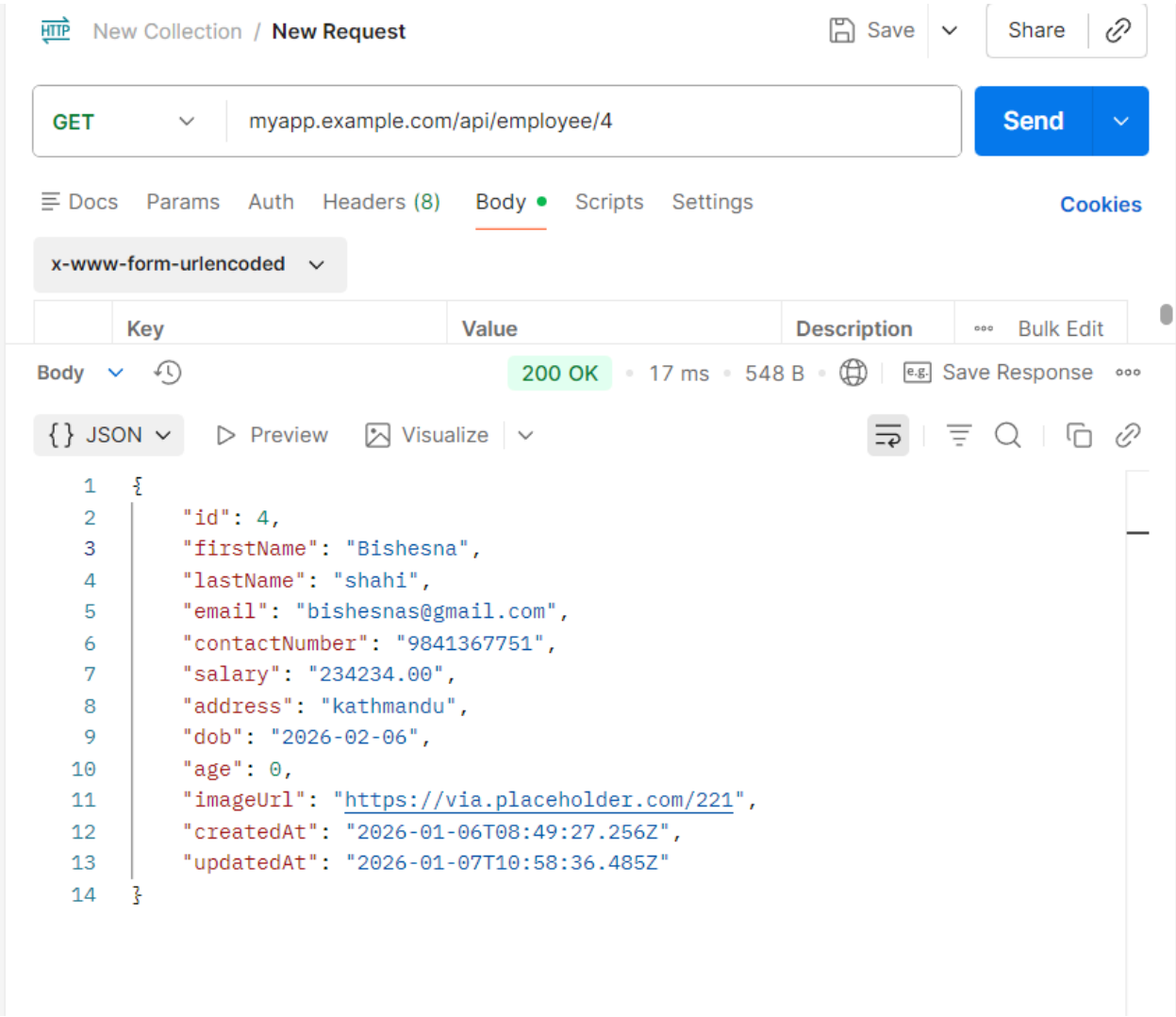
Complete list of all API endpoints:

Endpoint	Method	Purpose	Request Body
/api/employee	GET	Get all employee	None
/api/employee/:id	GET	Get one employee	None
/api/employee	POST	Create one employee	need data to create
/api/employee/:id	PATCH	Update employee	need data to update
/api/employee/:id	DELETE	Delete employee	none
/api/health	GET	Health check	none

api example:


DELETE
myapp.example.com/api/employee/4
Send
Docs
Params
Auth
Headers (8)
Body
Scripts
Settings
Cookies
x-www-form-urlencoded
Key
Value
Description
Bulk Edit
Body
200 OK
35 ms
349 B
Save Response
JSON
Preview
Visualize
{
"message": "Employee deleted successfully",
"deleted": {
"id": 4,
"firstName": "Bishesna",
"lastName": "shahi"
}
}


GET
myapp.example.com/api/employee
Send
Docs
Params
Auth
Headers (8)
Body
Scripts
Settings
Cookies
x-www-form-urlencoded
Key
Value
Description
Bulk Edit
Body
200 OK
16 ms
1.65 KB
Save Response
JSON
Preview
Visualize
[
{
"id": 4,
"firstName": "Bishesna",
"lastName": "shahi",
"email": "bishesnas@gmail.com",
"contactNumber": "9841367751",
"salary": "234234.00",
"address": "kathmandu",
"dob": "2026-02-06",
"age": 0,
"imageUrl": "https://via.placeholder.com/221",
"createdAt": "2026-01-06T08:49:27.256Z",
"updatedAt": "2026-01-07T10:58:36.485Z"
},
{
"id": 6,
"firstName": "xexisa",
"lastName": "sharma",
"email": "jiyon44508@daxiake.com",
"contactNumber": "9847342883",
"salary": "2342377.00",
"address": "kathmandu",



Deployment Instructions:

prerequisite:

- Docker desktop: enable Kubernetes
- helm

How Directory is maintained:

```
assignment
|____backend
```

```
|       |_____packages
|       |_____script.js
|       |_____DockerFile
|_____Frontend
        |_____DockerFile
        |_____index.html
        |_____style.css
        |_____index.js

|_____Kubnernetes
        |_____configmap.yaml
        |_____deployment-b.yaml
        |_____deployemnt.yaml
        |_____service_backend.yaml
        |_____service_frontend.yaml
        |_____secret-b.yaml
        |_____ingress-b.yaml
        |_____ingress.yaml
        |_____values.yaml
        |_____Readme.md
```

Image creation

To create a docker file for frontend you must be inside the Frontend folder where Dockerfile for frontend. here i build image of some-content-nginx

docker build -t <nameofimage> .

```
docker build -t some-content-nginx .
```

To create a docker file for backend you must be inside the Backend folder where Dockerfile for Backend. here I build image of node-backend.

```
docker build -t node-backend .
```

---

now lets deploy first Database:

I used helm values for postgres:

```
helm repo add bitnami https://charts.bitnami.com/bitnami
```

```
helm install my-postgresql bitnami/postgresql --version 18.2.0 --values value
s.yaml
```

```
helm upgrade --install my-postgresql bitnami/postgresql --version 18.2.0 --val
ues values.yaml
```

now to create Database, user and tables:

go to the running pod of postgres:

```
kubectl exec -it podname -n database - - bash
```

```
psql --host my-postgresql -U postgres -d postgres -p 5432
```

for password:

```
 kubectl get secret my-postgresql -n database
-o jsonpath="{.data.postgres-password}" | base64 --decode
```

Inside the Database:

```
psql --host my-postgresql -U myapp_user -d myapp_db -p 5432
```

```
CREATE DATABASE myapp_db;
CREATE USER myapp_user WITH PASSWORD 'mynewpassword';
GRANT ALL PRIVILEGES ON DATABASE myapp_db TO myapp_user;
```

to create employees table

```
CREATE TABLE employees (
    id SERIAL PRIMARY KEY,
    first_name VARCHAR(100) NOT NULL,
    last_name VARCHAR(100) NOT NULL,
    email VARCHAR(255) UNIQUE NOT NULL,
    contact_number VARCHAR(20) NOT NULL,
    salary NUMERIC(10, 2) NOT NULL,
    address TEXT NOT NULL,
    dob DATE NOT NULL,
    age INTEGER,
    image_url TEXT,
    created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
    updated_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
);
```

```
GRANT ALL PRIVILEGES ON TABLE employees TO myapp_user;
GRANT USAGE, SELECT ON SEQUENCE employees_id_seq TO myapp_user;
```

check if they are applied:

```
kubectl get pods
```

```
kubectl get secrets
```

```
kubectl get pv
```

```
kubectl get pvc
```

To connect with pgadmin 4

```
kubectl port-forward svc/<svc_name> 5432:5432
```

---

apply ingress:

```
kubectl apply -f https://raw.githubusercontent.com/kubernetes/ingress-nginx/controller-v1.10.1/deploy/static/provider/cloud/deploy.yaml
```

```
kubectl get ns
```

see if there is ns ingress-nginx

```
kubect get pods -n ingress-nginx
```

Now lets deploy backend:

```
kubectl create ns backend
```

```
kubectl apply deployment-b.yaml -n backend
```

```
kubectl apply service_backend.yaml -n backend
```

```
kubectl apply ingress-b.yaml -n backend
```

```
kubectl apply secret-b.yaml -n backend
```

```
kubectl apply configmap.yaml -n backend
```

to see if it is all applied:

```
kubectl get pods -n backend
```

```
kubectl get svc -n backend
```

```
kubectl get secrets -n backend
```

```
kubectl get configmap -n backend
```

```
kubectl get ingress -n backend
```

check if pods are creates

---

now lets deploy frontend:

```
kubectl create ns frontend
```

```
kubectl apply service_frontend.yaml -n frontend
```

```
kubectl apply deployment.yaml -n frontend
```

```
kubectl apply ingress.yaml -n frontend
```

check is it is applied:

```
kubectl get ingress -n frontend
```

```
kubectl get pods -n frontend
```

```
kubectl get svc -n frontend
```

---

replica analysis:

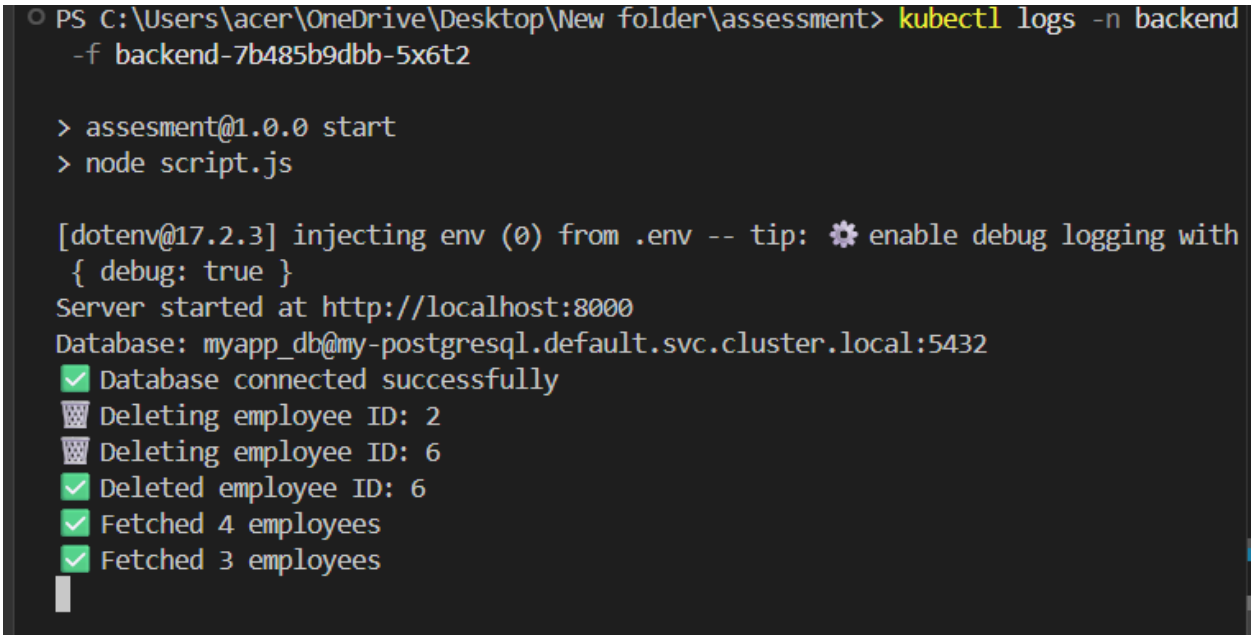
`kubectl scale deployment backend --replicas=2 -n backend`

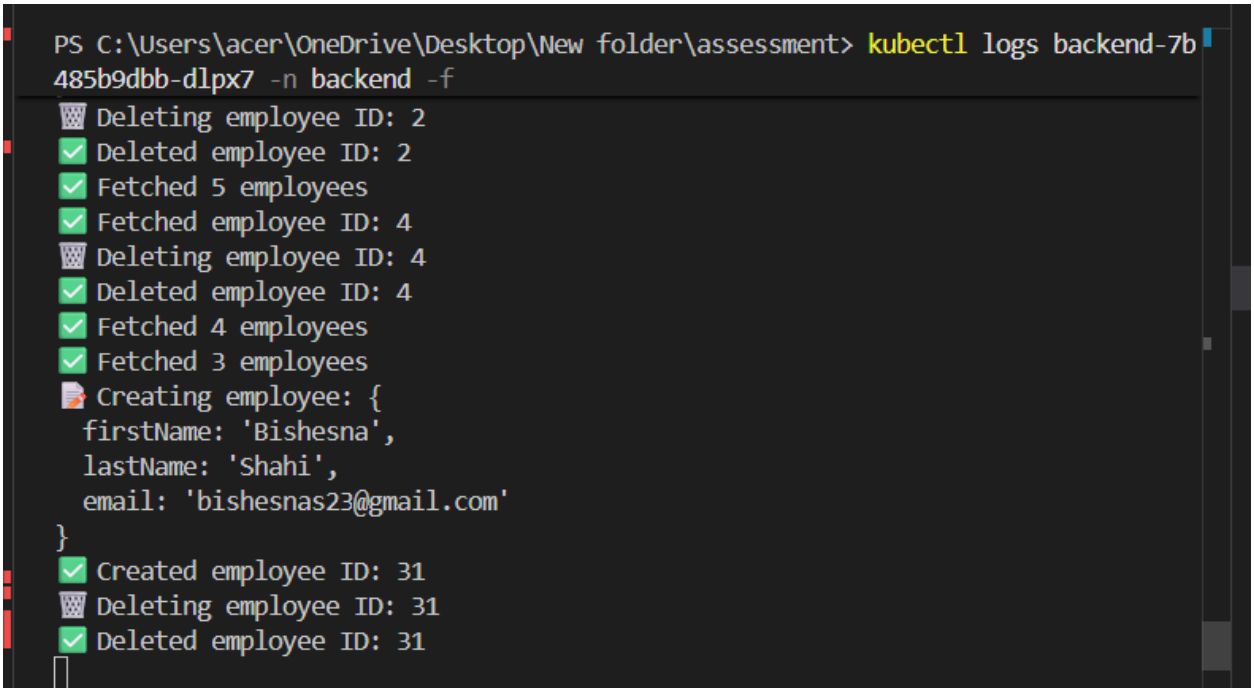
```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment> kubectl get pods -w -n
backend
NAME                       READY   STATUS    RESTARTS      AGE
backend-7b485b9dbb-5x6t2   1/1     Running   0             2m5s
backend-7b485b9dbb-dlpx7   1/1     Running   1 (67m ago)   150m
```

In 2 replica scenario:

- first task is sent to first pod
- and send task is sent to second pod

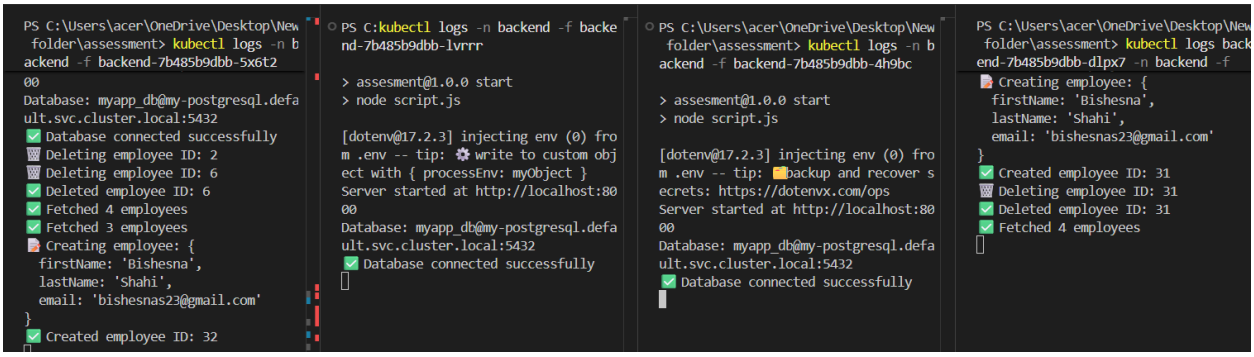
In this scenario, I added a new employee so one pod is responsible to add a new employ to database but we also need to fetch instantly. so another pod has less load, the request is sent to it.





In scenario of 4:

I sent a first request of creating a user. pod 1 handled the request, it created an employee. After the user is created, it needs to be fetched so the pod 2 handles it. Now when i sent a request to edit the pod, pod 3 handles the request as it has less request and then to fetch the data pod 4 takes the request.



liveness:

test1(wrong path):

```
          cpu: "500m"
      livenessProbe:
        httpGet:
          path: /bad
          port: 8000
        initialDelaySeconds: 10
        periodSeconds: 10
        timeoutSeconds: 5
        successThreshold: 1
        failureThreshold: 1
      readinessProbe:
        httpGet:
          path: /health
          port: 8000
        initialDelaySeconds: 60
        periodSeconds: 5
        timeoutSeconds: 3
        successThreshold: 1
```

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl get pods -n backend -w
NAME                       READY   STATUS             RESTARTS      AGE
backend-5b8cff4f65-cl4d9   0/1     CrashLoopBackOff   5 (12s ago)   3m2s
backend-7b485b9dbb-nmbrk   1/1     Running            0             6m27s
```

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl describe pod backend-5b8cff4f65-cl4d9 -n backend
  Type     Reason     Age                From               Message
  ----     ------     ----               ----               -------
  Normal   Scheduled  101s               default-scheduler  Successfully assigned backend/backend-5b8cff4f65-cl4d9 to docker-desktop
  Normal   Pulled     20s (x5 over 100s)  kubelet            Container image "node-backend:latest" already present on machine
  Normal   Created    20s (x5 over 100s)  kubelet            Created container: backend
  Normal   Started    20s (x5 over 100s)  kubelet            Started container backend
  Warning  Unhealthy  1s (x5 over 81s)   kubelet            Liveness probe failed: HTTP probe failed with statuscode: 404
  Normal   Killing    1s (x5 over 81s)   kubelet            Container backend failed liveness probe, will be restarted
  Warning  BackOff    0s                 kubelet            Back-off restarting failed container backend in pod backend-5b8cff4f65-cl4d9_backend(6d0f4f35-10eb-484c-
8a46-c5b66eb4a60b)
```

test2 faliure thershold change

```
        cpu: "500m"
    livenessProbe:
      httpGet:
        path: /bad
        port: 8000
      initialDelaySeconds: 10
      periodSeconds: 10
      timeoutSeconds: 5
      successThreshold: 1
      failureThreshold: 3
    readinessProbe:
      httpGet:
        path: /health
        port: 8000
      initialDelaySeconds: 60
      periodSeconds: 5
      timeoutSeconds: 3
      successThreshold: 1
```

```
PROBLEMS 63  OUTPUT  DEBUG CONSOLE  TERMINAL
TERMINAL                                                    powershell - kubernetes
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl describe pod backend-789fbcdd6c-ksvs2 -n backend
  Type     Reason     Age                  From               Message
  ----     ------     ----                 ----               -------
  Normal   Scheduled  2m58s                default-scheduler  Successfully assigned backend/backend-789fbcdd6c-ksvs2 to docker-desktop
  Normal   Pulled     48s (x5 over 2m58s)  kubelet            Container image "node-backend:latest" already present on machine
  Normal   Created    48s (x5 over 2m58s)  kubelet            Created container: backend
  Normal   Started    48s (x5 over 2m58s)  kubelet            Started container backend
  Warning  Unhealthy  9s (x15 over 2m48s)  kubelet            Liveness probe failed: HTTP probe failed with statuscode: 404
  Normal   Killing    9s (x5 over 2m28s)   kubelet            Container backend failed liveness probe, will be restarted
  Warning  BackOff    7s (x2 over 8s)      kubelet            Back-off restarting failed container backend in pod backend-789fbcdd6c-ksvs2_backend(bb519f04-5274-4540
-ab6d-6a43dbaf5130)
```

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl get pods -n backend -w
NAME                       READY   STATUS             RESTARTS      AGE
backend-789fbcdd6c-ksvs2   0/1     CrashLoopBackOff   4 (44s ago)   3m35s
backend-7b485b9dbb-nmbrk   1/1     Running            0             12m
```

test3 timeoutSeconds:

```yaml
livenessProbe:
  httpGet:
    path: /bad
    port: 8000
  initialDelaySeconds: 10
  periodSeconds: 10
  timeoutSeconds: 1
  successThreshold: 1
  failureThreshold: 2
```

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl describe pod backend-756f88449b-tz9zl -n backend
  ----     ------     ----                ----               -------
  Normal   Scheduled  2m12s               default-scheduler  Successfully assigned backend/backend-756f88449b-tz9zl to docker-desktop
  Normal   Pulled     32s (x5 over 2m12s) kubelet            Container image "node-backend:latest" already present on machine
  Normal   Created    32s (x5 over 2m11s) kubelet            Created container: backend
  Normal   Started    31s (x5 over 2m11s) kubelet            Started container backend
  Warning  Unhealthy  12s (x10 over 112s) kubelet            Liveness probe failed: HTTP probe failed with statuscode: 404
  Normal   Killing    12s (x5 over 102s)  kubelet            Container backend failed liveness probe, will be restarted
  Warning  BackOff    11s (x2 over 12s)   kubelet            Back-off restarting failed container backend in pod backend-756f88449b-tz9zl_backend(49c908bc-976d-485e
-b4d1-91cacf7dfe50)
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes>
```

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl get pods -n backend
NAME                       READY   STATUS             RESTARTS      AGE
backend-756f88449b-tz9zl   0/1     CrashLoopBackOff   4 (10s ago)   2m11s
backend-7b485b9dbb-nmbrk   1/1     Running            0             15m
```

---

readiness

test

I scaled database to 0 to temporarily give 503 error which means Service Unavailable. Now our backend did not get the essential service which gave readiness error 503(unhealthy).

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl scale statefulset my-postgresql --replicas=0
statefulset.apps/my-postgresql scaled
```

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl exec -it backend-6767bdf9df-gtwgs -n backend -- curl -i http://localhost:8000/health
HTTP/1.1 503 Service Unavailable
X-Powered-By: Express
Access-Control-Allow-Origin: *
Content-Type: application/json; charset=utf-8
Content-Length: 48
ETag: W/"30-spwp90Z8m5HdvaEXJnnU4/HIM3U"
Date: Fri, 09 Jan 2026 09:08:13 GMT
Connection: keep-alive
Keep-Alive: timeout=5

{"status":"unhealthy","database":"disconnected"}
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes>
```

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl get pods -n backend
NAME                       READY   STATUS             RESTARTS      AGE
backend-6767bdf9df-gtwgs   0/1     CrashLoopBackOff   4 (44s ago)   115s
backend-844b4997d6-7lj5v   0/1     Running            4 (59s ago)   83m
```

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl logs backend-844b4997d6-7lj5v -n backend

> assesment@1.0.0 start
> node script.js

[dotenv@17.2.3] injecting env (0) from .env -- tip: 🔐 prevent building .env in docker: https://dotenvx.com/prebuild
Server started at http://localhost:8000
Database: myapp_db@my-postgresql.default.svc.cluster.local:5432
❌ Error connecting to database: Error: connect ECONNREFUSED 10.101.37.172:5432
    at TCPConnectWrap.afterConnect [as oncomplete] (node:net:1555:16)
npm error path /app
npm error command failed
npm error signal SIGTERM
npm error command sh -c node script.js
npm error A complete log of this run can be found in: /root/.npm/_logs/2026-01-09T09_09_28_493Z-debug-0.log
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes>
```

It also removed the endpoint as readiness failure lead to removing from the service.

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl get endpoints -n backend
Warning: v1 Endpoints is deprecated in v1.33+; use discovery.k8s.io/v1 EndpointSlice
NAME              ENDPOINTS   AGE
backend-service               47h
```

i scaled database pod back to 1 which made pod running and replica error remove.

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl scale statefulset my-postgresql --replicas=1
statefulset.apps/my-postgresql scaled
```

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl get pods -n backend -w
NAME                       READY   STATUS             RESTARTS      AGE
backend-6767bdf9df-hc5pj   0/1     Running            0             6s
backend-844b4997d6-7lj5v   0/1     CrashLoopBackOff   5 (116s ago)   86m
backend-844b4997d6-7lj5v   0/1     Running            6 (2m48s ago)   87m
backend-844b4997d6-7lj5v   1/1     Running            6 (3m9s ago)    87m
```

We got the endpoints back.

```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl get endpoints -n backend
Warning: v1 Endpoints is deprecated in v1.33+; use discovery.k8s.io/v1 EndpointSlice
NAME              ENDPOINTS                       AGE
backend-service   10.1.1.43:8000,10.1.1.46:8000   2d
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes>
```

next i gave wrong path :

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: backend
  labels:
    app: backend
    tier: backend
spec:
  replicas: 2
  selector:
    matchLabels:
      app: backend
  template:
    metadata:
      labels:
        app: backend
        tier: backend
```

```yaml
    readinessProbe:
      httpGet:
        path: /health
        port: 8000
      initialDelaySeconds: 5
      periodSeconds: 2
      timeoutSeconds: 1
      failureThreshold: 1
```

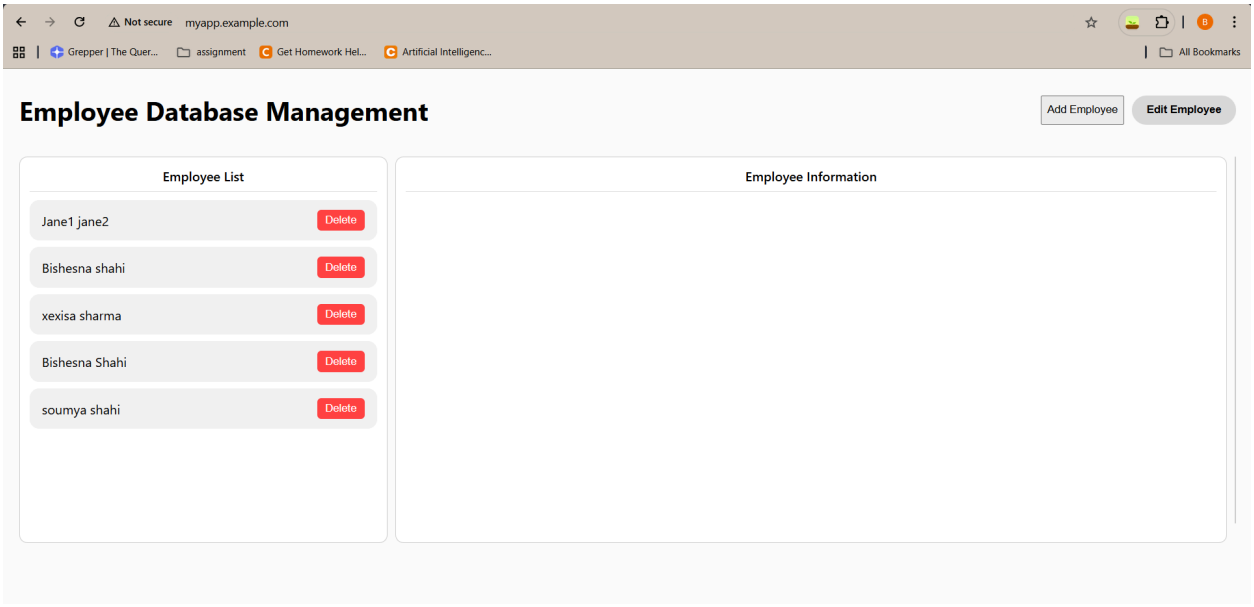
```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl get pods -n backend
NAME                       READY   STATUS    RESTARTS   AGE
backend-66fcfc84fd-nqg6f   0/1     Running   0          3s
backend-7fcf9d994f-9g7zd   1/1     Running   0          32s
backend-7fcf9d994f-ghnvl   0/1     Running   0          3s
```

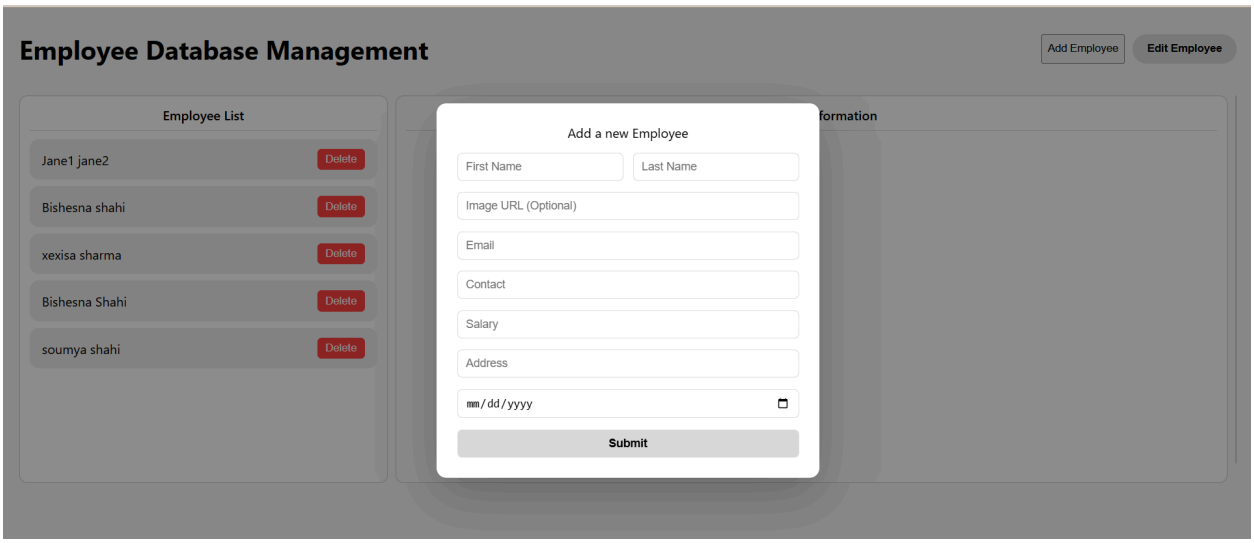
```
    Optional:                false
    DownwardAPI:             true
QoS Class:                   Burstable
Node-Selectors:              <none>
Tolerations:                 node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                             node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type     Reason     Age                From               Message
  ----     ------     ----               ----               -------
  Normal   Scheduled  67s                default-scheduler  Successfully assigned backend/backend-6f5ffb8d6f-9zmq9 to docker-desktop
  Normal   Pulled     67s                kubelet            Container image "node-backend:latest" already present on machine
  Normal   Created    67s                kubelet            Created container: backend
  Normal   Started    67s                kubelet            Started container backend
  Warning  Unhealthy  14s (x25 over 62s)  kubelet            Readiness probe failed: HTTP probe failed with statuscode: 404
```

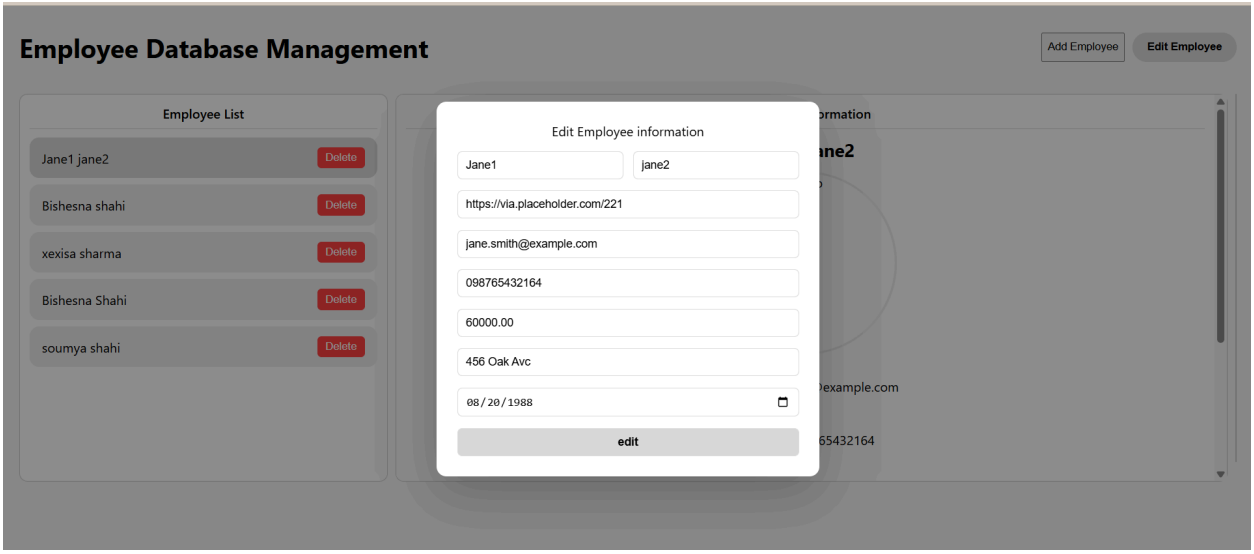
then i changed it to back to the correct path and did rollout restarted now it is back to the ready to serve.

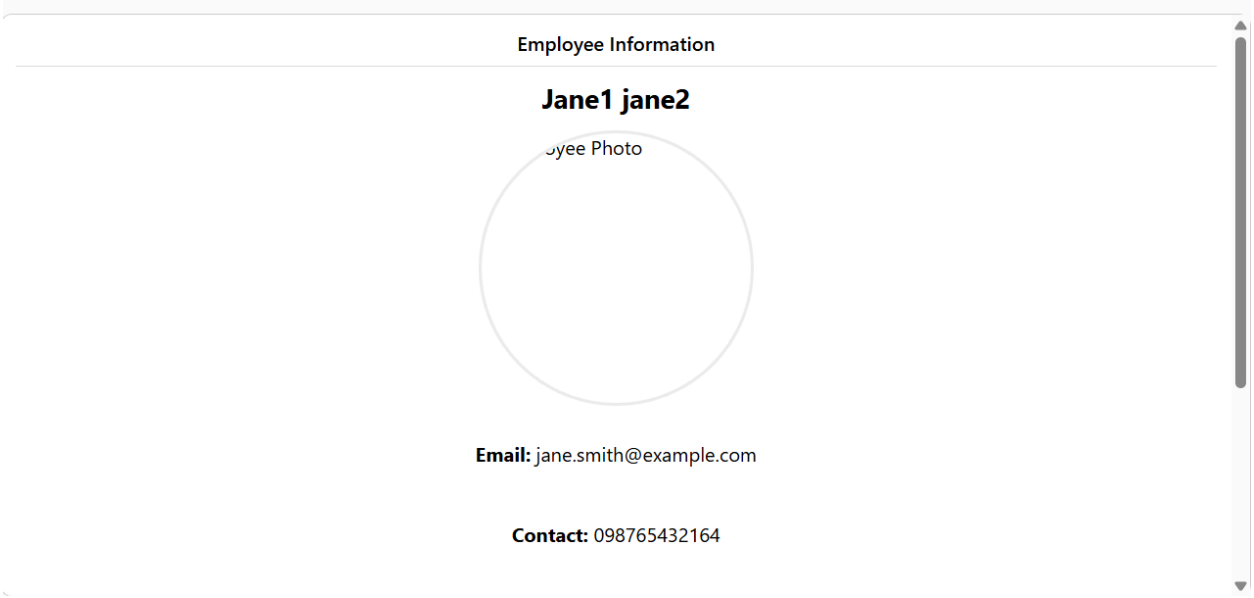
```
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl get pods -n backend
NAME                       READY   STATUS    RESTARTS   AGE
backend-66fcfc84fd-nqg6f   0/1     Running   0          3s
backend-7fcf9d994f-9g7zd   1/1     Running   0          32s
backend-7fcf9d994f-ghnvl   0/1     Running   0          3s
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl rollout restart deployment -n backend
deployment.apps/backend restarted
PS C:\Users\acer\OneDrive\Desktop\New folder\assessment\kubernetes> kubectl get pods -n backend
NAME                       READY   STATUS    RESTARTS   AGE
backend-6f5ffb8d6f-9zmq9   0/1     Running   0          3s
backend-7fcf9d994f-9g7zd   1/1     Running   0          55s
backend-7fcf9d994f-ghnvl   1/1     Running   0          26s
```

Frontend:

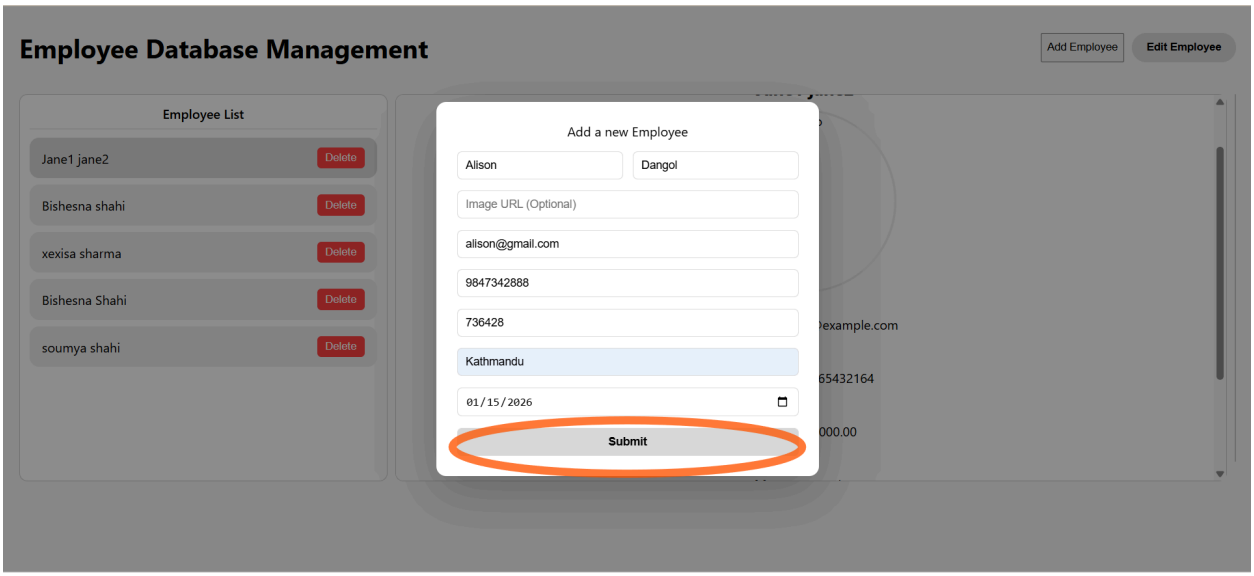


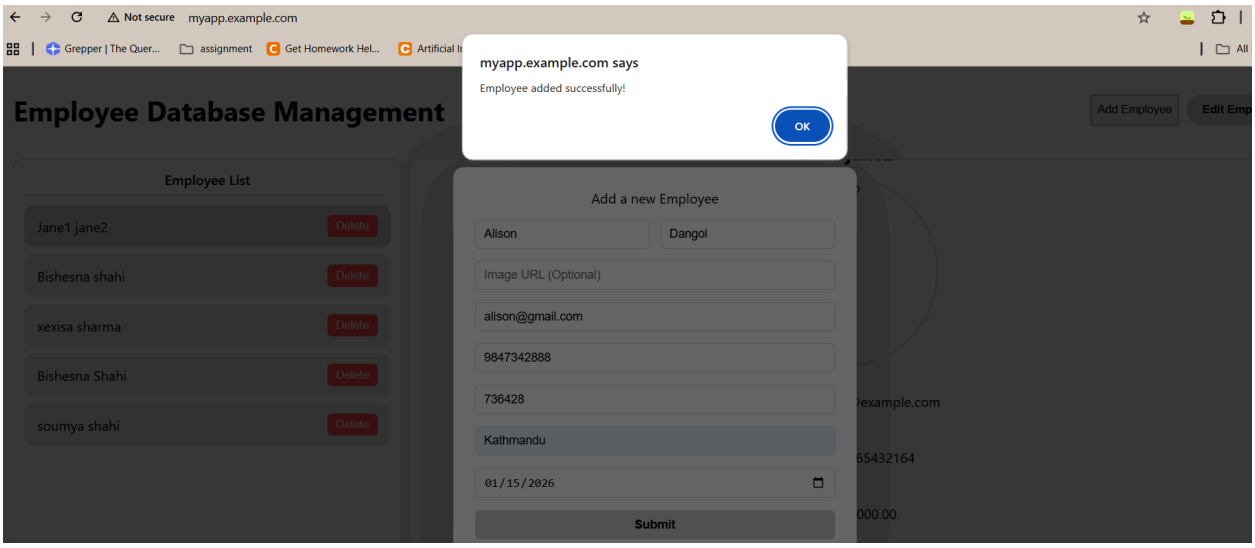

Employee Database Management
Add Employee
Edit Employee
Employee List
Jane1 jane2
Delete
Bishesna shahi
Delete
xexisa sharma
Delete
Bishesna Shahi
Delete
soumya shahi
Delete
formation
Add a new Employee
First Name
Last Name
Image URL (Optional)
Email
Contact
Salary
Address
mm/dd/yyyy
Submit

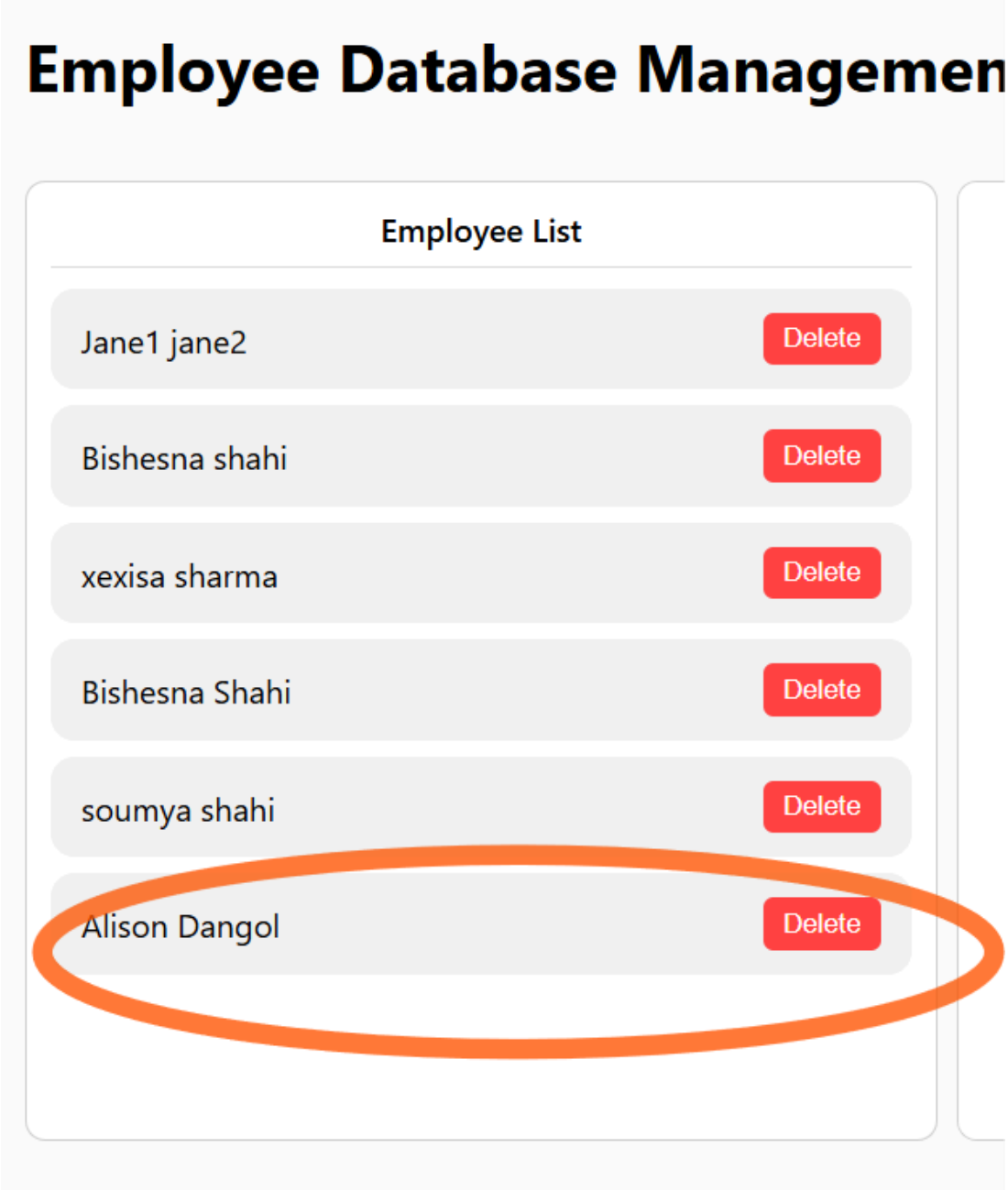

Employee Database Management
Add Employee
Edit Employee
Employee List
Jane1 jane2
Delete
Bishesna shahi
Delete
xexisa sharma
Delete
Bishesna Shahi
Delete
soumya shahi
Delete
ormation
ane2
example.com
65432164
Edit Employee information
Jane1
jane2
https://via.placeholder.com/221
jane.smith@example.com
098765432164
60000.00
456 Oak Avc
08/20/1988
edit



curd operation:

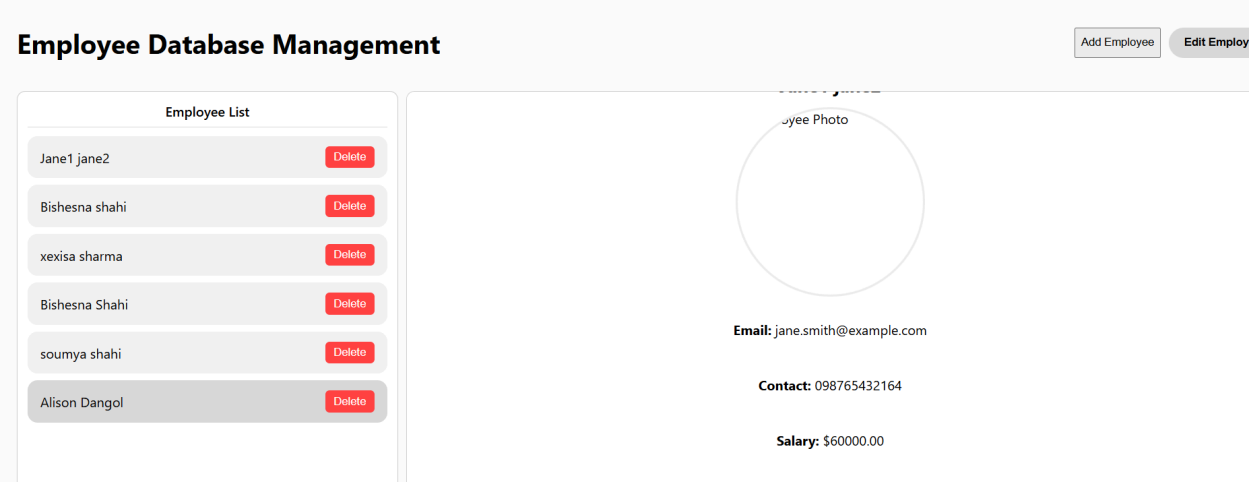



Not secure
myapp.example.com
Grepper | The Quer...
assignment
Get Homework Hel...
myapp.example.com says
Employee added successfully!
OK
Employee Database Management
Add Employee
Edit Emp
Employee List
Jane1 jane2
Delete
Bishesna shahi
Delete
xexisa sharma
Delete
Bishesna Shahi
Delete
soumya shahi
Delete
Add a new Employee
Alison
Dangol
Image URL (Optional)
alison@gmail.com
9847342888
736428
Kathmandu
01/15/2026
Submit
example.com
65432164
000.00

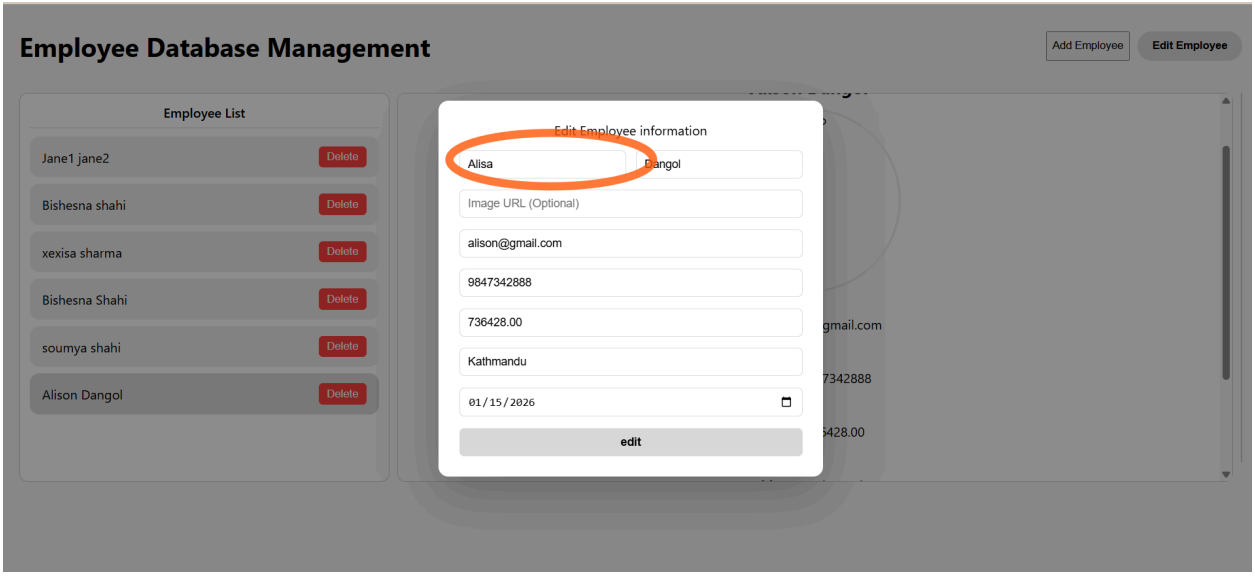


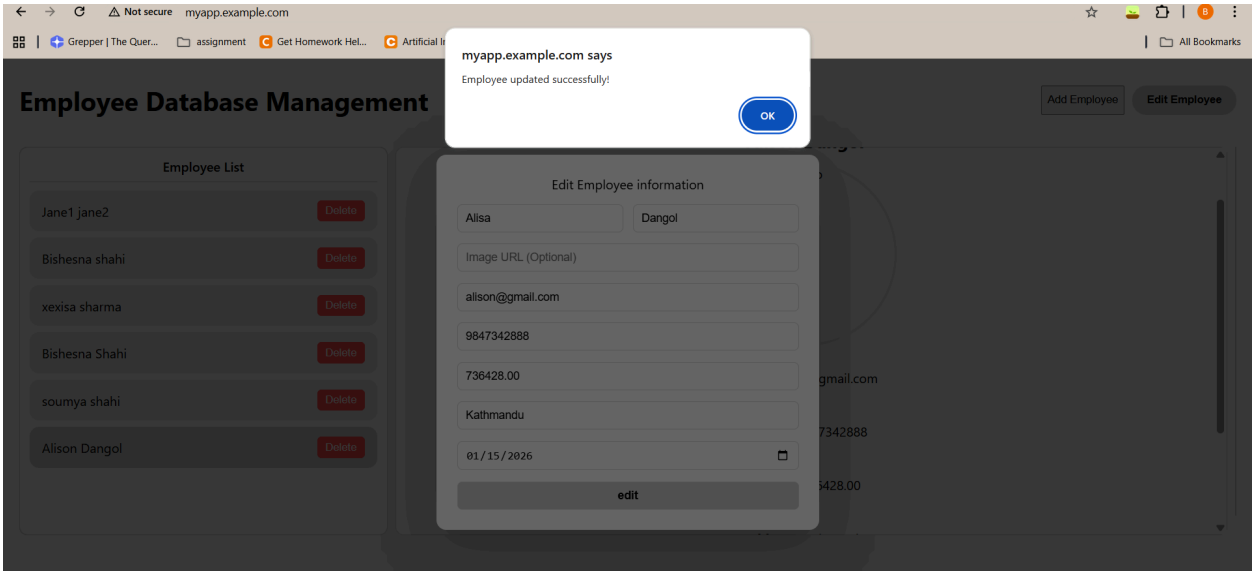
to edit:

first click to your select user

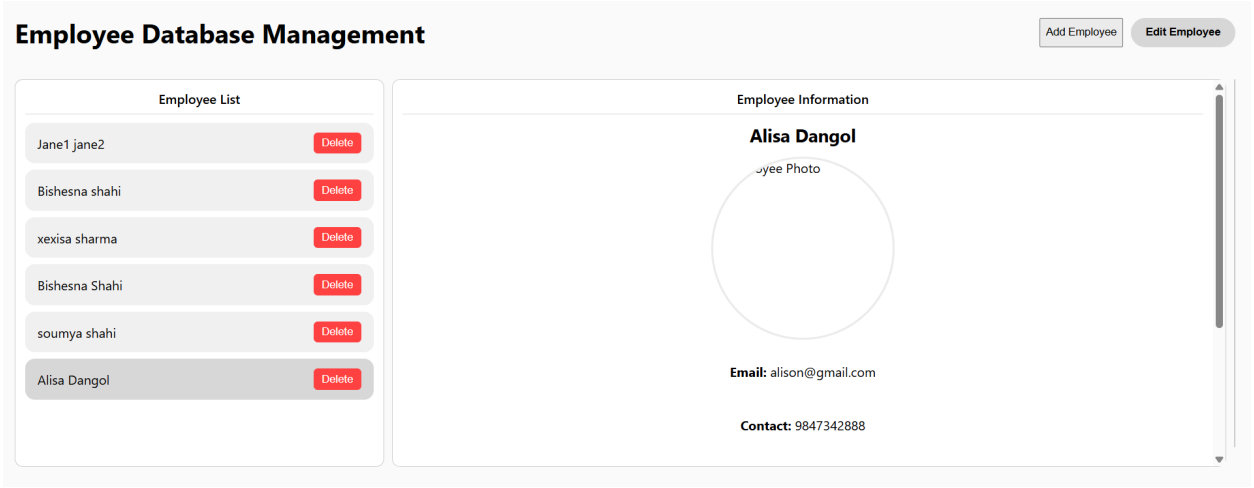


make a required change



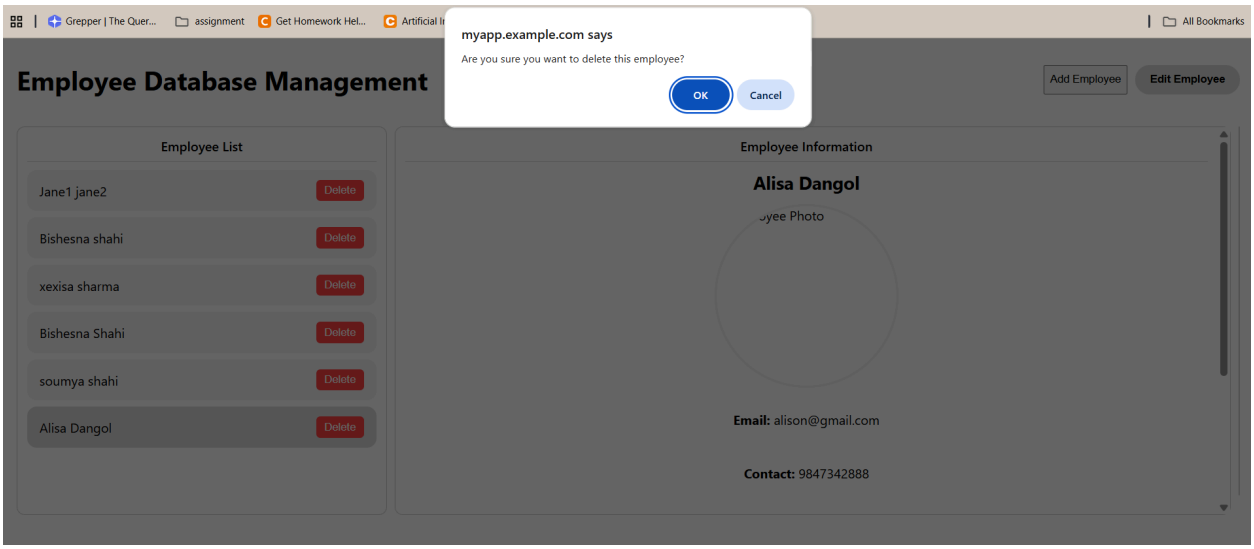


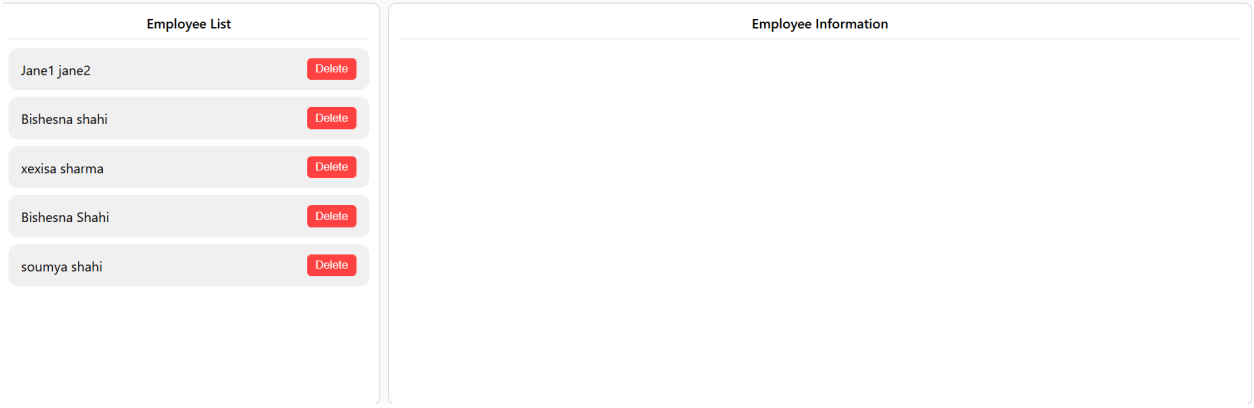
we can see the changed data



Delete:

click the delete button





Database:

Data Output | Messages | Notifications

Showing rows: 1 to 5 | Page No: 1 of 1

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1	2	Jane1	jane2	jane.smith@example.co...	098765432164	60000.00	456 Oak Avc	1988-08-20	38	https://via.plac
2	4	Bishesna	shahi	bishesnas@gmail.com	9841367751	234234.00	kathmandu	2026-02-06	0	https://via.plac
3	6	xexisa	sharma	jiyon44508@daxiake.com	9847342883	2342377.00	kathmandu	2026-02-06	0	
4	26	Bishesna	Shahi	bishesnas1@gmail.com	9847342884	44444444.00	Kathmandu	2026-01-13	0	[null]
5	27	soumya	shahi	bishesnas2@gmail.com	9841367751	234234.00	kathmandu	2026-01-07	0	https://via.plac

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