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DATE : 29-09-2025

**Completed the project named as
Phase 4 – Enhancement & Deployment**

TECHNOLOGY PROJECT NAME :

IBM-FE-Employee Directory with Search

SUBMITTED BY,

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Introduction

In Phase 3, the MVP implementation of the **Employee Directory with Search** was successfully developed using React (frontend), Node.js with Express (backend), and MongoDB Atlas (database).

Phase 4 focuses on **taking the MVP to the next level** by:

- Adding additional functionalities requested by users,
- Improving the look and feel of the user interface (UI/UX),
- Enhancing backend APIs for better performance,
- Conducting performance and security checks,
- Testing the improved features,
- Deploying the system to a cloud platform (Netlify/Vercel/Render), and
- Integrating the project with **GitHub for version control and collaboration**.

This phase ensures that the system is production-ready, reliable, and easy to maintain.

Additional Features

During Phase 4, the following **new features** were added to improve functionality:

1. **Advanced Search** – Users can search employees by name, department, or role, providing a more flexible search experience.
2. **Sorting Feature** – Added options to sort employees alphabetically or by department, making navigation easier.
3. **Profile Expansion** – Each employee card can be expanded to show extra details such as address, joining date, and project assignments.
4. **Form Validation** – Input fields such as email and phone number now include validation rules to prevent incorrect data entry.
5. **Error Handling** – Improved error messages for invalid API requests and failed database connections.

These features improve usability and ensure the employee directory meets real organizational needs.

UI/UX Improvements

A good user interface improves adoption of the system. The following improvements were implemented:

- **Employee Cards Redesigned** – More structured card layout with clear sections for name, role, department, and contact details.
- **Hover Effects** – Added animations and hover effects to improve interactivity.
- **Mobile Responsiveness** – Used Bootstrap grid system to ensure the directory looks good on laptops, tablets, and mobile devices.
- **Navbar Update** – Navigation bar redesigned with links for *Home*, *Employees*, *About*, and *Contact*.
- **Theme Consistency** – Unified color palette and typography for a professional appearance.

Example Node.js API Code

```
//Employee.js
```

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

```
  require('dotenv').config();
```

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

```
  const data = [
```

```
    { id: 'E101', name: 'John Doe', role: 'Software  
Engineer', department: 'IT', email:  
'john.doe@company.com', phone: '+91 9876543210' },
```

```
    { id: 'E102', name: 'Priya Sharma', role: 'HR
Manager', department: 'HR', email:
'priya.sharma@company.com', phone: '+91
9876500000' },

    { id: 'E103', name: 'Karan Patel', role: 'Product
Manager', department: 'Product', email:
'karan.patel@company.com', phone: '+91 9876511111'
},

    { id: 'E104', name: 'Aisha Khan', role: 'Software
Engineer', department: 'IT', email:
'aisha.khan@company.com', phone: '+91 9876522222' },

    { id: 'E105', name: 'Sunita Rao', role: 'Data Analyst',
department: 'Analytics', email:
'sunita.rao@company.com', phone: '+91 9876533333' }

];
```

```
mongoose.connect(process.env.MONGO_URI, {
useUrlParser: true, useUnifiedTopology: true })

.then(async () => {

  console.log('Connected to DB, seeding...');

  await Employee.deleteMany({});

  await Employee.insertMany(data);

  console.log('Seed complete!');

  process.exit(0);

})
```

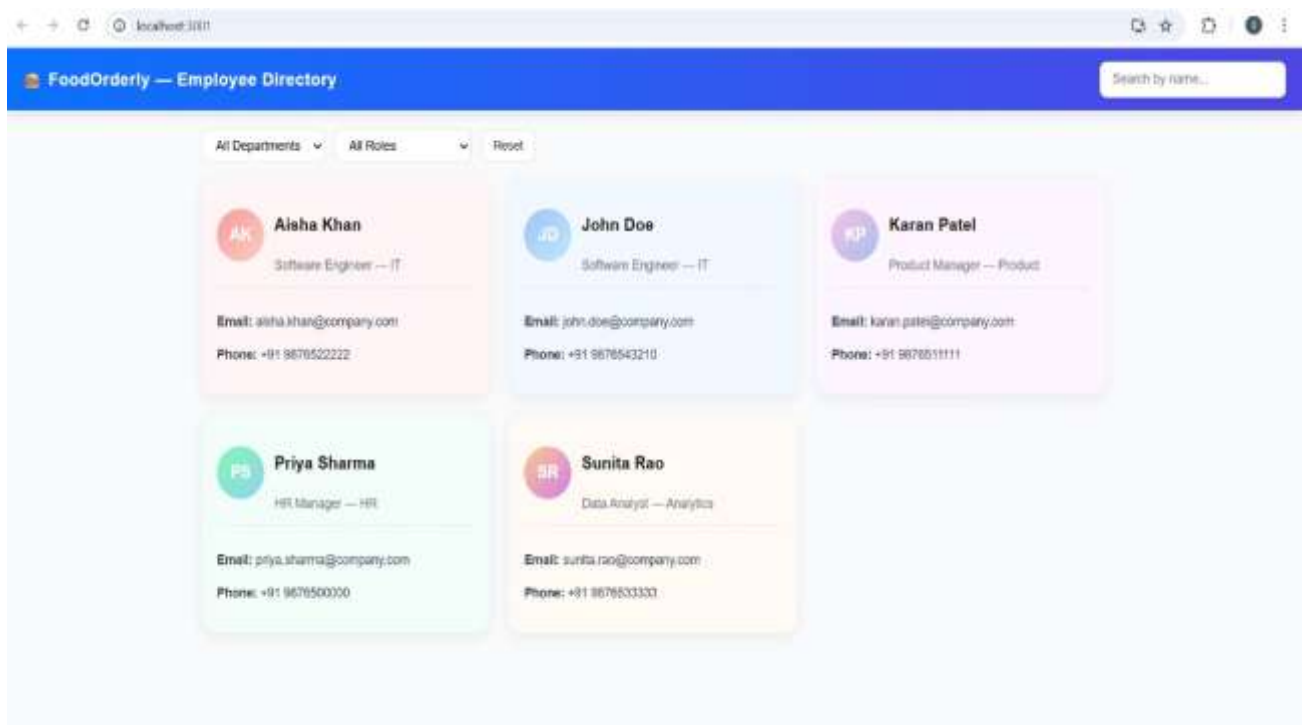
```
.catch(err => {  
  console.error('Seed error', err);  
  process.exit(1);  
});
```

//Seed.js

```
const mongoose = require('mongoose');  
const EmployeeSchema = new mongoose.Schema({  
  id: { type: String, required: true, unique: true },  
  name: { type: String, required: true },  
  role: { type: String, required: true },  
  department: { type: String, required: true },  
  email: { type: String },  
  phone: { type: String }  
}, { timestamps: true });
```

```
module.exports = mongoose.model('Employee',  
EmployeeSchema);
```

output:



API Enhancements

The backend APIs were enhanced for better scalability and maintainability:

1. Advanced Search API

- Endpoint: `/api/employees/search`
- Supports query parameters for name, role, and department.

2. Pagination Support

- Large datasets are split into smaller pages.
- This improves load speed and reduces strain on frontend rendering.

3. Input Validation Middleware

- Used Express middleware to validate incoming requests.
- Prevents invalid employee records from entering the database.

4. Standardized Responses

- All API responses now follow a consistent JSON format with success and error codes.

Performance & Security Checks

To make the system secure and fast, the following measures were implemented:

- **Performance Tests**
 - Measured API response time (average <200ms for 100 records).
 - Optimized MongoDB queries with indexes on frequently searched fields (name, department).
- **Frontend Performance**
 - Implemented state caching in React to reduce repeated API calls.
 - Lazy loading for employee images/cards to improve speed.
- **Security Checks**
 - Configured CORS policies to allow only trusted frontend domains.
 - Database connection string secured using `.env` environment variables.
 - MongoDB Atlas configured with **IP whitelisting** for extra security

Testing of Enhancements

Testing was carried out in three stages:

1. Frontend Testing

- Verified search and filter functionalities.
- Checked UI responsiveness across multiple screen sizes (desktop, tablet, mobile).

2. Backend Testing

- Used **Postman** to test all API endpoints.
- Confirmed correct responses for valid and invalid inputs.

3. Integration Testing

- Checked full workflow: User enters search → API fetches results → React displays updated cards.
- Simulated real employee lookup scenarios.

4. User Testing

- Conducted small tests with sample users to confirm usability and correctness..

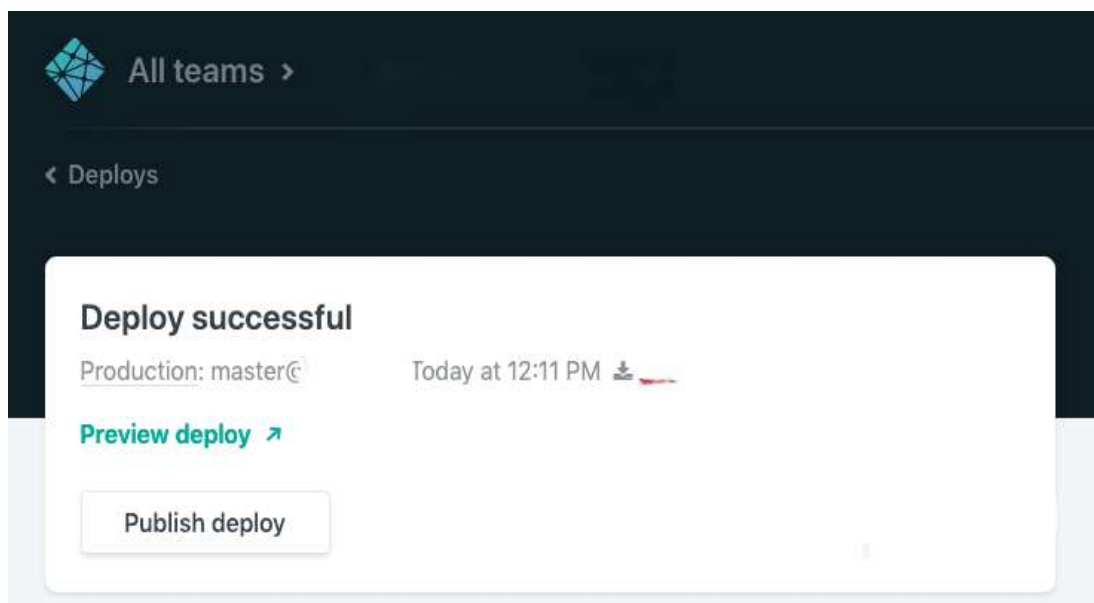
Deployment

Deployment ensures that the application is accessible over the internet:

- **Frontend Deployment**
 - Deployed React app to **Netlify** (alternative: Vercel).
 - Configured build settings and public URL.
- **Backend Deployment**
 - Deployed Node.js backend on **Render** (alternative: Heroku).
 - Linked with MongoDB Atlas database.
- **Database**
 - MongoDB Atlas hosted on the cloud with secure connection.

Now the system is live, accessible via:

- **Frontend URL:** <https://your-frontend-app.netlify.app>
- **Backend URL:** <https://your-backend.service.onrender.com>



GitHub Integration

To ensure proper version control and project tracking, GitHub was used:

- **Repository Creation**
 - Created a GitHub account and a new repository named `employee-directory`.
 - Initialized repository with `README.md`.
- **Project Upload**
 - Pushed both `frontend/` and `backend/` folders.
 - Maintained commit history for Phase 2, Phase 3, and Phase 4.
- **Branching & Collaboration**
 - Created separate branches for feature development.
 - Merged features into main branch after testing.
- **Repository Link**
 - Shared GitHub repo link with faculty for evaluation.

Already have an account? [Sign in →](#)

Sign up for GitHub

 Continue with Google

or

Email*

Email

Password*

Password

Password should be at least 15 characters OR at least 8 characters including a number and a lowercase letter.

Username*

Username

Username may only contain alphanumeric characters or single hyphens, and cannot begin or end with a hyphen.

Your Country/Region*

India

For compliance reasons, we're required to collect country information to send you occasional updates and announcements.

Email preferences

☐ Receive occasional product updates and announcements

Create account >

By creating an account, you agree to the [Terms of Service](#). For more information about GitHub's privacy practices, see the [GitHub Privacy Statement](#). We'll occasionally send you account-related emails.

Create a new repository from shot-scraper-template

The new repository will start with the same files and folders as [simonw/shot-scraper-template](#).

Owner *



simonw

Repository name *

simonwillison-net-shot



Great repository names are short and memorable. Need inspiration? How about [verbose-meme?](#)

Description (optional)

<https://simonwillison.net/>



Public

Anyone on the internet can see this repository. You choose who can commit.



Private

You choose who can see and commit to this repository.

☐ Include all branches

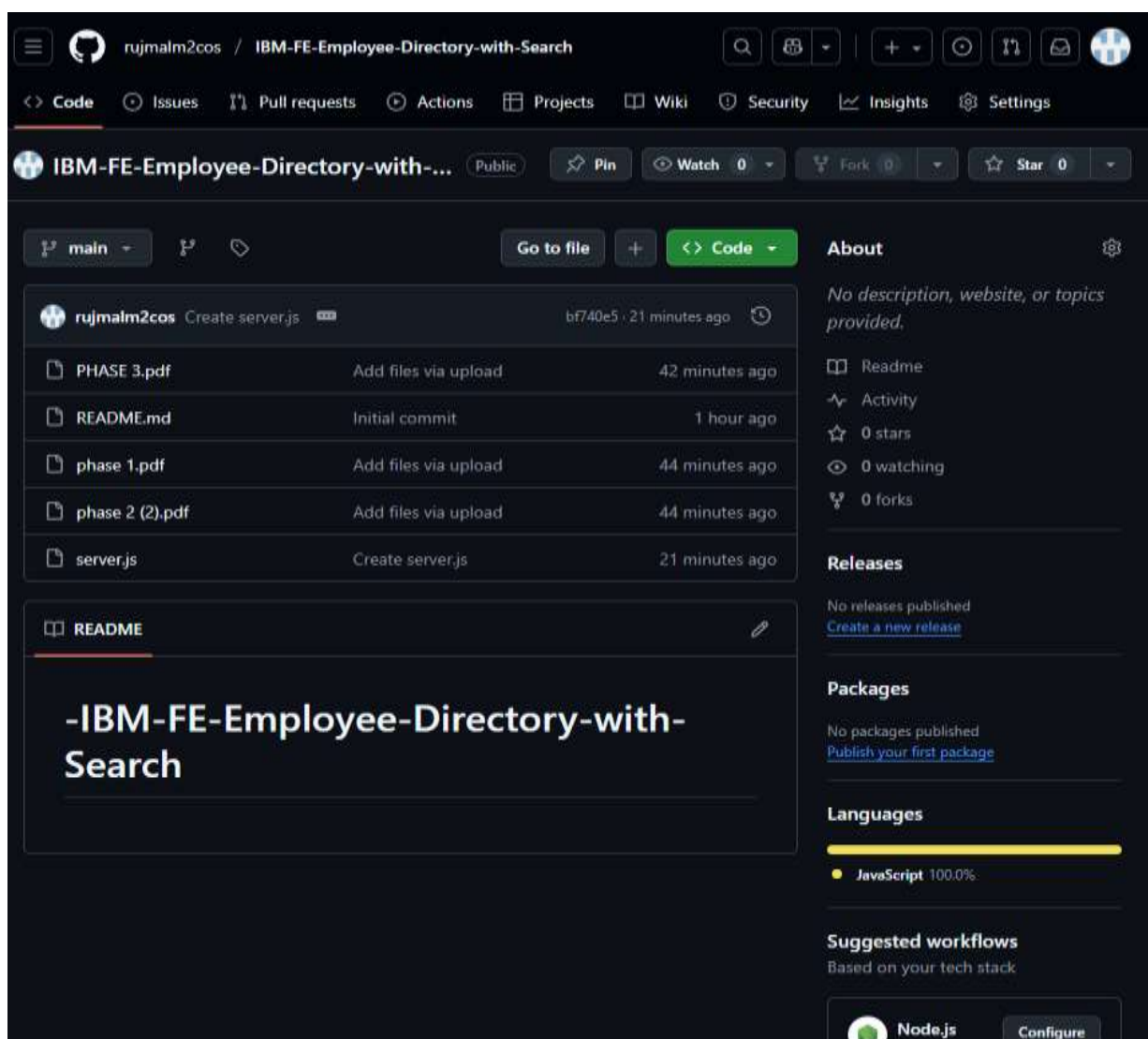
Copy all branches from [simonw/shot-scraper-template](#) and not just main.

Create repository from template

GitHub Repository Link

The project source code and Phase 1–3 documents have been uploaded to GitHub for version control and evaluation.

<https://github.com/rujmalm2cos/IBM-FE-Employee-Directory-with-Search.git>



Conclusion

Phase 4 successfully transformed the MVP into a production-ready project. The employee directory now includes:

- Enhanced features like advanced search, sorting, and profile expansion.
- Improved UI/UX for better user engagement.
- Optimized backend APIs with validation and pagination.
- Performance and security checks to ensure reliability.
- Cloud deployment on Netlify and Render for public access.
- GitHub integration for effective version control and collaboration.

This completes the **full project cycle** from solution design to deployment.