Wk09 Assignment: Hibernate and JPA

Problem Statement

• Create a Java Project

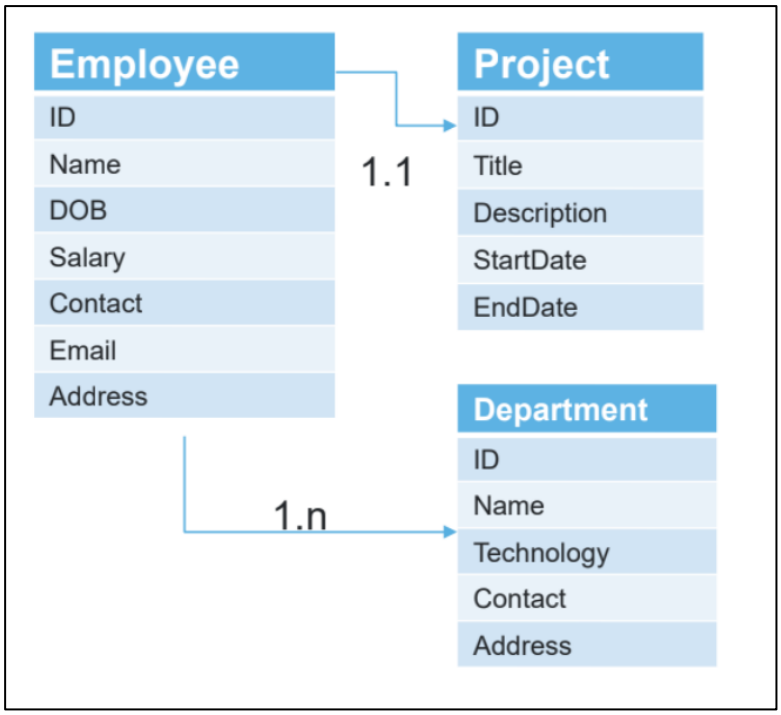
• Create Entities and Attributes with Relationships shown in diagram

• Create Employee API (which inserts data in all dependent tables with transaction handling)

• Delete Employee API

• Create Project for Employee

• Update Project and Department for Employee

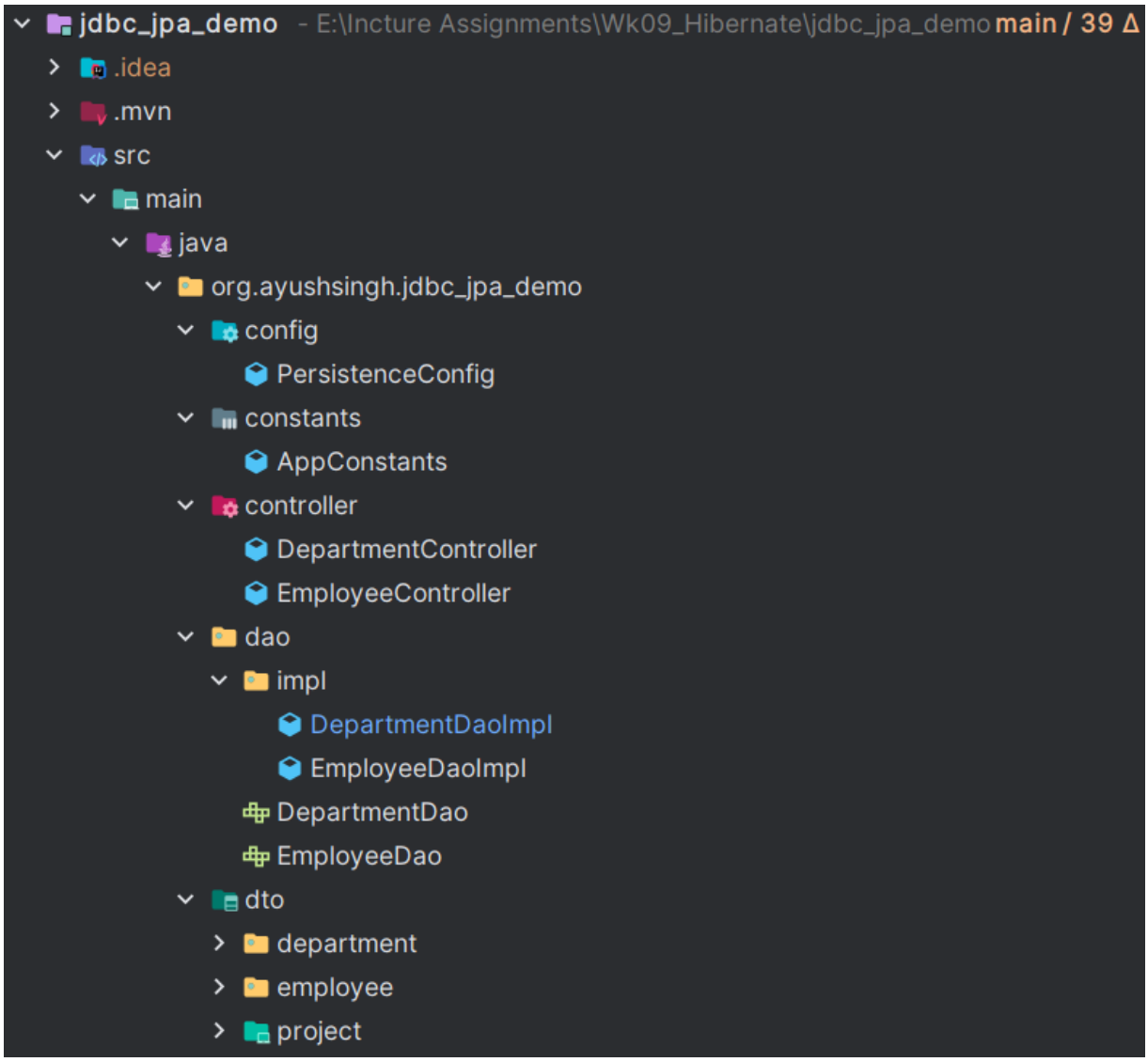


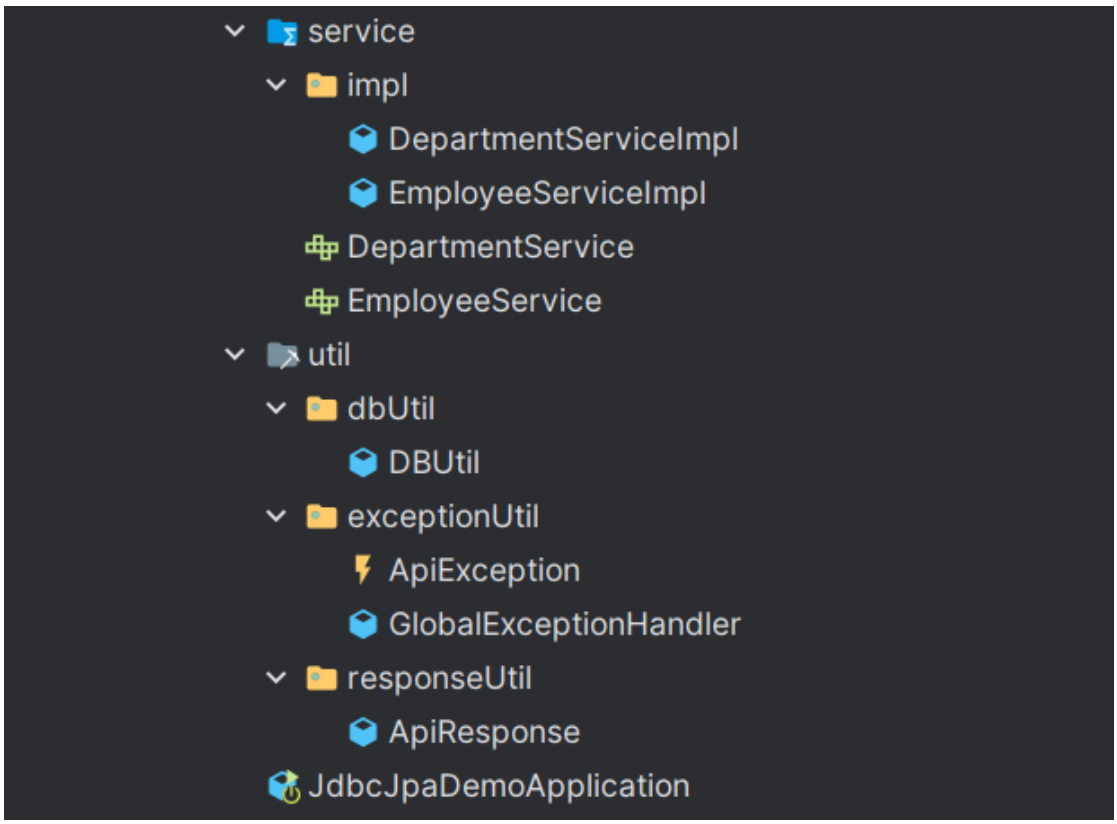
Project Repository

The complete code can be found here-

https://github.com/singhayush20/Assignments/tree/main/Wk09_Hibernate

Project Structure





DB Configuration

PersistenceConfig

```java
package org.ayushsingh.jdbc_jpa_demo.config;

import com.zaxxer.hikari.HikariDataSource;
import jakarta.persistence.SharedCacheMode;
import jakarta.persistence.ValidationMode;
import jakarta.persistence.spi.ClassTransformer;
import jakarta.persistence.spi.PersistenceUnitInfo;
import jakarta.persistence.spi.PersistenceUnitTransactionType;
import org.hibernate.cfg.AvailableSettings;

import javax.sql.DataSource;
import java.net.URL;
import java.util.Arrays;
import java.util.List;
import java.util.Properties;

/**
 * Configuration class for defining persistence unit information.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
public class PersistenceConfig implements PersistenceUnitInfo {

    @Override
    public void addTransformer(ClassTransformer arg0) {

    }

    @Override
    public boolean excludeUnlistedClasses() {
        return false;
    }

    @Override
    public ClassLoader getClassLoader() {
        return null;
    }

    @Override
    public List<URL> getJarFileUrls() {
        return null;
    }

    @Override
    public DataSource getJtaDataSource() {
        HikariDataSource dataSource = new HikariDataSource();
        dataSource.setJdbcUrl("jdbc:mysql://localhost/jpa_hibernate_demo");
        dataSource.setUsername("hbstudent");
        dataSource.setPassword("hbstudent");

        return dataSource;
    }

    @Override
    public List<String> getManagedClassNames() {
        return Arrays.asList("org.ayushsingh.jdbc_jpa_demo.entity.Employee",
                "org.ayushsingh.jdbc_jpa_demo.entity.Department",
                "org.ayushsingh.jdbc_jpa_demo.entity.Project");
    }

    @Override
    public List<String> getMappingFileNames() {
        return null;
    }
```

```
    @Override
    public ClassLoader getNewTempClassLoader() {
        return null;
    }

    @Override
    public DataSource getNonJtaDataSource() {
        return null;
    }

    @Override
    public String getPersistenceProviderClassName() {
        return "org.hibernate.jpa.HibernatePersistenceProvider";
    }

    @Override
    public String getPersistenceUnitName() {
        return "my-persistence-unit";
    }

    @Override
    public URL getPersistenceUnitRootUrl() {

        return null;
    }

    @Override
    public String getPersistenceXMLSchemaVersion() {

        return null;
    }

    @Override
    public Properties getProperties() {
        Properties properties = new Properties();

        properties.put(AvailableSettings.HBM2DDL_AUTO, "update"); //for demo purpose, use
update/create (don't use in production)
        properties.put(AvailableSettings.FORMAT_SQL, true);
        properties.put(AvailableSettings.SHOW_SQL, true);

        // Specify the dialect for your database (e.g., MySQL)
        properties.put(AvailableSettings.DIALECT, "org.hibernate.dialect.MySQLDialect");

        return properties;
    }

    @Override
    public SharedCacheMode getSharedCacheMode() {

        return null;
    }

    @Override
    public PersistenceUnitTransactionType getTransactionType() {

        return PersistenceUnitTransactionType.RESOURCE_LOCAL;
    }

    @Override
    public ValidationMode getValidationMode() {

        return null;
    }

}
```

DBUtil

```
package org.ayushsingh.jdbc_jpa_demo.util.dbUtil;

import jakarta.persistence.EntityManagerFactory;
```

```java
import org.ayushsingh.jdbc_jpa_demo.config.PersistenceConfig;
import org.hibernate.jpa.HibernatePersistenceProvider;
import org.springframework.context.annotation.Bean;
import org.springframework.context.annotation.Configuration;

import java.util.HashMap;


/**
 * Utility class for managing the database.
 * Provides a method {@link #getEntityManagerFactory()} to obtain the {@link
EntityManagerFactory} bean for database operations.
 * Avoid creating multiple {@link EntityManagerFactory} beans.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
@Configuration
public class DBUtil {

    @Bean
    public EntityManagerFactory getEntityManagerFactory() {
        EntityManagerFactory emf = new
HibernatePersistenceProvider().createContainerEntityManagerFactory(new
PersistenceConfig(), new HashMap<>());
        return emf;
    }
}
```

Entity

Employee

```java
package org.ayushsingh.jdbc_jpa_demo.entity;

import jakarta.persistence.*;
import lombok.*;

import java.time.LocalDate;

/**
 * Entity class representing an employee.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
@Getter
@Setter
@NoArgsConstructor
@AllArgsConstructor
@Builder
@Entity
@Table(name = "hb_demo_Employee")
public class Employee {

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    @Column(name = "ID", nullable = false, unique = true)
    private Long employeeId;

    @Column(name = "Name", nullable = false)
    private String name;

    @Column(name = "DOB", nullable = false)
    private LocalDate dob;

    @Column(name = "Salary", nullable = false)
    private Long salary;
```

```
    @Column(name = "Contact", nullable = false, unique = true, length = 10)
    private Long contact;

    @Column(name = "Email", nullable = false, unique = true)
    private String email;

    @Column(name = "Address", nullable = false)
    private String address;

    @OneToOne(cascade = { CascadeType.MERGE, CascadeType.PERSIST, CascadeType.REFRESH
    }, fetch = FetchType.LAZY)
    @JoinColumn(name = "Project_ID", referencedColumnName = "ID")
    private Project project;

    @ManyToOne(cascade = { CascadeType.MERGE, CascadeType.PERSIST, CascadeType.REFRESH },
fetch = FetchType.LAZY)
    @JoinColumn(name="Department_ID", referencedColumnName = "ID")
    private Department department;
}
```

Department

```
package org.ayushsingh.jdbc_jpa_demo.entity;

import jakarta.persistence.*;
import lombok.*;

import java.util.HashSet;
import java.util.Objects;
import java.util.Set;


/**
 * Entity class representing a department.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
@NoArgsConstructor
@AllArgsConstructor
@Builder
@Table(name="hb_demo_Department")
@Entity
public class Department {


    @Id
    @Column(name="ID", nullable = false, unique = true)
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    public Long departmentId;

    @Column(name="Name", nullable = false,unique = true)
    private String name;

    @Column(name="Technology", nullable = false)
    private String technology;

    @Column(name="Address", nullable = false)
    private String address;

    @Column(name="Contact", nullable = false, unique = true, length = 10)
    private Long contact;

    @OneToMany(mappedBy = "department", cascade =
{CascadeType.MERGE,CascadeType.PERSIST,CascadeType.DETACH}, fetch = FetchType.LAZY)
    Set<Employee> employees = new HashSet<>();
```

```
    public Long getDepartmentId() {
        return departmentId;
    }

    public void setDepartmentId(Long departmentId) {
        this.departmentId = departmentId;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public String getTechnology() {
        return technology;
    }

    public void setTechnology(String technology) {
        this.technology = technology;
    }

    public String getAddress() {
        return address;
    }

    public void setAddress(String address) {
        this.address = address;
    }

    public Long getContact() {
        return contact;
    }

    public void setContact(Long contact) {
        this.contact = contact;
    }

    public Set<Employee> getEmployees() {
        return employees;
    }

    public void setEmployees(Set<Employee> employees) {
        this.employees = employees;
    }

    @Override
    public String toString() {
        return "Department{" +
                "departmentId=" + departmentId +
                ", name='" + name + '\'' +
                ", technology='" + technology + '\'' +
                ", address='" + address + '\'' +
                ", contact=" + contact +
                '}';
    }

    @Override
    public boolean equals(Object o) {
        if (this == o) return true;
        if (o == null || getClass() != o.getClass()) return false;
        Department that = (Department) o;
        return Objects.equals(departmentId, that.departmentId);
    }

    @Override
    public int hashCode() {
        return Objects.hash(departmentId);
```

```
    }
}
```

Project

```
package org.ayushsingh.jdbc_jpa_demo.entity;

import jakarta.persistence.*;
import lombok.*;

import java.time.LocalDate;


/**
 * Entity class representing a project.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
@Getter
@Setter
@NoArgsConstructor
@AllArgsConstructor
@Builder
@Entity
@Table(name = "hb_demo_Project")
public class Project {

    @Id
    @Column(name = "ID", nullable = false, unique = true)
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long projectId;

    @Column(name = "Title", nullable = false, unique = true)
    private String title;

    @Column(name = "Description", nullable = false)
    private String description;

    @Column(name = "Start_Date", nullable = false)
    private LocalDate startDate;

    @Column(name = "End_Date", nullable = false)
    private LocalDate endDate;

    @OneToOne(mappedBy = "project", cascade = { CascadeType.MERGE, CascadeType.PERSIST,
CascadeType.REFRESH }, fetch = FetchType.LAZY)
    private Employee employee;


}
```

Service

EmployeeService

```
package org.ayushsingh.jdbc_jpa_demo.service;


import org.ayushsingh.jdbc_jpa_demo.dto.employee.EmployeeCreateDto;
import org.ayushsingh.jdbc_jpa_demo.dto.employee.EmployeeDetailsDto;
import org.ayushsingh.jdbc_jpa_demo.dto.project.ProjectCreateDto;
import org.ayushsingh.jdbc_jpa_demo.dto.project.ProjectDetailsDto;

/**
 * Service interface for managing employee-related operations.
 * Defines methods for creating, deleting, and updating employees, as well as assigning
departments and projects.
 *
 * @author Ayush Singh
```

```
 * @version 1.0
 * @since 2024-04-12
 */
public interface EmployeeService {
    EmployeeDetailsDto createEmployee(EmployeeCreateDto employee);

    void deleteEmployee(Long employeeId);

    void assignDepartment(Long employeeId, Long departmentId);

    ProjectDetailsDto createProjectForEmployee(Long employeeId, ProjectCreateDto project);

    ProjectDetailsDto updateProjectForEmployee(Long employeeId, ProjectDetailsDto
project);

}
```

DepartmentService

```
package org.ayushsingh.jdbc_jpa_demo.service;

import org.ayushsingh.jdbc_jpa_demo.dto.department.DepartmentCreateDto;
import org.ayushsingh.jdbc_jpa_demo.dto.department.DepartmentDetailsDto;


/**
 * Service interface for managing department-related operations.
 * Defines a method for creating departments.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
public interface DepartmentService {
    DepartmentDetailsDto create(DepartmentCreateDto department);
}
```

DepartmentServiceImpl

```
package org.ayushsingh.jdbc_jpa_demo.service.impl;


import lombok.RequiredArgsConstructor;
import org.ayushsingh.jdbc_jpa_demo.dao.DepartmentDao;
import org.ayushsingh.jdbc_jpa_demo.dto.department.DepartmentCreateDto;
import org.ayushsingh.jdbc_jpa_demo.dto.department.DepartmentDetailsDto;
import org.ayushsingh.jdbc_jpa_demo.entity.Department;
import org.ayushsingh.jdbc_jpa_demo.service.DepartmentService;
import org.modelmapper.ModelMapper;
import org.springframework.stereotype.Service;

/**
 * Service implementation for managing department-related operations.
 * Implements method for creating departments.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
@Service
@RequiredArgsConstructor
public class DepartmentServiceImpl implements DepartmentService {

    private final DepartmentDao departmentDao;
    private final ModelMapper modelMapper;

    /**
     * Creates a new department.
     *
     * @param departmentDto The DTO representing the department to be created.
     * @return The details as {@link DepartmentDetailsDto} for the created department.
     */
    @Override
```

```
    public DepartmentDetailsDto create(DepartmentCreateDto departmentDto) {
        Department department=this.modelMapper.map(departmentDto,Department.class);
        department=this.departmentDao.create(department);
        return this.modelMapper.map(department,DepartmentDetailsDto.class);
    }
}
```

EmployeeServiceImpl

```
package org.ayushsingh.jdbc_jpa_demo.service.impl;


import lombok.RequiredArgsConstructor;
import org.ayushsingh.jdbc_jpa_demo.dao.EmployeeDao;
import org.ayushsingh.jdbc_jpa_demo.dto.employee.EmployeeCreateDto;
import org.ayushsingh.jdbc_jpa_demo.dto.employee.EmployeeDetailsDto;
import org.ayushsingh.jdbc_jpa_demo.dto.project.ProjectCreateDto;
import org.ayushsingh.jdbc_jpa_demo.dto.project.ProjectDetailsDto;
import org.ayushsingh.jdbc_jpa_demo.entity.Department;
import org.ayushsingh.jdbc_jpa_demo.entity.Employee;
import org.ayushsingh.jdbc_jpa_demo.entity.Project;
import org.ayushsingh.jdbc_jpa_demo.service.EmployeeService;
import org.modelmapper.ModelMapper;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.stereotype.Service;



/**
 * Service implementation for managing employee-related operations.
 * Implements methods for creating, deleting, and updating employees,
 * as well as assigning departments and projects.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
@Service
@RequiredArgsConstructor
public class EmployeeServiceImpl implements EmployeeService {

    private final Logger logger= LoggerFactory.getLogger(EmployeeServiceImpl.class);
    private final EmployeeDao employeeDao;
    private final ModelMapper modelMapper;


    /**
     * Creates a new employee.
     *
     * @param employee The DTO representing the employee to be created.
     * @return The details as {@link EmployeeDetailsDto} for the created employee.
     */
    @Override
    public EmployeeDetailsDto createEmployee(EmployeeCreateDto employee) {
        Employee emp=new Employee();
        emp.setName(employee.getName());
        emp.setDob(employee.getDob());
        emp.setContact(employee.getContact());
        emp.setEmail(employee.getEmail());
        emp.setAddress(employee.getAddress());
        emp.setSalary(employee.getSalary());
        Project project=this.modelMapper.map(employee.getProject(),Project.class);
        project.setEmployee(emp);
        emp.setProject(project);
        Department
department=this.modelMapper.map(employee.getDepartment(),Department.class);
        emp.setDepartment(department);
        emp=employeeDao.save(emp);
        return this.modelMapper.map(emp,EmployeeDetailsDto.class);
    }
```

```java
    /**
     * Deletes an employee by ID.
     *
     * @param employeeId The ID of the employee to be deleted.
     */
    @Override
    public void deleteEmployee(Long employeeId) {
        logger.info("deleting employee with id {}",employeeId);
        employeeDao.delete(employeeId);
        logger.info("deleted employee with id {}",employeeId);
    }


    /**
     * Updates a project for an employee.
     *
     * @param employeeId The ID of the employee.
     * @param prj    The DTO representing the updated project details.
     * @return The details as {@link ProjectDetailsDto} for the updated project.
     */

    @Override
    public ProjectDetailsDto updateProjectForEmployee(Long employeeId, ProjectDetailsDto
prj) {
        logger.info("updating project for employee with id {} project:
{}",employeeId,prj);
        Project project=this.modelMapper.map(prj,Project.class);
        Project updatedProject=employeeDao.updateProjectForEmployee(employeeId,project);
        logger.info("updated project for employee with id {} project:
{}",employeeId,updatedProject);
        return this.modelMapper.map(updatedProject,ProjectDetailsDto.class);
    }


    /**
     * Assigns a department to an employee.
     *
     * @param employeeId   The ID of the employee.
     * @param departmentId The ID of the department to be assigned.
     */
    @Override
    public void assignDepartment(Long employeeId, Long departmentId) {
        logger.info("assigning department to employee with id {} department:
{}",employeeId,departmentId);
        this.employeeDao.assignDepartment(employeeId,departmentId);
        logger.info("assigned department to employee with id {} ",employeeId);
    }


    /**
     * Creates a new project for an employee.
     *
     * @param employeeId The ID of the employee.
     * @param newProject    The DTO representing the project to be created.
     * @return The details as {@link ProjectDetailsDto} of the created project.
     */
    @Override
    public ProjectDetailsDto createProjectForEmployee(Long employeeId, ProjectCreateDto
newProject) {
        logger.info("creating project for employee with id {} project:
{}",employeeId,newProject);
        Project project=this.modelMapper.map(newProject,Project.class);
        project=employeeDao.assignNewProject(employeeId,project);
        logger.info("created project for employee with id {} project:
{}",employeeId,project);
        return this.modelMapper.map(project,ProjectDetailsDto.class);
    }

}
```

Persistence Layer

EmployeeDao

```java
package org.ayushsingh.jdbc_jpa_demo.dao;

import org.ayushsingh.jdbc_jpa_demo.entity.Employee;
import org.ayushsingh.jdbc_jpa_demo.entity.Project;

/**
 * Interface for performing CRUD operations related to employees and their projects.
 * Defines methods for saving, deleting, and updating employee and project entities.
 * Also includes methods for assigning departments and new projects to employees.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
public interface EmployeeDao {
    Employee save(Employee employee);
    void delete(Long employeeId);
    void assignDepartment(Long employeeId, Long departmentId);

    Project updateProjectForEmployee(Long employeeId, Project project);


    Project assignNewProject(Long employeeId, Project project);
}
```

EmployeeDao Implementation

```java
package org.ayushsingh.jdbc_jpa_demo.dao.impl;


import jakarta.persistence.EntityManager;
import jakarta.persistence.EntityManagerFactory;
import lombok.RequiredArgsConstructor;
import org.ayushsingh.jdbc_jpa_demo.dao.EmployeeDao;
import org.ayushsingh.jdbc_jpa_demo.entity.Department;
import org.ayushsingh.jdbc_jpa_demo.entity.Employee;
import org.ayushsingh.jdbc_jpa_demo.entity.Project;
import org.ayushsingh.jdbc_jpa_demo.util.exceptionUtil.ApiException;
import org.springframework.stereotype.Component;

import java.util.Objects;


/**
 * Implementation of the {@link EmployeeDao} interface for performing CRUD operations
related to employees.
 * Uses JPA for database interaction.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
@Component
@RequiredArgsConstructor
public class EmployeeDaoImpl implements EmployeeDao {
    private final EntityManagerFactory entityManagerFactory;


    /**
     * Saves an employee entity.
     *
     * @param employee The employee entity to be saved.
     * @return The saved {@link Employee} entity.
     */
    @Override
    public Employee save(Employee employee) {
        EntityManager entityManager=entityManagerFactory.createEntityManager();
      try{
```

```
            entityManager.getTransaction().begin();
            entityManager.persist(employee);
            entityManager.getTransaction().commit();
            return employee;
        }
        finally {
         if(entityManager.getTransaction().isActive())    {
             entityManager.getTransaction().rollback();
         }
         entityManager.close();
        }
    }

    /**
     * Deletes an employee by ID.
     *
     * @param employeeId The ID of the employee to be deleted.
     */
    @Override
    public void delete(Long employeeId) {
        EntityManager entityManager=entityManagerFactory.createEntityManager();
        try{
            entityManager.getTransaction().begin();
            Employee employee = entityManager.find(Employee.class, employeeId);
            entityManager.remove(employee);
            entityManager.getTransaction().commit();
        }
        finally {
            if(entityManager.getTransaction().isActive())    {
                entityManager.getTransaction().rollback();
            }
            entityManager.close();
        }
    }


    /**
     * Assigns a department to an employee.
     *
     * @param employeeId   The ID of the employee.
     * @param departmentId The ID of the department to be assigned.
     */
    @Override
    public void assignDepartment(Long employeeId, Long departmentId) {
        EntityManager entityManager=entityManagerFactory.createEntityManager();
        try{
            entityManager.getTransaction().begin();
            Employee employee = entityManager.find(Employee.class, employeeId);
            if(employee==null){
                throw new ApiException("Employee not found");
            }
            Department department = entityManager.find(Department.class, departmentId);
            if(department==null){
                throw new ApiException("Department not found");
            }
            employee.setDepartment(department);
            entityManager.persist(employee);
            entityManager.getTransaction().commit();
        }
        finally {
            if(entityManager.getTransaction().isActive())    {
                entityManager.getTransaction().rollback();
            }
            entityManager.close();
        }
    }


    /**
     * Updates a project for an employee.
     *
```

```
     * @param employeeId The ID of the employee.
     * @param project    The project entity representing the updated project details.
     * @return The updated {@link Project} entity.
     */
    @Override
    public Project updateProjectForEmployee(Long employeeId, Project project) {
        EntityManager entityManager=entityManagerFactory.createEntityManager();
        try{
            entityManager.getTransaction().begin();
            Employee employee = entityManager.find(Employee.class, employeeId);
            if(employee==null){
                throw new ApiException("Employee not found");
            }
            Project oldProject=employee.getProject();
           if(oldProject==null){
               //if no previous project, save new
               employee.setProject(project);
           }
           else{
               if(!Objects.equals(oldProject.getProjectId(), project.getProjectId())){
                   //if old project id and new project id is not same, throw exception
                   throw new ApiException("The project with id "+project.getProjectId()+"
does not exist");
               }
               oldProject.setTitle(project.getTitle());
               oldProject.setStartDate(project.getStartDate());
               oldProject.setEndDate(project.getEndDate());
               oldProject.setStartDate(project.getStartDate());
               employee.setProject(oldProject);
           }
            entityManager.persist(employee);
            entityManager.getTransaction().commit();
            return project;
        }
        finally {
            if(entityManager.getTransaction().isActive())   {
                entityManager.getTransaction().rollback();
            }
            entityManager.close();
        }
    }


    /**
     * Assigns a new project to an employee.
     *
     * @param employeeId The ID of the employee.
     * @param project    The project entity representing the new project to be assigned.
     * @return The assigned {@link Project} entity.
     */
    @Override
    public Project assignNewProject(Long employeeId, Project project) {
        EntityManager entityManager=entityManagerFactory.createEntityManager();
        try{
            entityManager.getTransaction().begin();
            Employee employee = entityManager.find(Employee.class, employeeId);
            if(employee==null){
                throw new ApiException("Employee not found");
            }
            entityManager.remove(employee.getProject());
            employee.setProject(project);
            entityManager.persist(employee);
            entityManager.getTransaction().commit();
            return project;
        }
        finally {
            if(entityManager.getTransaction().isActive())   {
                entityManager.getTransaction().rollback();
            }
            entityManager.close();
        }
```

```
    }
}
```

DepartmentDao

```
package org.ayushsingh.jdbc_jpa_demo.dao;

import org.ayushsingh.jdbc_jpa_demo.entity.Department;

/**
 * Interface for performing CRUD operations related to departments.
 * Defines a method for creating a new department entity.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
public interface DepartmentDao {
    Department create(Department department);
}
```

DepartmentDao Implementation

```
package org.ayushsingh.jdbc_jpa_demo.dao.impl;


import jakarta.persistence.EntityManager;
import jakarta.persistence.EntityManagerFactory;
import lombok.RequiredArgsConstructor;
import org.ayushsingh.jdbc_jpa_demo.dao.DepartmentDao;
import org.ayushsingh.jdbc_jpa_demo.entity.Department;
import org.springframework.stereotype.Component;


/**
 * Implementation of the {@link DepartmentDao} interface for performing CRUD operations
related to employees.
 * Uses JPA for database interaction.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
@Component
@RequiredArgsConstructor
public class DepartmentDaoImpl implements DepartmentDao {
    private final EntityManagerFactory entityManagerFactory;



    /**
     * Creates a new department in the database.
     *
     * @param department The department object to be created.
     * @return The created department object.
     */
    @Override
    public Department create(Department department) {

            EntityManager entityManager = entityManagerFactory.createEntityManager();
       try{
            entityManager.getTransaction().begin();
            entityManager.persist(department);
            entityManager.getTransaction().commit();
            return department;
       }

       finally {
            if(entityManager.getTransaction().isActive()){
                entityManager.getTransaction().rollback();
            }
```

```
            entityManager.close();
        }
    }
}
```

Controller

DepartmentController

```
package org.ayushsingh.jdbc_jpa_demo.controller;

import lombok.RequiredArgsConstructor;
import org.ayushsingh.jdbc_jpa_demo.dto.department.DepartmentCreateDto;
import org.ayushsingh.jdbc_jpa_demo.dto.department.DepartmentDetailsDto;
import org.ayushsingh.jdbc_jpa_demo.service.DepartmentService;

import org.ayushsingh.jdbc_jpa_demo.util.responseUtil.ApiResponse;
import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.*;

/**
 * Controller class for managing department-related operations.
 * REST APIs for department related operations are defined here.
 *
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
@RestController
@RequestMapping("/api/v1/department")
@RequiredArgsConstructor
public class DepartmentController {
    private final DepartmentService departmentService;


    /**
     * Creates a new department.
     *
     * @param department The DTO representing the department to be created.
     * @return {@link ResponseEntity} containing {@link ApiResponse} with details of the
created department.
     */
    @PostMapping(value = "/new")
    public ResponseEntity<ApiResponse<DepartmentDetailsDto>> createDepartment(@RequestBody
DepartmentCreateDto department) {
        DepartmentDetailsDto departmentDetailsDto=departmentService.create(department);
        return new ResponseEntity<>(new ApiResponse<>(departmentDetailsDto),
HttpStatus.CREATED);
    }
}
```

EmployeeController

```
package org.ayushsingh.jdbc_jpa_demo.controller;

import lombok.RequiredArgsConstructor;
import org.ayushsingh.jdbc_jpa_demo.dto.employee.EmployeeCreateDto;
import org.ayushsingh.jdbc_jpa_demo.dto.employee.EmployeeDetailsDto;
import org.ayushsingh.jdbc_jpa_demo.dto.project.ProjectCreateDto;
import org.ayushsingh.jdbc_jpa_demo.dto.project.ProjectDetailsDto;
import org.ayushsingh.jdbc_jpa_demo.service.EmployeeService;
import org.ayushsingh.jdbc_jpa_demo.util.responseUtil.ApiResponse;
import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.*;

/**
 * Controller class for managing employee-related operations.
 * REST APIs for employee related operations are defined here.
 *
```

```java
 * @author Ayush Singh
 * @version 1.0
 * @since 2024-04-12
 */
@RestController
@RequestMapping("/api/v1/employee")
@RequiredArgsConstructor
public class EmployeeController {

    private final EmployeeService employeeService;


    /**
     * Creates a new employee.
     *
     * @param employee The DTO representing the employee to be created.
     * @return {@link ResponseEntity} containing {@link ApiResponse} with details of the
created employee.
     */
    @PostMapping("/new")
    public ResponseEntity<ApiResponse<EmployeeDetailsDto>> createEmployee(@RequestBody
EmployeeCreateDto employee) {
        EmployeeDetailsDto createdEmployee = employeeService.createEmployee(employee);
        return new ResponseEntity<>(new ApiResponse<>(createdEmployee),
HttpStatus.CREATED);
    }


    /**
     * Deletes an employee by ID.
     *
     * @param employeeId The ID of the employee to be deleted.
     * @return {@link ResponseEntity} containing {@link ApiResponse} indicating the
success of the operation.
     */
    @DeleteMapping("/{employeeId}")
    public ResponseEntity<ApiResponse<String>> deleteEmployee(@PathVariable Long
employeeId) {
        employeeService.deleteEmployee(employeeId);
        return new ResponseEntity<>(new ApiResponse<>("Employee deleted successfully"),
HttpStatus.OK);
    }


    /**
     * Assigns a department to an employee.
     *
     * @param employeeId   The ID of the employee.
     * @param departmentId The ID of the department to be assigned.
     * @return {@link ResponseEntity} containing {@link ApiResponse} indicating the
success of the operation.
     */
    @PutMapping("/{employeeId}/department/{departmentId}")
    public ResponseEntity<ApiResponse<String>> assignDepartment(@PathVariable Long
employeeId,
                                                @PathVariable Long departmentId) {
        employeeService.assignDepartment(employeeId, departmentId);
        return new ResponseEntity<>(new ApiResponse<>("Department assigned successfully"),
HttpStatus.OK);
    }

    /**
     * Creates a new project for an employee.
     *
     * @param employeeId The ID of the employee.
     * @param project    The DTO representing the project to be created.
     * @return {@link ResponseEntity} containing {@link ApiResponse} indicating the
success of the operation.
     */
    @PostMapping("/project/new/{employeeId}")
    public ResponseEntity<ProjectDetailsDto> createProjectForEmployee(@PathVariable Long
```

```
employeeId,
                                                                    @RequestBody
ProjectCreateDto project) {
        ProjectDetailsDto createdProject =
employeeService.createProjectForEmployee(employeeId, project);
        return new ResponseEntity<>(createdProject, HttpStatus.CREATED);
    }

    /**
     * Updates a project for an employee.
     *
     * @param employeeId The ID of the employee.
     * @param project    The DTO representing the updated project details.
     * @return {@link ResponseEntity} containing {@link ApiResponse} indicating the
success of the operation.
     */
    @PutMapping("/project/{employeeId}")
    public ResponseEntity<ProjectDetailsDto> updateProjectForEmployee(@PathVariable Long
employeeId, @RequestBody ProjectDetailsDto project) {
        ProjectDetailsDto updatedProject =
employeeService.updateProjectForEmployee(employeeId, project);
        return new ResponseEntity<>(updatedProject, HttpStatus.OK);
    }
}
```

API Requests and Response

Department

Create Department

POST: http://localhost:8080/api/v1/department/new

Request Body:

```
{
    "name":"Department 1",
    "technology": "Technology 1",
    "address": "Address 1",
    "contact": 8765678965
}
```

Response Body:

```
{
    "data": {
        "departmentId": 16,
        "name": "Department 1",
        "technology": "Technology 1",
        "address": "Address 1",
        "contact": 8765678965
    },
    "message": "Success",
    "code": "2000"
}
```

Employee

Create New Employee

POST: http://localhost:8080/api/v1/employee/new

Request Body:

```
{
    "name": "Ayush Singh",
```

```
    "dob": "2002-04-20",
    "salary": 1000000,
    "contact": 8764327865,
    "email": "ayushsingh20april@gmail.com",
    "address": "Agra, UP",
    "project": {
        "title": "Project 1",
        "description": "Des 1",
        "startDate": "2020-02-26",
        "endDate": "2020-03-27"
    },
    "department":{
        "name": "Department 2",
        "technology": "Java",
        "address": "Address 2",
        "contact": 9878986654
    }
}
```

Response Body:

```
{
    "employeeId": 1,
    "name": "Ayush Singh",
    "dob": "2002-04-20",
    "salary": 1000000,
    "contact": 8764327865,
    "email": "ayushsingh20april@gmail.com",
    "address": "Agra, UP",
    "project": {
        "projectId": "1",
        "title": "Project 1",
        "description": "Des 1",
        "startDate": "2020-02-26",
        "endDate": "2020-03-27"
    },
    "department": {
        "departmentId": 1,
        "name": "Department 2",
        "technology": "Java",
        "address": "Address 2",
        "contact": 9878986654
    }
}
```

Delete employee

DELETE: http://localhost:8080/api/v1/employee/1

Response Body:

```
{
    "data": "Employee deleted successfully",
    "message": "Success",
    "code": "2000"
}
```

Update department

PUT: http://localhost:8080/api/v1/employee/1/department/1

Response Body:


```
{
    "data": "Department assigned successfully",
    "message": "Success",
    "code": "2000"
}
```


Create new project for employee

POST: http://localhost:8080/api/v1/employee/project/new/1

Request Body:


```
{
        "title": "Project 2",
        "description": "Des 2",
        "startDate": "2021-05-17",
        "endDate": "2022-04-26"
    }
```


Response Body:


```
{
    "projectId": "2",
    "title": "Project 2",
    "description": "Des 2",
    "startDate": "2021-05-17",
    "endDate": "2022-04-26"
}
```


Update project

PUT: http://localhost:8080/api/v1/employee/project/1

Request Body:


```
{
    "projectId": "2",
    "title": "Project 204",
    "description": "Des 204",
    "startDate": "2022-05-17",
    "endDate": "2023-04-26"
}
```


Response Body:


```
{
    "projectId": "2",
    "title": "Project 204",
    "description": "Des 204",
    "startDate": "2022-05-17",
    "endDate": "2023-04-26"
}
```