**Question 01:**

Consider a database application with **Department** and **Employee** classes.

The **Department** class represents various departments within an organization, while the **Employee** class represents individual employees.

Each employee is associated with a specific department.

1. Define a Java class called **Department** with the necessary fields and attributes to accurately represent a department within an organizational database application.

The fields will look like below

1. **id** (int): A unique identifier for the department.
2. **name** (String): The name of the department.
3. **description** (String): A brief description or summary of the department's purpose.
4. **location** (String): The physical location or office where the department operates.
5. **manager** (Employee): A reference to the employee who manages the department.
6. **employees** (List<Employee>): A list of employees who belong to the department.
7. To accurately represent employees in an organizational database application, create a Java class called **Employee** with the necessary fields and attributes. Define the key fields that should be included in the **Employee** class to effectively model and manage employee-related information. Explain the significance of each field and how it contributes to accurately representing employee data within the application.

The fields will look like below

1. **id** (int): A unique identifier for the employee.
2. **firstName** (String): The employee's first name.
3. **lastName** (String): The employee's last name.
4. **email** (String): The employee's email address.
5. **phoneNumber** (String): The employee's contact phone number.
6. **hireDate** (Date): The date the employee was hired.
7. **jobTitle** (String): The employee's job title or position within the organization.
8. **salary** (double): The employee's salary or compensation.
9. **department** (Department): A reference to the department to which the employee belongs.
10. **Now create another class TestDepartmentEmployees.java, in which you need to store 5 departments and 50 employees**

**The data interms of objects has given for you**

// Create and store 5 departments with real department names

Department department1 = new Department("Human Resources", "HR Department", "Location A", null);

Department department2 = new Department("Information Technology", "IT Department", "Location B", null);

Department department3 = new Department("Sales and Marketing", "Sales Department", "Location C", null);

Department department4 = new Department("Finance and Accounting", "Finance Department", "Location D", null);

Department department5 = new Department("Research and Development", "R&D Department", "Location E", null);

// Create and store 25 employee objects

Employee employee1 = new Employee("John", "Doe", "john.doe@example.com", "123-456-7890", new Date(), "Software Developer", 60000.0, department1);

Employee employee2 = new Employee("Alice", "Smith", "alice.smith@example.com", "987-654-3210", new Date(), "HR Specialist", 55000.0, department1);

Employee employee3 = new Employee("Bob", "Johnson", "bob.johnson@example.com", "555-123-7890", new Date(), "Data Analyst", 52000.0, department1);

Employee employee4 = new Employee("Emily", "Brown", "emily.brown@example.com", "456-789-1230", new Date(), "Marketing Coordinator", 51000.0, department1);

Employee employee5 = new Employee("Daniel", "Williams", "daniel.williams@example.com", "222-333-4444", new Date(), "Recruiter", 53000.0, department1);

Employee employee6 = new Employee("Sara", "Wilson", "sara.wilson@example.com", "111-222-3333", new Date(), "System Analyst", 58000.0, department2);

Employee employee7 = new Employee("Michael", "Johnson", "michael.johnson@example.com", "333-444-5555", new Date(), "Software Engineer", 62000.0, department2);

Employee employee8 = new Employee("Olivia", "Smith", "olivia.smith@example.com", "777-888-9999", new Date(), "Network Administrator", 59000.0, department2);

Employee employee9 = new Employee("William", "Brown", "william.brown@example.com", "444-555-6666", new Date(), "Database Administrator", 60000.0, department2);

Employee employee10 = new Employee("Sophia", "Davis", "sophia.davis@example.com", "999-888-7777", new Date(), "UI/UX Designer", 58000.0, department2);

Employee employee11 = new Employee("Emma", "Johnson", "emma.johnson@example.com", "555-666-7777", new Date(), "Sales Manager", 65000.0, department3);

Employee employee12 = new Employee("Noah", "Smith", "noah.smith@example.com", "444-333-2222", new Date(), "Sales Representative", 54000.0, department3);

Employee employee13 = new Employee("Ava", "Brown", "ava.brown@example.com", "999-888-7777", new Date(), "Marketing Manager", 63000.0, department3);

Employee employee14 = new Employee("Liam", "Davis", "liam.davis@example.com", "111-222-3333", new Date(), "Marketing Specialist", 55000.0, department3);

Employee employee15 = new Employee("Oliver", "Wilson", "oliver.wilson@example.com", "888-777-6666", new Date(), "Sales Representative", 54000.0, department3);

Employee employee16 = new Employee("Mia", "Anderson", "mia.anderson@example.com", "555-444-3333", new Date(), "Sales Representative", 54000.0, department4);

Employee employee17 = new Employee("Lucas", "Martinez", "lucas.martinez@example.com", "777-666-5555", new Date(), "Marketing Coordinator", 52000.0, department4);

Employee employee18 = new Employee("Sophia", "Hernandez", "sophia.hernandez@example.com", "333-222-1111", new Date(), "Sales Representative", 54000.0, department4);

Employee employee19 = new Employee("Logan", "Lopez", "logan.lopez@example.com", "222-333-4444", new Date(), "Marketing Specialist", 52000.0, department4);

Employee employee20 = new Employee("Evelyn", "Gonzalez", "evelyn.gonzalez@example.com", "111-222-3333", new Date(), "Sales Manager", 62000.0, department4);

Employee employee21 = new Employee("James", "Anderson", "james.anderson@example.com", "555-444-3333", new Date(), "Research Scientist", 65000.0, department5);

Employee employee22 = new Employee("Emma", "Martinez", "emma.martinez@example.com", "777-666-5555", new Date(), "Lab Technician", 52000.0, department5);

Employee employee23 = an Employee("William", "Hernandez", "william.hernandez@example.com", "333-222-1111", new Date(), "Data Analyst", 54000.0, department5);

Employee employee24 = new Employee("Sophia", "Lopez", "sophia.lopez@example.com", "222-333-4444", new Date(), "Research Assistant", 52000.0, department5);

Employee employee25 = new Employee("Oliver", "Gonzalez", "oliver.gonzalez@example.com", "111-222-3333", new Date(), "R&D Manager", 62000.0, department5);

**4. Now try to solve the following problems**

1. **Retrieve all departments with their respective employee counts.**
2. **Retrieve the department name and the highest salary among its employees for each department.**
3. **Find the employees who earn more than $60,000 in the "IT" department.**
4. **List all employees in the "HR" department in alphabetical order.**
5. **Retrieve the departments with no employees.**
6. **Find the employee with the highest salary in the organization.**
7. **List employees in the "Finance" department hired after a specific date.**
8. **Retrieve the total number of employees in each department.**
9. **Find the employees in the "Research and Development" department with a salary between $50,000 and $60,000.**
10. **List employees and their respective departments in alphabetical order.**
11. **Retrieve a list of employees along with their department names.**
12. **Find employees in the "Finance" department and include their department details.**
13. **List employees and their respective departments using an INNER JOIN.**
14. **Retrieve employees in the "IT" department along with their department descriptions.**
15. **Find employees hired after a specific date and include their department names.**
16. **Retrieve the department names along with the total salary of employees in each department.**
17. **List departments with their respective employees' email addresses.**
18. **Retrieve the departments with the highest and lowest average employee salaries.**
19. **List employees in the "HR" department and their supervisors.**
20. **Retrieve employees who have the same supervisors as "John Doe."**
21. **Retrieve employees and their respective departments, but only for the first three employees.**
22. **Find employees who are in departments with a specific description.**
23. **List employees in the "IT" department and their supervisors using join.**
24. **Retrieve employees who are supervised by "John Doe" and include their department names.**
25. **List the departments with their respective department managers.**
26. **Find employees in the "HR" department and include their supervisors using join.**
27. **Retrieve the department names and the average salary of employees in each department using a join.**
28. **List employees in the "Finance" department and their department manager's name.**