EMPLOYEE MANAGEMENT SYSTEM

By

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WIPRO-NGA-.NET-REACT-PHASE2-C7 CAPSTONE

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Introduction

The Employee Management System:is a full-stack web application designed to help organizations manage employee data, leave requests, and reports efficiently. This system allows HRs to add, edit, view, and delete employee records, ensuring smooth workforce management. It also enables managers to oversee their teams and approve or reject leave requests while allowing employees to apply for leave and track its status. The platform features a modern UI using React, Redux, and follows best practices for state management, authentication with JWT, and backend API development using .NET Core and SQL Server.

Key Features & Functionalities

- User Authentication & Authorization – Secure login using JWT-based authentication with Role-Based Access Control (HR, Manager, Employee).
- Employee Management – HRs can add, edit, delete, and view employee details efficiently.
- Role Assignment – HRs can assign roles (HR, Manager, Employee) to users for controlled access.
- Leave Management – Employees can apply for leave, and managers/HRs can approve or reject requests.
- Real-time Notifications – Employees receive updates on leave approvals or rejections.
- State Management with Redux – Centralized data handling ensures performance and consistency.
- Form Validation – Ensures accurate data entry before storing employee details in the database.
- Bootstrap-based UI – Provides a responsive, modern, and user-clean interface.

Problem Definition & Objectives

Problem Definition:

HR departments struggle with managing employee records, leave requests, and reports efficiently. Manual processes cause errors, delays, and inefficiencies. Tracking roles and approvals becomes difficult without a centralized system. This project provides a digital solution for streamlined HR operations.

Objectives:

- Develop a user-friendly web application for managing employees.
- Implement CRUD functionality (Create, Read, Update, Delete) for employee records.
- Enable user authentication and role-based access control (RBAC) using JWT.
- Allow employees to apply for leave and managers/HRs to approve or reject requests.
- Implement state management using Redux for better performance.
- Ensure secure and efficient backend operations using .NET Core and SQL Server.
- Optimize database performance using indexing and normalization techniques.

Frontend & Backend Architecture

Technology Stack:

- Frontend: React, Redux Toolkit, React Router, Bootstrap
- Backend: ASP.NET Core Web API, Entity Framework Core
- Database: Microsoft SQL Server Management Studio
- Authentication: JWT Authentication, Role-Based Access Control (RBAC)

Component Breakdown & API Design

Frontend Component Breakdown

The frontend is built using React, following a modular and component-based approach. This ensures better maintainability, reusability, and performance optimization.

1. State Management (Redux Toolkit)

- Centralized state management is handled using Redux Toolkit.
- Slices are created for different entities (e.g., employeeSlice for managing employee data).
- Uses async thunks to fetch, add, edit, and delete employee records from the backend.

2. Routing (React Router)

- React Router enables navigation between different views without reloading the page.
- Protected routes ensure that only authenticated users can access certain pages.

3. UI Components

- The UI follows a structured hierarchy to keep the application maintainable and user-friendly.
- App.js – Main entry point that initializes routing and layout.
- Navbar.js – Displays navigation links and user authentication options.
- Sidebar.js – Renders role-based navigation links using react-router-dom and react-bootstrap.
- PrivateRoute.js – Protects routes by allowing only authenticated users and redirects others to login.
- RoleRoute.js – Restricts access based on user roles, redirecting unauthorized users to login or home.
- EmployeeList.js – Displays all employees in a list format.
- EmployeeDetails.js – Shows detailed information about a selected employee.
- AddEmployee.js – Form to create a new employee with validation.
- EditEmployee.js – Form to update an existing employee record.
- Login.js – Handles user authentication (login).
- Register.js – Allows new users to register.

API Design & Endpoints

The backend follows a RESTful API approach with structured and secure endpoints.

1. Authentication & Authorization

- Uses JWT (JSON Web Token) for secure authentication.
- Tokens are stored on the frontend and sent in API requests.
- Role-based access control (RBAC) ensures users can only modify authorized data.

2. API Endpoints

Auth Method ------- Endpoint ---------- purpose

- POST /api/Auth/register – Registers a new user.
- POST /api/Auth/login – Authenticates user and returns JWT token.

Employees

- GET /api/Employees – Retrieves all employees.
- POST /api/Employees – Adds a new employee (requires authentication).
- GET /api/Employees/{id} – Fetches a specific employee by ID.
- PUT /api/Employees/{id} – Updates an existing employee record.
- DELETE /api/Employees/{id} – Deletes an employee (only authorized users).
- GET /api/Employees/manager/{managerId} – Retrieves employees under a specific manager.
- GET /api/Employees/profile – Fetches the profile details of the logged-in user.

Leaves

- GET /api/Leaves – Retrieves all leave requests.
- POST /api/Leaves – Employee applies for leave.
- GET /api/Leaves/{id} – Fetches a specific leave request.
- PUT /api/Leaves/{id}/status – Approves or rejects leave requests.

Reports

- GET /api/Reports/employee-directory – Retrieves a directory of all employees.
- GET /api/Reports/leave-analysis – Fetches leave request statistics.
- GET /api/Reports/department-distribution – Provides an overview of employees by department.
- GET /api/Reports/leave-distribution-by-type – Analyzes leave requests based on type.
- GET /api/Reports/average-leaves-by-department/{year} – Fetches average leave data per department for a specific year.
- GET /api/Reports/manager-hierarchy – Displays the organizational structure of managers and employees.

3. Authentication Flow

- User logs in using credentials.
- Backend verifies credentials and generates a JWT token.
- Frontend stores the token and includes it in API requests.
- Protected endpoints validate the token before processing the request.

4. Role-Based Access Control (RBAC)

- HR Users: Can manage employees, assign roles, and approve/reject leave requests.
- Manager Users: Can view and approve/reject leave requests for their team.
- Employee Users: Can view their profile and apply for leave.

Database Design & Storage Optimization

1. Entities & Relationships

A.Users Table

- Stores authentication details (username, password, email).
- Has a One-to-Many Relationship with Employees (An HR can manage multiple employees).
- Linked to the Roles Table (Each user has a specific role).

B. Employees Table

- Stores employee details, including name, position, department, and contact information.
- Each employee is associated with one manager (Many-to-One Relationship).

C. Roles Table

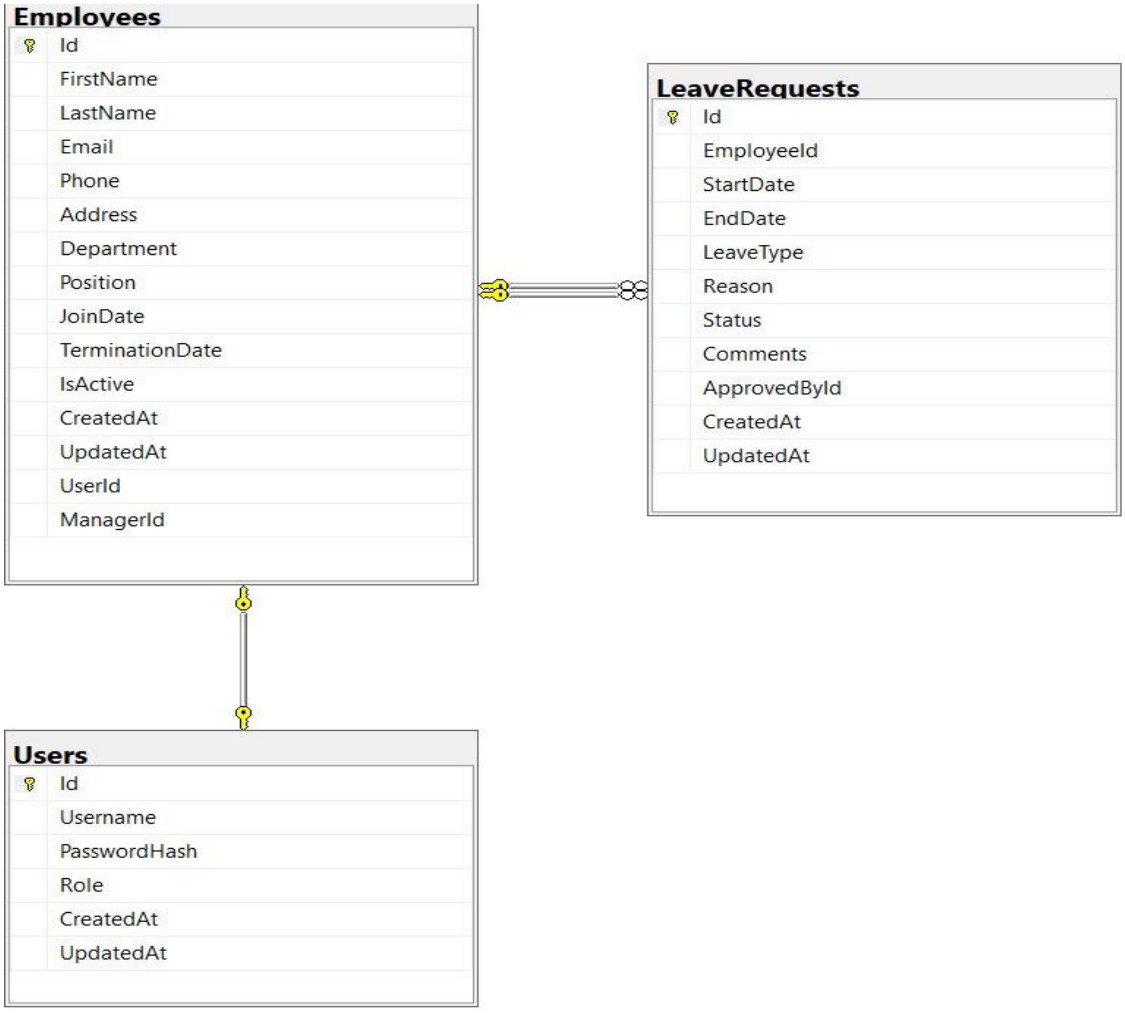
- Implements role-based access control (RBAC) for HR, Manager, and Employee roles.
- Has a One-to-Many Relationship with Users (A role can be assigned to multiple users).

D. Leaves Table

- Stores leave requests submitted by employees.
- Linked to Employees (Many-to-One Relationship where an employee can have multiple leave requests).
- Stores leave status (Pending, Approved, Rejected).

2. ERD Representation

The Entity-Relationship Diagram (ERD) visually represents the relationships between Users, Employees, and Leaves.



Storage Optimization

1. Indexing for Faster Queries

Primary Key Indexing:

- UserId (Users table)
- EmployeeId (Employees table)
- RoleId (Roles table)
- LeaveId (Leaves table)

Foreign Key Indexing:

- Indexing foreign keys (UserId in Employees, RoleId in Users) ensures faster joins and lookups.

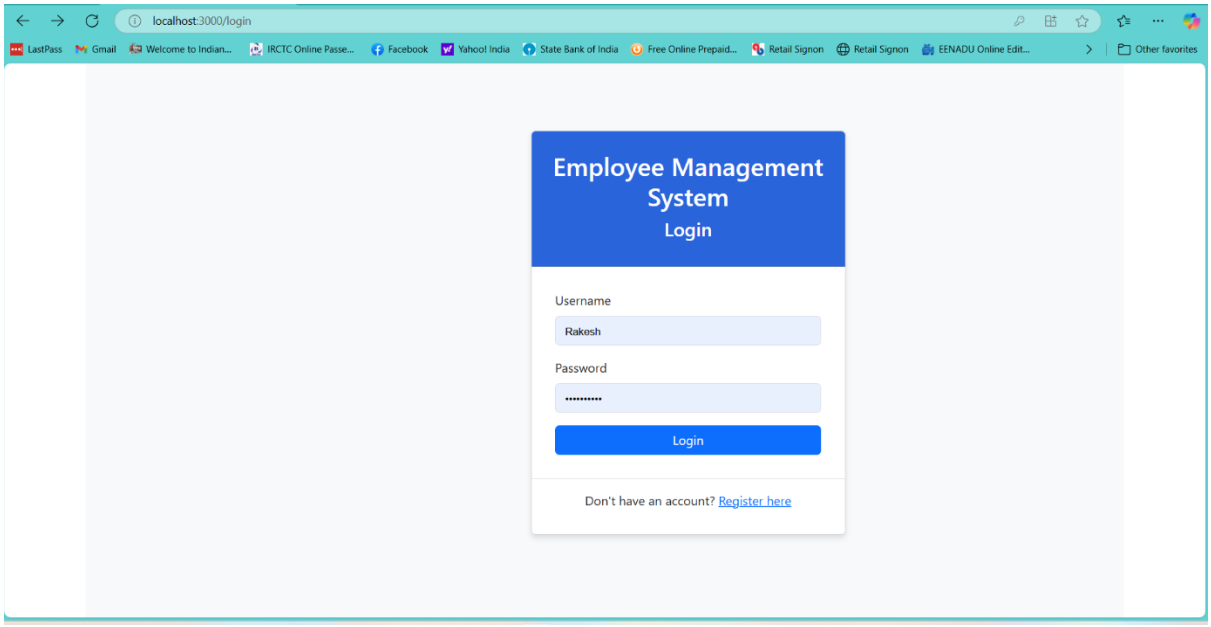
2. Query Optimization Techniques

Optimized Data Retrieval:

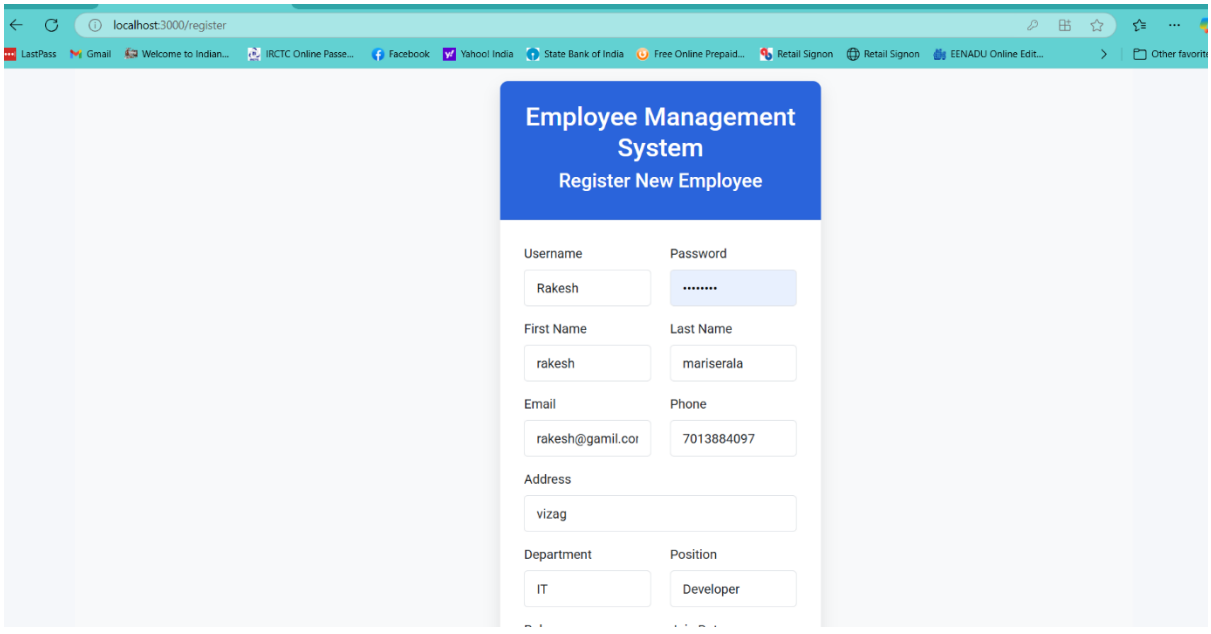
- SELECT only required columns instead of **SELECT ***.
- Use pagination (OFFSET and LIMIT) to retrieve employee and leave data in chunks.
- Implement caching for frequently accessed records.

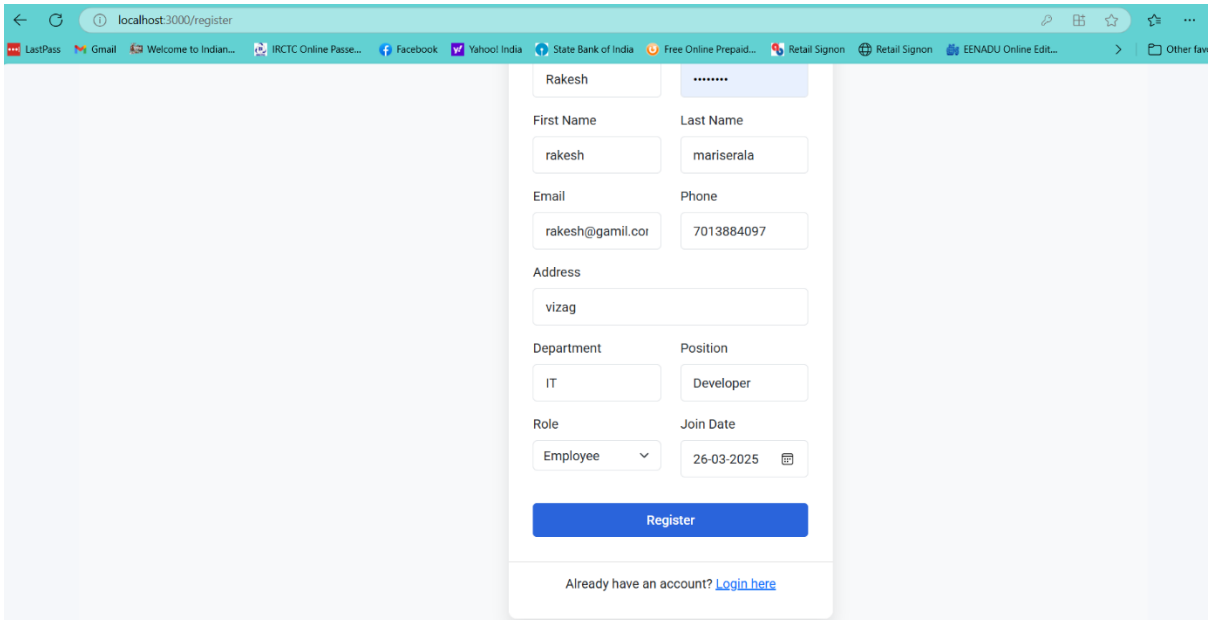
Snapshots of the Application

1.Authentication and Authorization

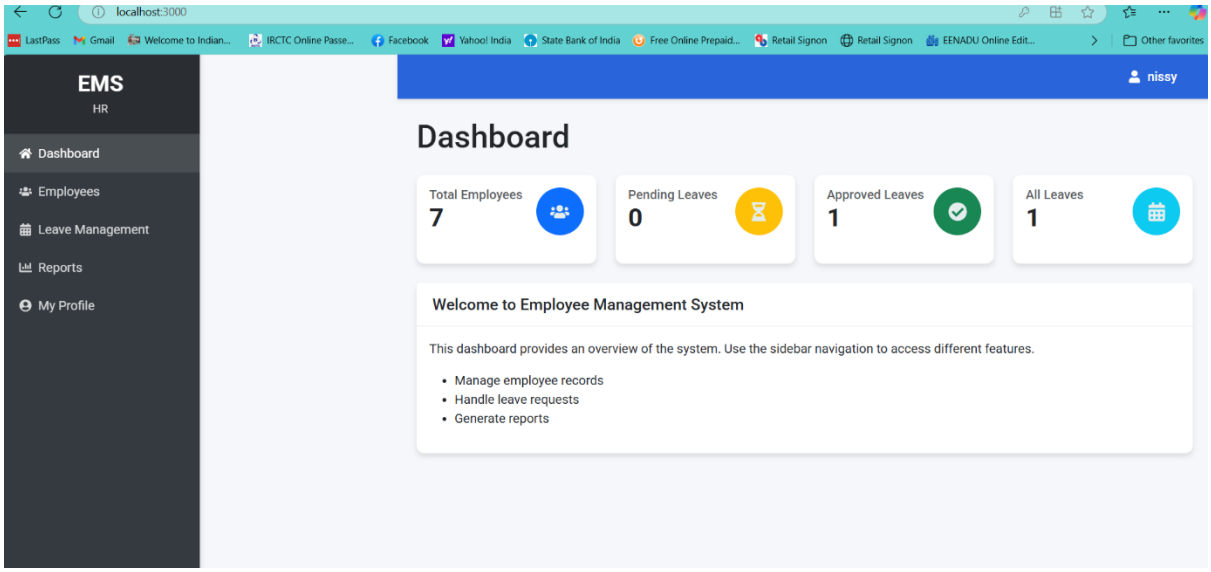


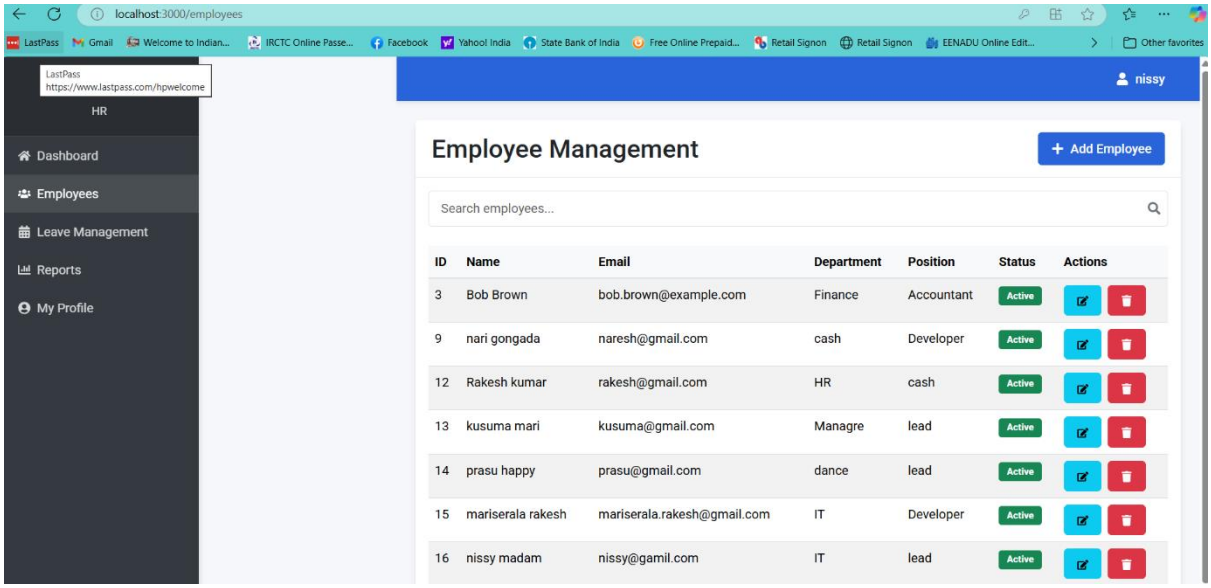
2.Register New Employee

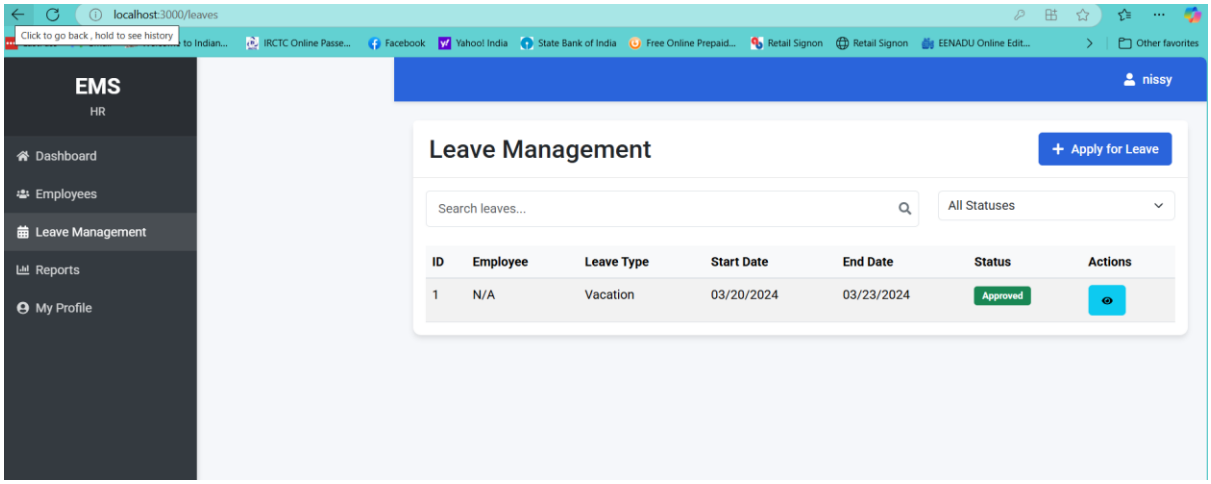


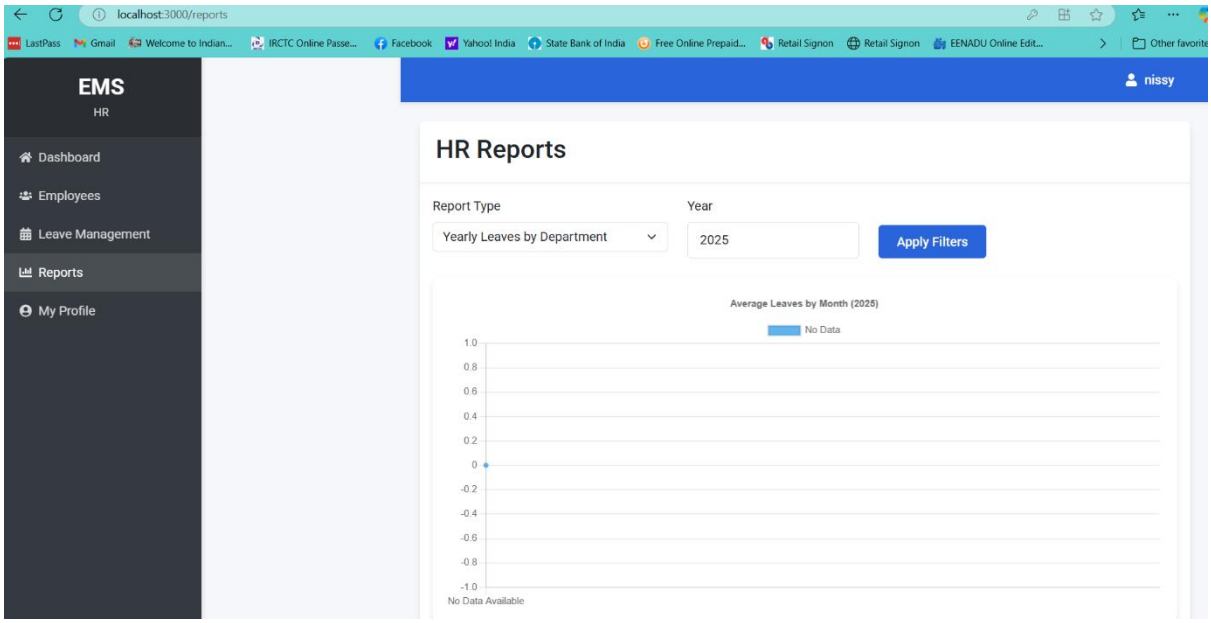


3.Dashboard(HR), Employee management , Leave management ,reports and delete

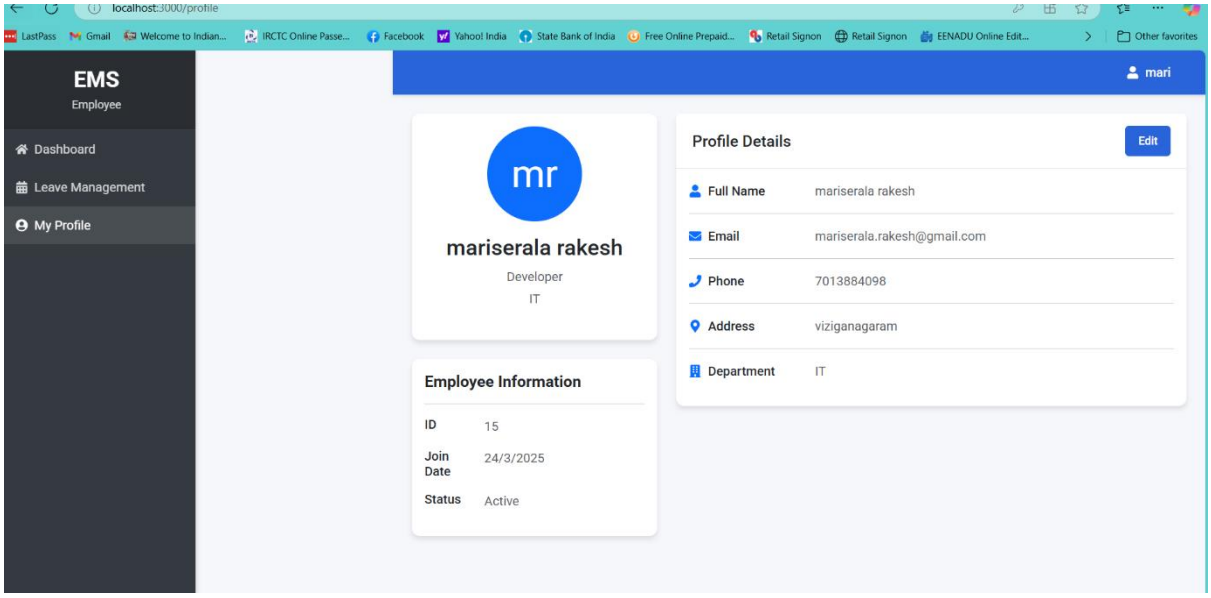


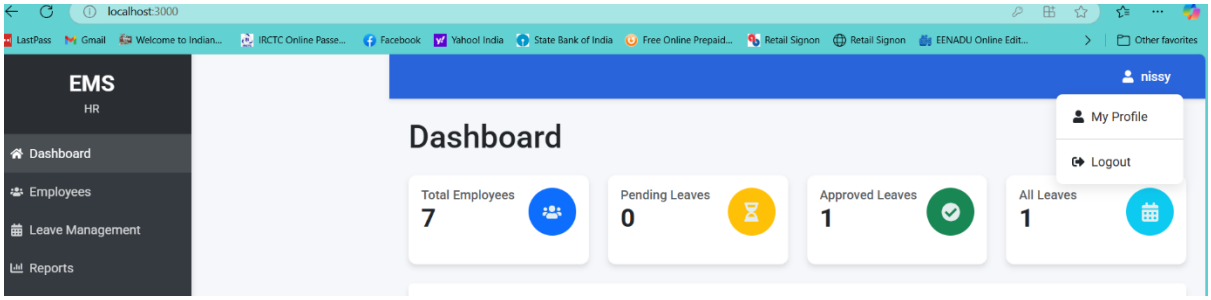

localhost:3000/employees
LastPass
https://www.lastpass.com/hpwelcome
HR
Dashboard
Employees
Leave Management
Reports
My Profile
nissy
Employee Management
+ Add Employee
Search employees...
ID Name Email Department Position Status Actions
3 Bob Brown bob.brown@example.com Finance Accountant Active
9 nari gongada naresh@gmail.com cash Developer Active
12 Rakesh kumar rakesh@gmail.com HR cash Active
13 kusuma mari kusuma@gmail.com Managre lead Active
14 prasu happy prasu@gmail.com dance lead Active
15 mariserala rakesh mariserala.rakesh@gmail.com IT Developer Active
16 nissy madam nissy@gamil.com IT lead Active

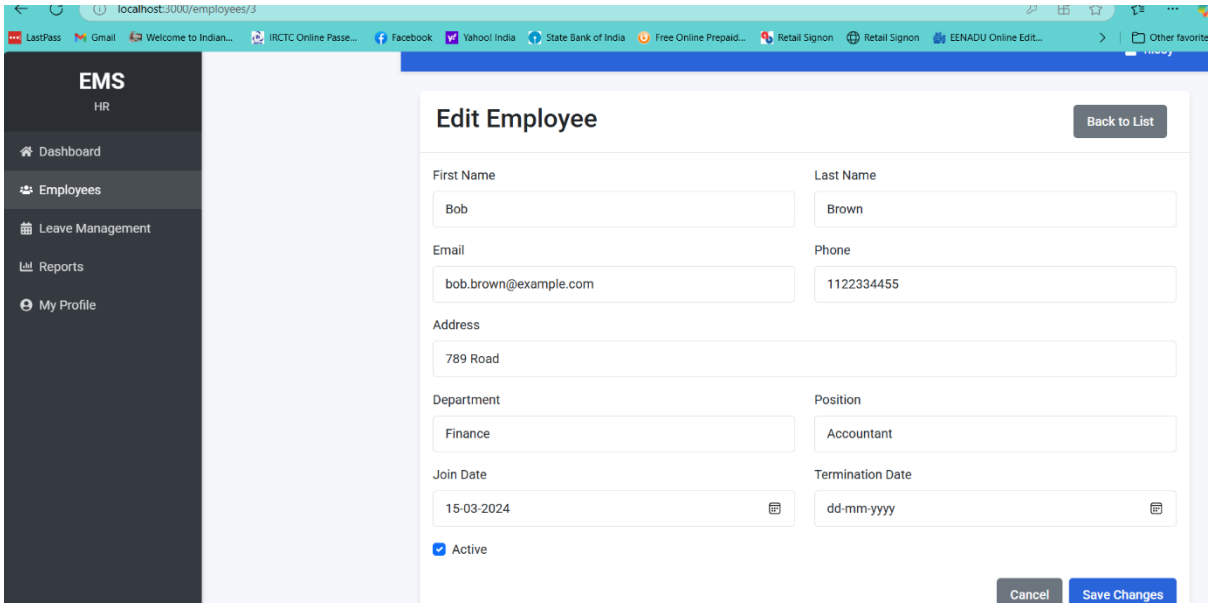

localhost:3000/leaves
Click to go back, hold to see history
EMS
HR
Dashboard
Employees
Leave Management
Reports
My Profile
nissy
Leave Management
+ Apply for Leave
Search leaves...
All Statuses
ID Employee Leave Type Start Date End Date Status Actions
1 N/A Vacation 03/20/2024 03/23/2024 Approved


localhost:3000/reports
EMS
HR
Dashboard
Employees
Leave Management
Reports
My Profile
nissy
HR Reports
Report Type
Yearly Leaves by Department
Year
2025
Apply Filters
Average Leaves by Month (2025)
No Data
1.0
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1.0
No Data Available

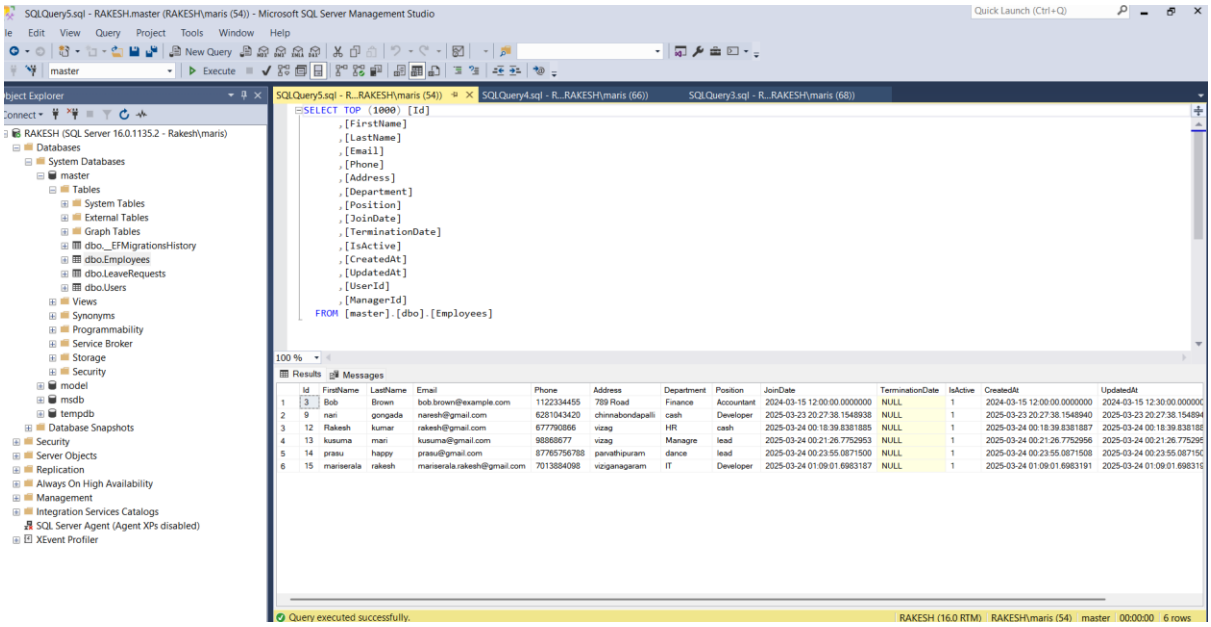
4.Profile ,Logout page and edit employee(HR)



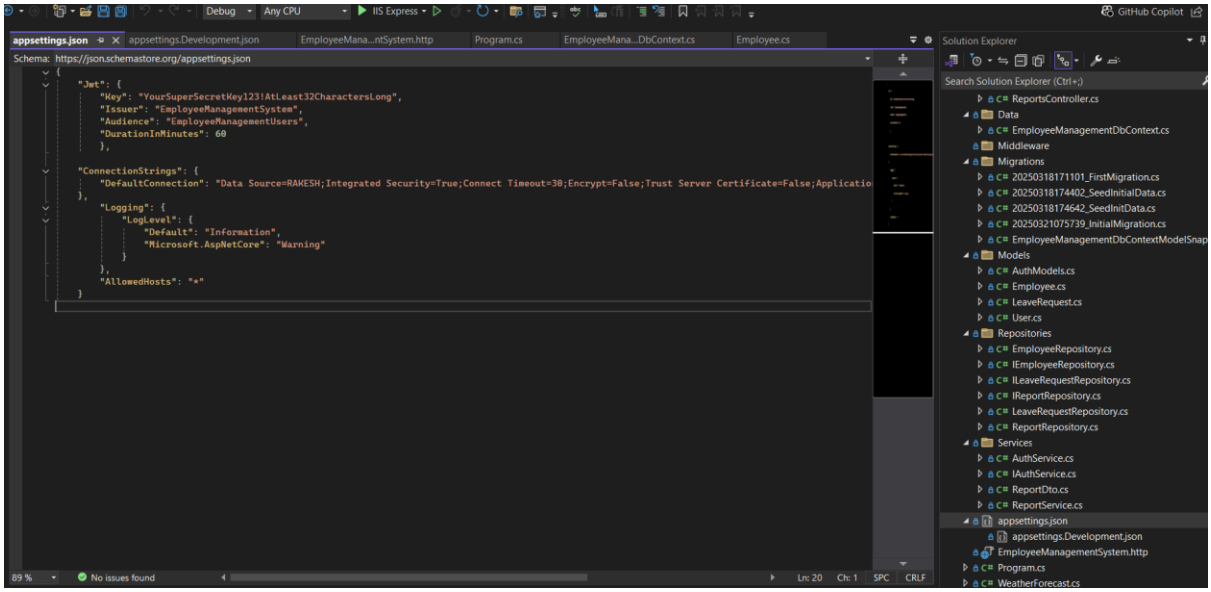




Database & Configuration File

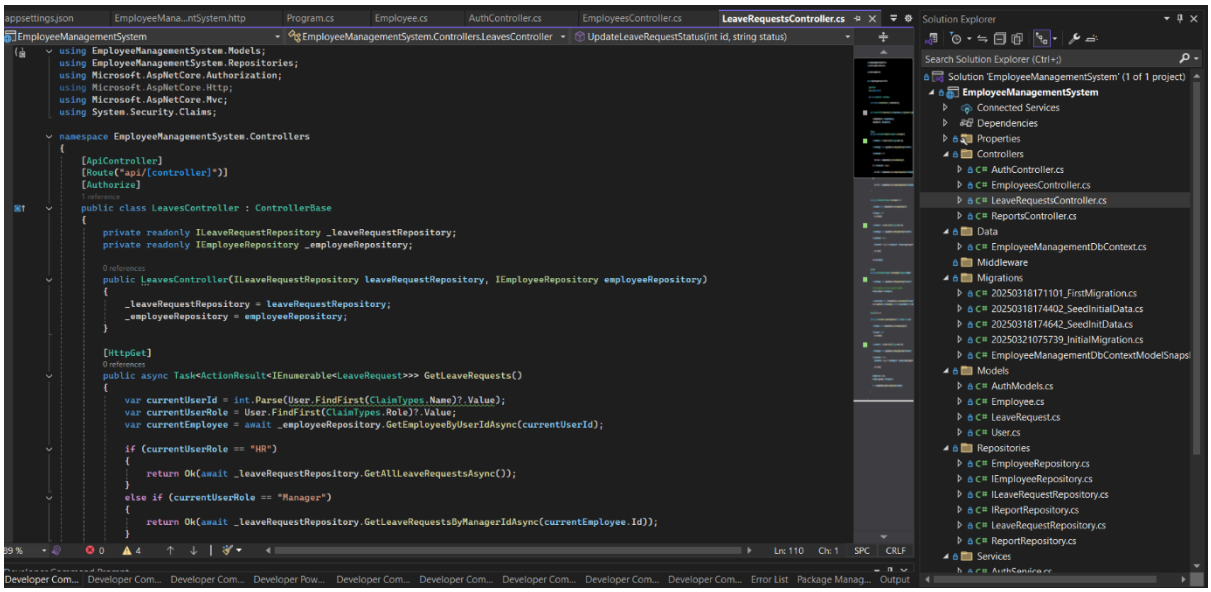


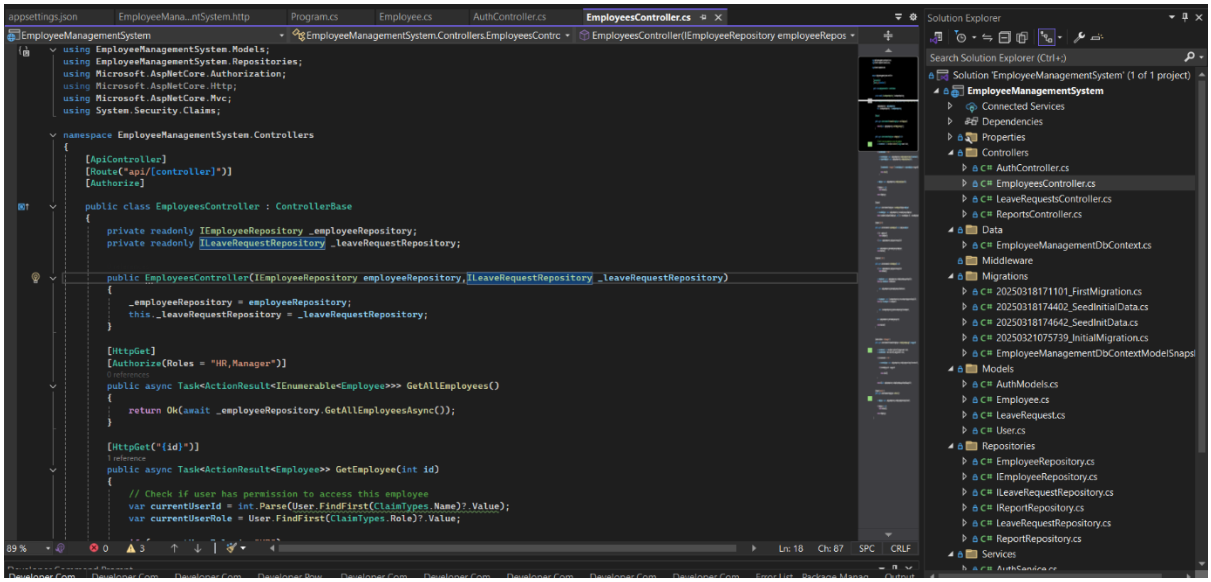
Appsettings.json

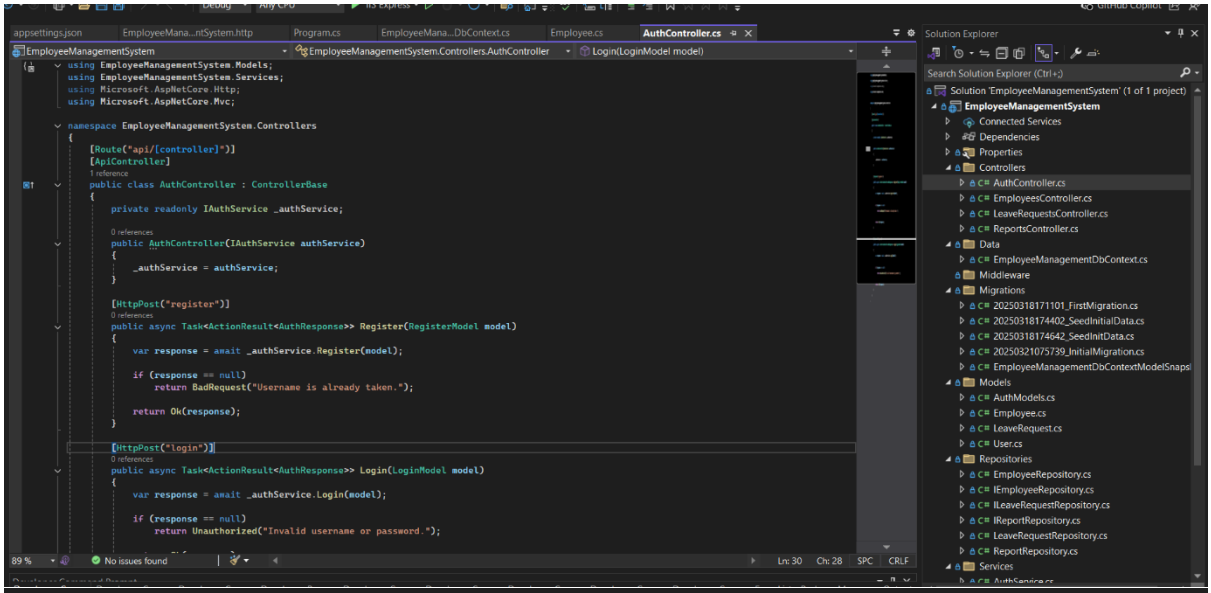


Code Snapshots-Backend

Controllers






appsettings.json
EmployeeMana...ntSystem.http
Program.cs
EmployeeMana...DbContext.cs
Employee.cs
AuthController.cs
EmployeeManagementSystem
EmployeeManagementSystem.Controllers.AuthController
Login(LoginModel model)
using EmployeeManagementSystem.Models;
using EmployeeManagementSystem.Services;
using Microsoft.AspNetCore.Http;
using Microsoft.AspNetCore.Mvc;
namespace EmployeeManagementSystem.Controllers
{
[Route("api/[controller]")]
[ApiController]
1 reference
public class AuthController : ControllerBase
{
private readonly IAuthService _authService;
0 references
public AuthController(IAuthService authService)
{
_authService = authService;
}
[HttpPost("register")]
0 references
public async Task<ActionResult<AuthResponse>> Register(RegisterModel model)
{
var response = await _authService.Register(model);
if (response == null)
return BadRequest("Username is already taken.");
return Ok(response);
}
[HttpPost("login")]
0 references
public async Task<ActionResult<AuthResponse>> Login(LoginModel model)
{
var response = await _authService.Login(model);
if (response == null)
return Unauthorized("Invalid username or password.");
89 %
No issues found
Ln: 30
Ch: 28
SPC
CRLF
Solution Explorer
Search Solution Explorer (Ctrl+;)
Solution 'EmployeeManagementSystem' (1 of 1 project)
EmployeeManagementSystem
Connected Services
Dependencies
Properties
Controllers
AuthController.cs
EmployeesController.cs
LeaveRequestsController.cs
ReportsController.cs
Data
EmployeeManagementDbContext.cs
Middleware
Migrations
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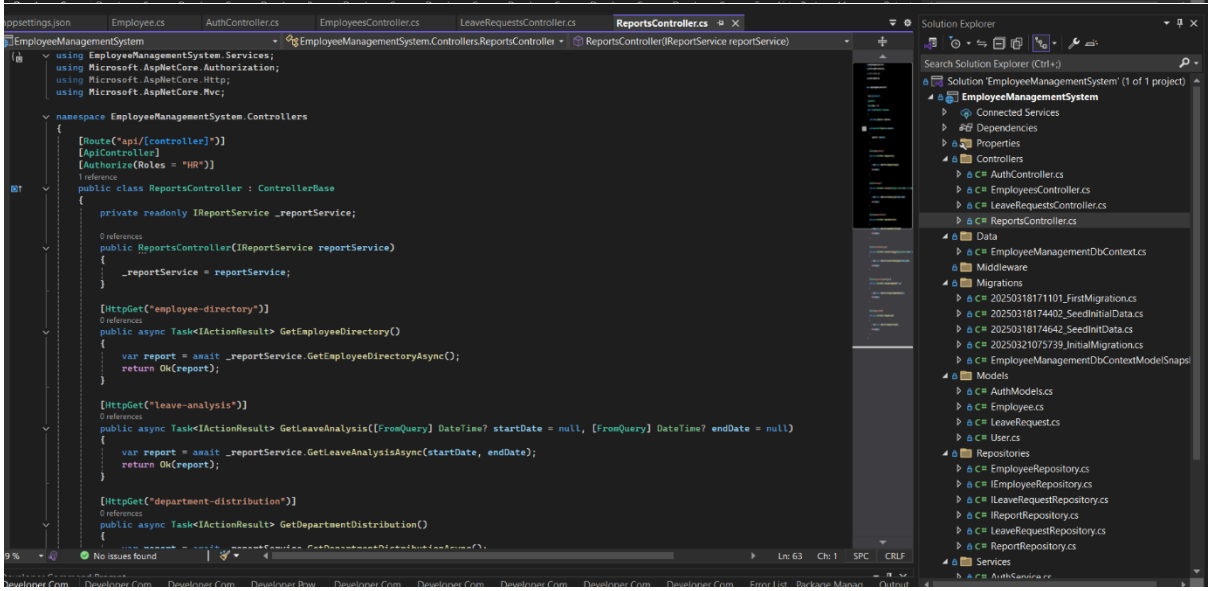
20250318174402_SeedInitialData.cs
20250318174642_SeedInitData.cs
20250321075739_InitialMigration.cs
EmployeeManagementDbContextModelSnapsl
Models
AuthModels.cs
Employee.cs
LeaveRequest.cs
User.cs
Repositories
EmployeeRepository.cs
IEmployeeRepository.cs
ILeaveRequestRepository.cs
IReportRepository.cs
LeaveRequestRepository.cs
ReportRepository.cs
Services


appsettings.json
Employee.cs
AuthController.cs
EmployeesController.cs
LeaveRequestsController.cs
ReportsController.cs
EmployeeManagementSystem
EmployeeManagementSystem.Controllers.ReportsController
ReportsController(IReportService reportService)
using EmployeeManagementSystem.Services;
using Microsoft.AspNetCore.Authorization;
using Microsoft.AspNetCore.Http;
using Microsoft.AspNetCore.Mvc;
namespace EmployeeManagementSystem.Controllers
{
[Route("api/[controller]")]
[ApiController]
[Authorize(Roles = "HR")]
1 reference
public class ReportsController : ControllerBase
{
private readonly IReportService _reportService;
0 references
public ReportsController(IReportService reportService)
{
_reportService = reportService;
}
[HttpGet("employee-directory")]
0 references
public async Task<IActionResult> GetEmployeeDirectory()
{
var report = await _reportService.GetEmployeeDirectoryAsync();
return Ok(report);
}
[HttpGet("leave-analysis")]
0 references
public async Task<IActionResult> GetLeaveAnalysis([FromQuery] DateTime? startDate = null, [FromQuery] DateTime? endDate = null)
{
var report = await _reportService.GetLeaveAnalysisAsync(startDate, endDate);
return Ok(report);
}
[HttpGet("department-distribution")]
0 references
public async Task<IActionResult> GetDepartmentDistribution()
{
9 %
No issues found
Ln: 63
Ch: 1
SPC
CRLF
Solution Explorer
Search Solution Explorer (Ctrl+;)
Solution 'EmployeeManagementSystem' (1 of 1 project)
EmployeeManagementSystem
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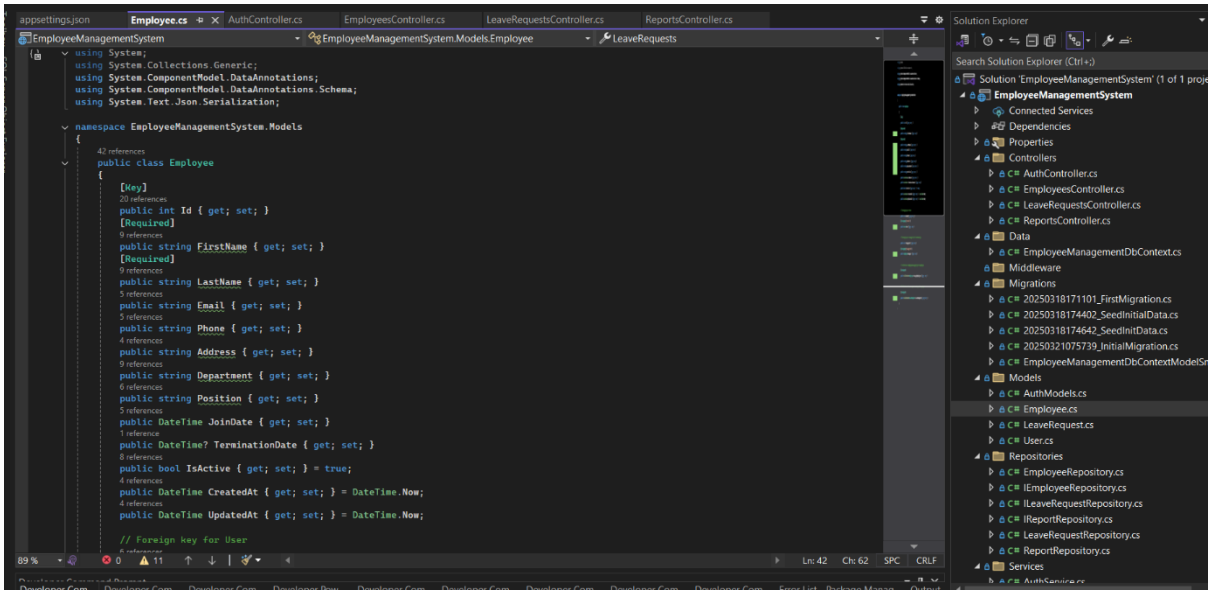
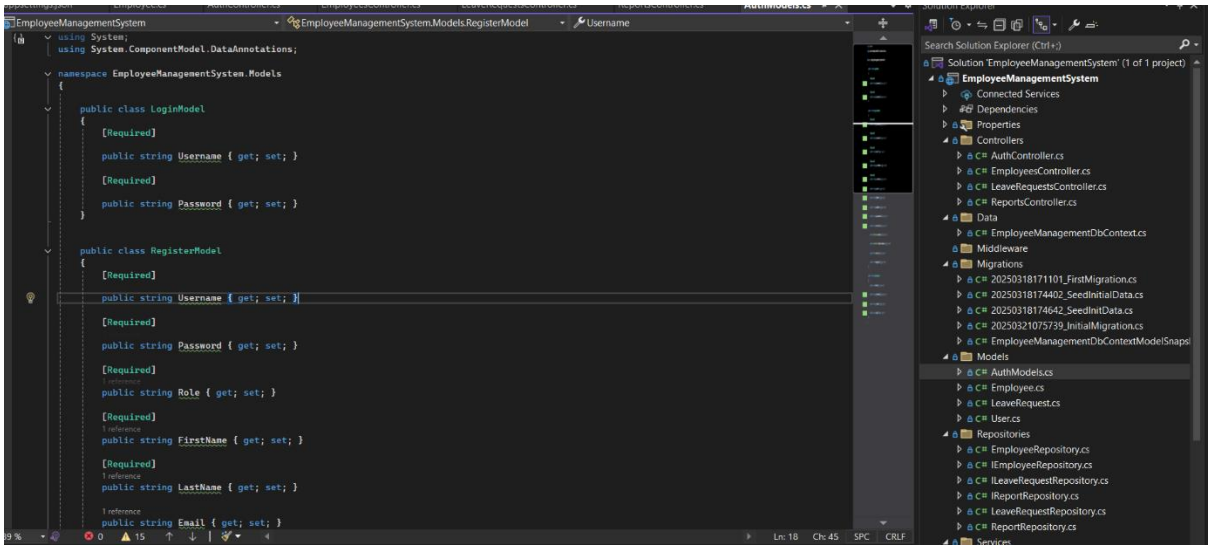
ILeaveRequestRepository.cs
IReportRepository.cs
LeaveRequestRepository.cs
ReportRepository.cs
Services

Model.cs-Login



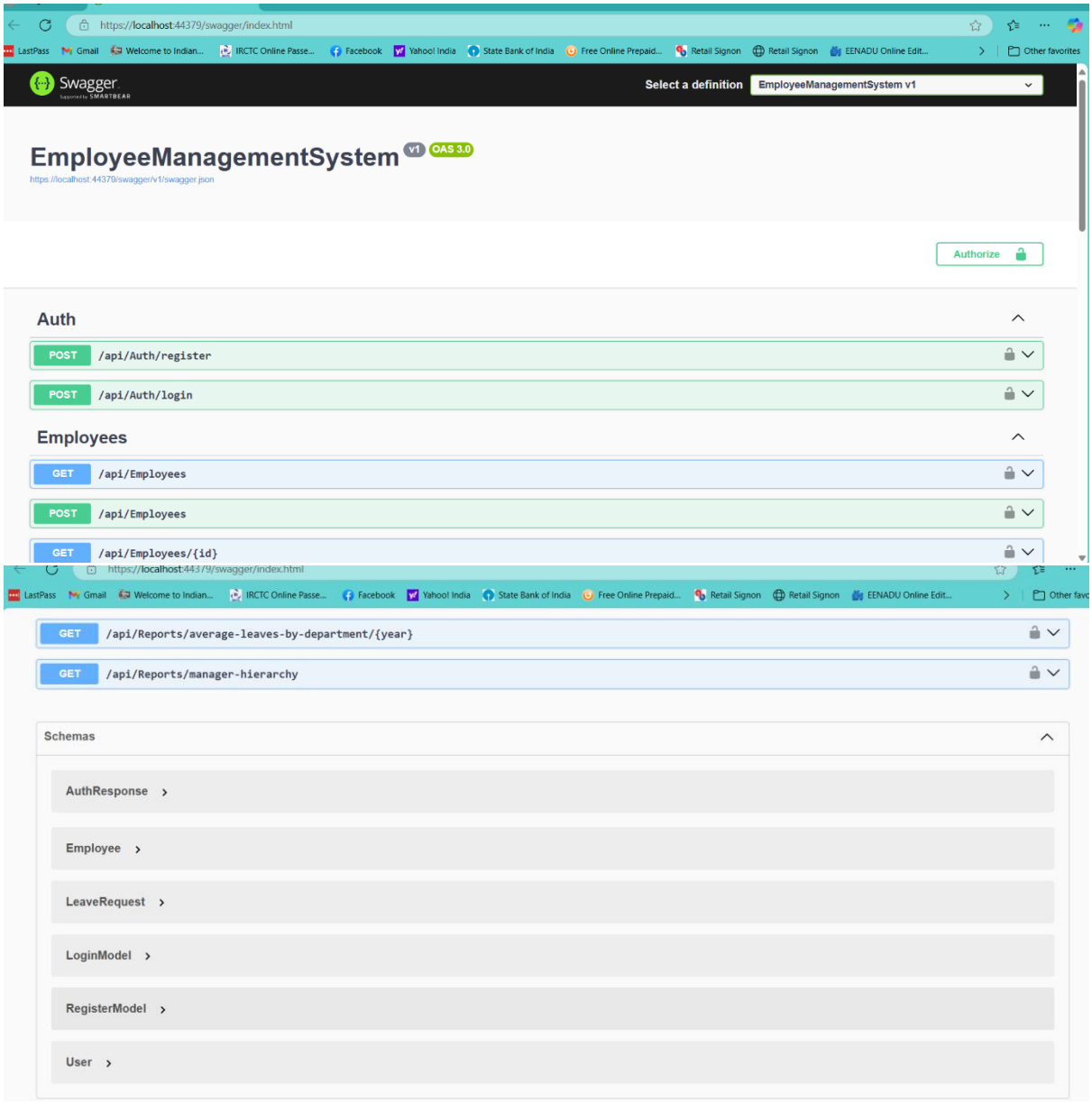
```
using System;
using System.Collections.Generic;
using System.ComponentModel.DataAnnotations;
using System.ComponentModel.DataAnnotations.Schema;
using System.Text.Json.Serialization;

namespace EmployeeManagementSystem.Models
{
    public class Employee
    {
        [Key]
        public int Id { get; set; }
        [Required]
        public string FirstName { get; set; }
        [Required]
        public string LastName { get; set; }
        public string Email { get; set; }
        public string Phone { get; set; }
        public string Address { get; set; }
        public string Department { get; set; }
        public string Position { get; set; }
        public DateTime JoinDate { get; set; }
        public DateTime? TerminationDate { get; set; }
        public bool IsActive { get; set; } = true;
        public DateTime CreatedAt { get; set; } = DateTime.Now;
        public DateTime UpdatedAt { get; set; } = DateTime.Now;

        // Foreign key for User
```



```
using System;
using System.ComponentModel.DataAnnotations;

namespace EmployeeManagementSystem.Models
{
    public class LoginModel
    {
        [Required]
        public string Username { get; set; }
        [Required]
        public string Password { get; set; }
    }

    public class RegisterModel
    {
        [Required]
        public string Username { get; set; }
        [Required]
        public string Password { get; set; }
        [Required]
        public string Role { get; set; }
        [Required]
        public string FirstName { get; set; }
        [Required]
        public string LastName { get; set; }
        public string Email { get; set; }
```

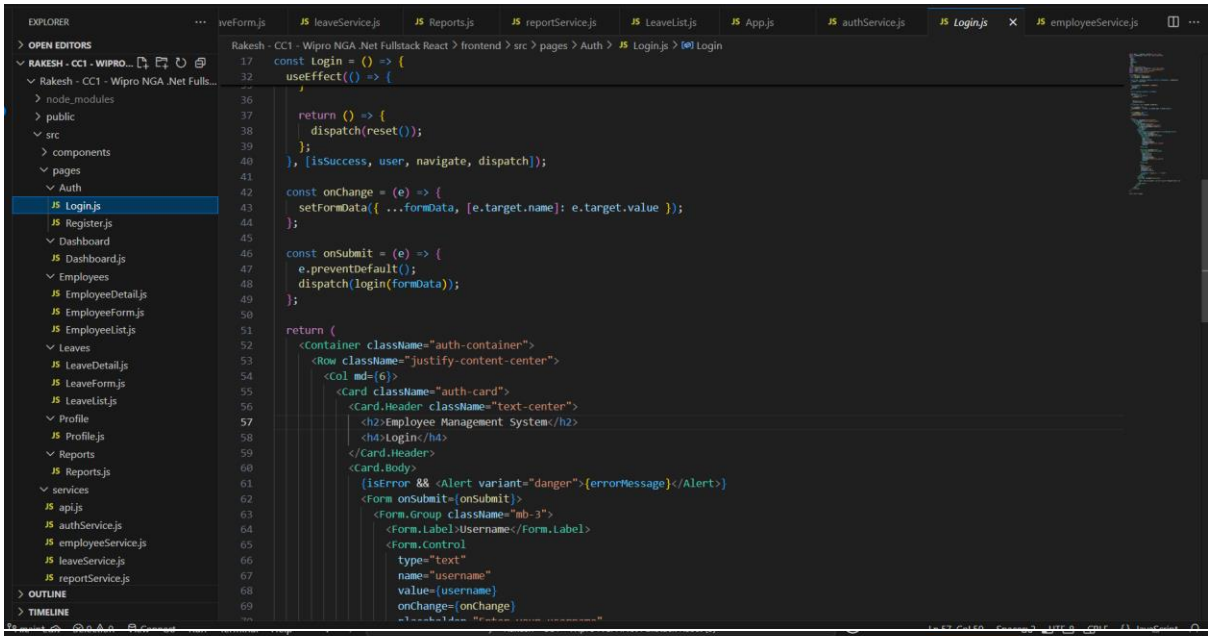
Backend


https://localhost:44379/swagger/index.html
LastPass
Gmail
Welcome to Indian...
IRCTC Online Passe...
Facebook
Yahoo! India
State Bank of India
Free Online Prepaid...
Retail Signon
Retail Signon
EENADU Online Edit...
Other favorites
Leaves
GET /api/Leaves
POST /api/Leaves
GET /api/Leaves/{id}
PUT /api/Leaves/{id}/status
Reports
GET /api/Reports/employee-directory
GET /api/Reports/leave-analysis
GET /api/Reports/department-distribution
GET /api/Reports/leave-distribution-by-type
GET /api/Reports/average-leaves-by-department/{year}
GET /api/Reports/manager-hierarchy
Employees
GET /api/Employees
POST /api/Employees
GET /api/Employees/{id}
PUT /api/Employees/{id}
DELETE /api/Employees/{id}
GET /api/Employees/manager/{managerId}
GET /api/Employees/profile
Leaves
GET /api/Leaves
POST /api/Leaves
GET /api/Leaves/{id}

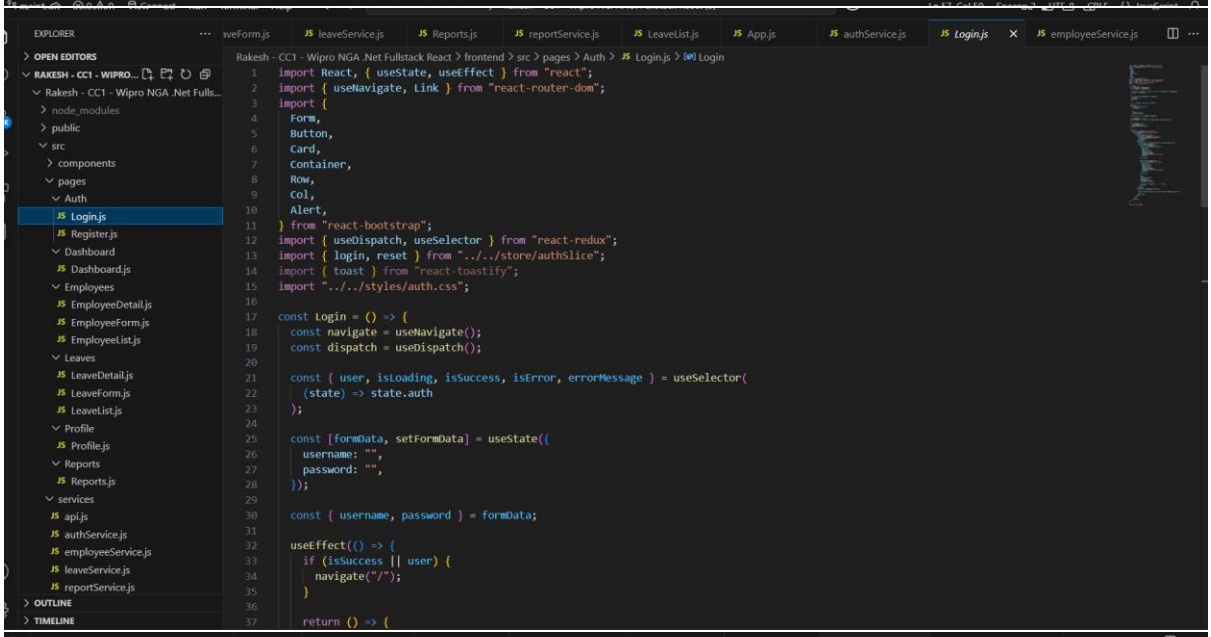


Code Snapshort-Frontend

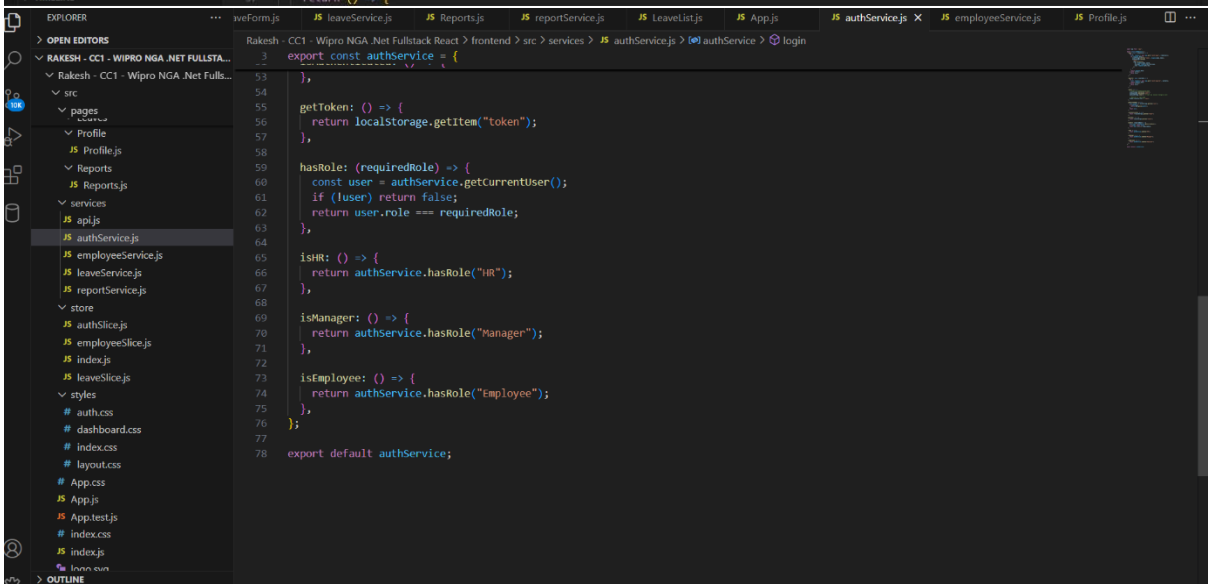
Services-Components



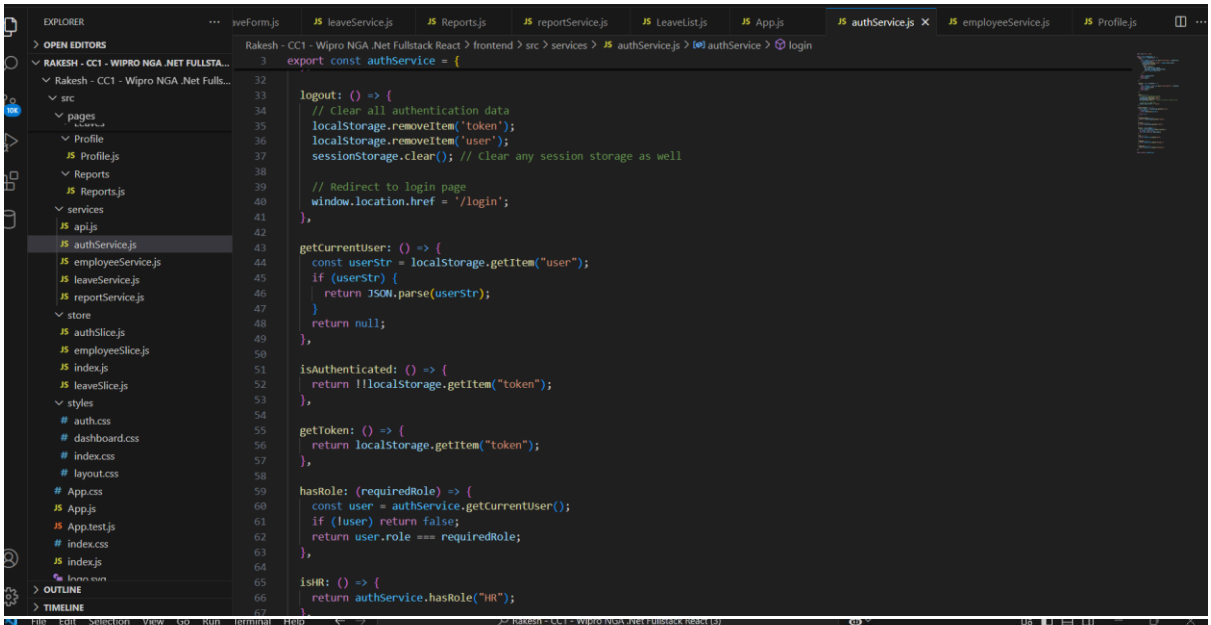
```
Rakesh - CC1 - Wipro NGA .Net Fullstack React > frontend > src > pages > Auth > Login.js > Login
const Login = () => {
  useEffect(() => {
    return () => {
      dispatch(reset());
    };
  }, [isSuccess, user, navigate, dispatch]);

  const onChange = (e) => {
    setFormData({ ...formData, [e.target.name]: e.target.value });
  };

  const onSubmit = (e) => {
    e.preventDefault();
    dispatch(login(formData));
  };

  return (
    <Container className="auth-container">
      <Row className="justify-content-center">
        <Col md={6}>
          <Card className="auth-card">
            <Card.Header className="text-center">
              <h2>Employee Management System</h2>
              <h4>Login</h4>
            </Card.Header>
            <Card.Body>
              {isError && <Alert variant="danger">{errorMessage}</Alert>}
              <Form onSubmit={onSubmit}>
                <Form.Group className="mb-3">
                  <Form.Label>Username</Form.Label>
                  <Form.Control
                    type="text"
                    name="username"
                    value={username}
                    onChange={onChange}
```



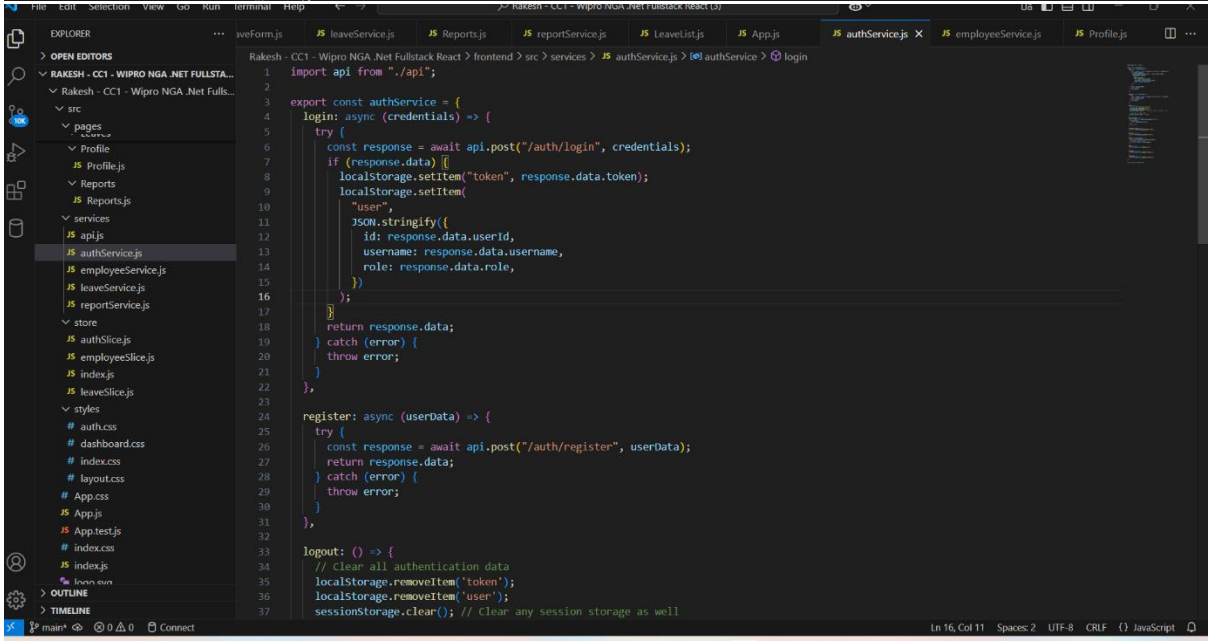
```
Rakesh - CC1 - Wipro NGA .Net Fullstack React > frontend > src > pages > Auth > Login.js > Login
import React, { useState, useEffect } from "react";
import { useNavigate, Link } from "react-router-dom";
import {
  Form,
  Button,
  Card,
  Container,
  Row,
  Col,
  Alert,
} from "react-bootstrap";
import { useDispatch, useSelector } from "react-redux";
import { login, reset } from "../../store/authSlice";
import { toast } from "react-toastify";
import "../../styles/auth.css";

const Login = () => {
  const navigate = useNavigate();
  const dispatch = useDispatch();

  const { user, isLoading, isSuccess, isError, errorMessage } = useSelector(
    (state) => state.auth
  );

  const [formData, setFormData] = useState({
    username: "",
    password: "",
  });

  const { username, password } = formData;

  useEffect(() => {
    if (isSuccess || user) {
      navigate("/");
    }

    return () => {
```



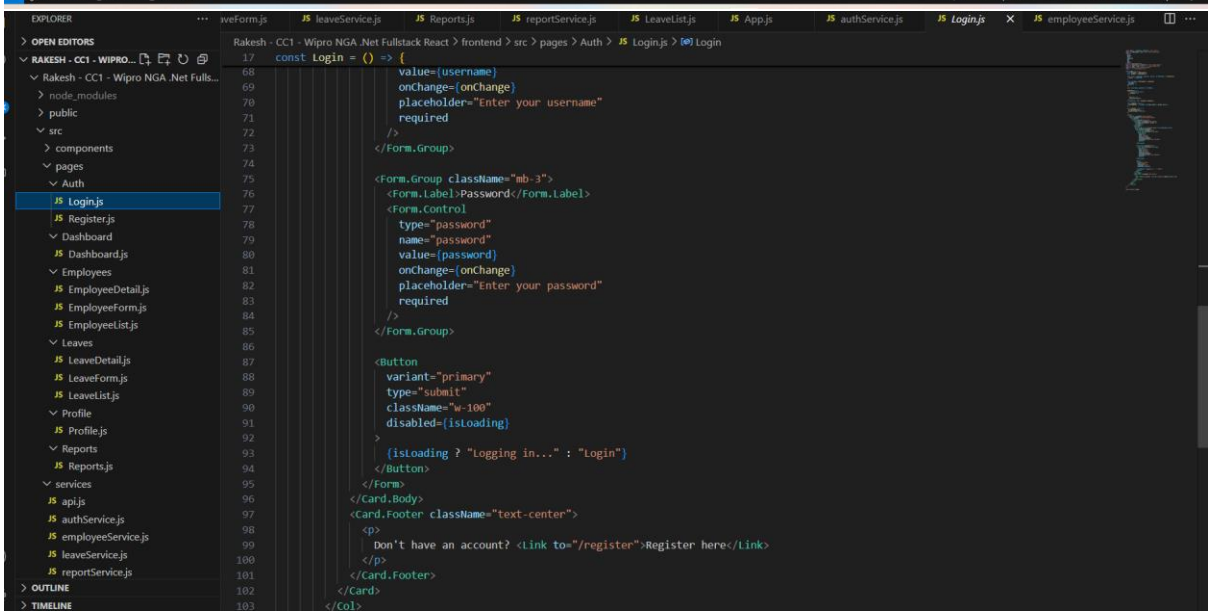
```
Rakesh - CC1 - Wipro NGA .Net Fullstack React > frontend > src > services > authService.js > authService > login
export const authService = {
  },

  getToken: () => {
    return localStorage.getItem("token");
  },

  hasRole: (requiredRole) => {
    const user = authService.getCurrentUser();
    if (!user) return false;
    return user.role === requiredRole;
  },

  isHR: () => {
    return authService.hasRole("HR");
  },

  isManager: () => {
    return authService.hasRole("Manager");
  },

  isEmployee: () => {
    return authService.hasRole("Employee");
  },
};

export default authService;
```



```
export const authService = {

  logout: () => {
    // Clear all authentication data
    localStorage.removeItem('token');
    localStorage.removeItem('user');
    sessionStorage.clear(); // Clear any session storage as well

    // Redirect to login page
    window.location.href = '/login';
  },

  getCurrentUser: () => {
    const userStr = localStorage.getItem("user");
    if (userStr) {
      return JSON.parse(userStr);
    }
    return null;
  },

  isAuthenticated: () => {
    return !!localStorage.getItem("token");
  },

  getToken: () => {
    return localStorage.getItem("token");
  },

  hasRole: (requiredRole) => {
    const user = authService.getCurrentUser();
    if (!user) return false;
    return user.role === requiredRole;
  },

  isHR: () => {
    return authService.hasRole("HR");
  }
```



```
import api from "./api";

export const authService = {
  login: async (credentials) => {
    try {
      const response = await api.post("/auth/login", credentials);
      if (response.data) {
        localStorage.setItem("token", response.data.token);
        localStorage.setItem(
          "user",
          JSON.stringify({
            id: response.data.userId,
            username: response.data.username,
            role: response.data.role,
          })
        );
      }
      return response.data;
    } catch (error) {
      throw error;
    }
  },

  register: async (userData) => {
    try {
      const response = await api.post("/auth/register", userData);
      return response.data;
    } catch (error) {
      throw error;
    }
  },

  logout: () => {
    // Clear all authentication data
    localStorage.removeItem('token');
    localStorage.removeItem('user');
    sessionStorage.clear(); // Clear any session storage as well
```



```
const Login = () => {
                    value={username}
                    onChange={onChange}
                    placeholder="Enter your username"
                    required
                  />
                </Form.Group>

                <Form.Group className="mb-3">
                  <Form.Label>Password</Form.Label>
                  <Form.Control
                    type="password"
                    name="password"
                    value={password}
                    onChange={onChange}
                    placeholder="Enter your password"
                    required
                  />
                </Form.Group>

                <Button
                  variant="primary"
                  type="submit"
                  className="w-100"
                  disabled={isLoading}
                >
                  {isLoading ? "Logging in..." : "Login"}
                </Button>
              </Form>
            </Card.Body>
            <Card.Footer className="text-center">
              <p>
                Don't have an account? <Link to="/register">Register here</Link>
              </p>
            </Card.Footer>
          </Card>
        </Col>
```

Deployment & Hosting Details

Github:https://github.com/Rakesh701388/CAPSTONE-Capstone-EMPLOYEE-MANAGEMENT-SYSTEM