

# Rajalakshmi Engineering College

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Batch: 2028

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## 2024\_28\_III\_OOPS Using Java Lab

### REC\_2028\_OOPS using Java\_Week 11

Attempt : 1

Total Mark : 20

Marks Obtained : 20

### **Section 1 : Project**

#### **1. Problem Statement**

Create a JDBC-based Inventory Management System that handles runtime input to manage items in an inventory. The system should allow users to:

Add a new item (item ID, name, quantity, price).

Restock an item by increasing its quantity.

Reduce the stock of an item, ensuring sufficient quantity.

Display all items in the inventory in a sorted order by item ID.

Exit the application.

Half of the code is given here; Only the remaining part should be completed.

The system should connect to a MySQL database using the following default credentials:

DB URL: jdbc:mysql://localhost/ri\_db

USER: test

PWD: test123

The items table has already been created with the following structure:

Table Name: items

#### ***Input Format***

The first line of input consists of an integer choice, representing the operation to be performed (1 for Add Item, 2 for Restock item, 3 for reduce item, 4 for Display, 5 for Exit).

For choice 1 (Add Item):

- The second line consists of an integer item\_id.
- The third line consists of a string name.
- The fourth line consists of an integer quantity.
- The fifth line consists of a double price.

For choice 2 (Restock Item):

- The second line consists of an integer item\_id.
- The third line consists of an integer quantity\_to\_add (must be positive).

For choice 3 (Reduce Stock):

- The second line consists of an integer item\_id.
- The third line consists of an integer quantity\_to\_remove (must be positive).

For choice 4 (Display Inventory):

- No additional inputs are required.

For choice 5 (Exit):

- No additional inputs are required.

#### ***Output Format***

For choice 1 (Add Item):

- Print "Item added successfully" if the item was added.
- Print "Failed to add item." if the insertion failed.

For choice 2 (Restock Item):

- Print "Item restocked successfully" if the restock was successful.
- Print "Item not found." if the specified item ID does not exist.

For choice 3 (Reduce Stock):

- Print "Stock reduced successfully" if the stock reduction was successful.
- Print "Not enough stock to remove." if there is insufficient quantity.
- Print "Item not found." if the specified item ID does not exist.

For choice 4 (Display Inventory):

- Display each item on a new line in the format:
- ID | Name | Quantity | Price
- If no items are available, print nothing (or handle with an appropriate message if desired).

For choice 5 (Exit):

- Print "Exiting Inventory Management System."

For invalid input:

- Print "Invalid choice. Please try again."

#### ***Sample Test Case***

Input: 1

101

Laptop

50

1200.00  
4  
5  
Output: Item added successfully  
ID | Name | Quantity | Price  
101 | Laptop | 50 | 1200.00  
Exiting Inventory Management System.

### Answer

```
import java.sql.*;  
import java.util.Scanner;  
  
class InventoryManagementSystem {  
    public static void main(String[] args) {  
        try (Connection conn = DriverManager.getConnection("jdbc:mysql://  
localhost/ri_db", "test", "test123");  
        Scanner scanner = new Scanner(System.in)) {  
  
            boolean running = true;  
  
            while (running) {  
  
                int choice = scanner.nextInt();  
  
                switch (choice) {  
                    case 1:  
                        addItem(conn, scanner);  
                        break;  
                    case 2:  
                        restockItem(conn, scanner);  
                        break;  
                    case 3:  
                        reduceStock(conn, scanner);  
                        break;  
                    case 4:  
                        displayInventory(conn);  
                        break;  
                    case 5:  
                        System.out.println("Exiting Inventory Management System.");  
                        running = false;  
                        break;  
                    default:  
                }  
            }  
        }  
    }  
}
```

```
        System.out.println("Invalid choice. Please try again.");
    }
}
} catch (SQLException e) {
    e.printStackTrace();
}
}

public static void addItem(Connection conn, Scanner scanner) {
    int id = scanner.nextInt();
    scanner.nextLine();
    String name = scanner.nextLine();
    int quantity = scanner.nextInt();
    double price = scanner.nextDouble();

    try {
        String sql = "INSERT INTO items (item_id, name, quantity, price) VALUES (?, ?, ?, ?)";
        PreparedStatement stmt = conn.prepareStatement(sql);
        stmt.setInt(1, id);
        stmt.setString(2, name);
        stmt.setInt(3, quantity);
        stmt.setDouble(4, price);

        int rows = stmt.executeUpdate();
        if (rows > 0) {
            System.out.println("Item added successfully");
        } else {
            System.out.println("Failed to add item.");
        }
    } catch (SQLException e) {
        System.out.println("Failed to add item.");
    }
}

public static void restockItem(Connection conn, Scanner scanner) {
    int id = scanner.nextInt();
    int quantityToAdd = scanner.nextInt();

    try {
        String check = "SELECT quantity FROM items WHERE item_id = ?";
        PreparedStatement checkStmt = conn.prepareStatement(check);
        checkStmt.setInt(1, id);
```

```
ResultSet rs = checkStmt.executeQuery();

if (!rs.next()) {
    System.out.println("Item not found.");
    return;
}

int newQuantity = rs.getInt(1) + quantityToAdd;
String update = "UPDATE items SET quantity = ? WHERE item_id = ?";
PreparedStatement updateStmt = conn.prepareStatement(update);
updateStmt.setInt(1, newQuantity);
updateStmt.setInt(2, id);
updateStmt.executeUpdate();

System.out.println("Item restocked successfully");

} catch (SQLException e) {
    System.out.println("Item not found.");
}
}

public static void reduceStock(Connection conn, Scanner scanner) {
    int id = scanner.nextInt();
    int quantityToRemove = scanner.nextInt();

    try {
        String check = "SELECT quantity FROM items WHERE item_id = ?";
        PreparedStatement checkStmt = conn.prepareStatement(check);
        checkStmt.setInt(1, id);
        ResultSet rs = checkStmt.executeQuery();

        if (!rs.next()) {
            System.out.println("Item not found.");
            return;
        }

        int currentQuantity = rs.getInt(1);

        if (currentQuantity < quantityToRemove) {
            System.out.println("Not enough stock to remove.");
            return;
        }
    }
}
```

```

        int newQuantity = currentQuantity - quantityToRemove;
        String update = "UPDATE items SET quantity = ? WHERE item_id = ?";
        PreparedStatement updateStmt = conn.prepareStatement(update);
        updateStmt.setInt(1, newQuantity);
        updateStmt.setInt(2, id);
        updateStmt.executeUpdate();

        System.out.println("Stock reduced successfully");

    } catch (SQLException e) {
        System.out.println("Item not found.");
    }
}

public static void displayInventory(Connection conn) {
    try {
        String sql = "SELECT * FROM items ORDER BY item_id";
        PreparedStatement stmt = conn.prepareStatement(sql);
        ResultSet rs = stmt.executeQuery();

        System.out.println("ID | Name | Quantity | Price");
        while (rs.next()) {
            System.out.println(rs.getInt("item_id") + " | " +
                rs.getString("name") + " | " +
                rs.getInt("quantity") + " | " +
                String.format("%.2f", rs.getDouble("price")));
        }
    } catch (SQLException e) {
        e.printStackTrace();
    }
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement

In ABC Corporation, employee records are stored in a database.

To efficiently manage employee details using Java and JDBC, you are tasked with building an Employee Management System that supports the following functionalities:

Adding a new employee

Updating an employee's salary

Viewing an employee's details

Displaying all employees

You are given two files:

File 1: Employee.java (POJO Class)

This class represents the Employee entity.

An Employee contains the following details:

Field Description

employeeId Unique Employee ID (Integer)

name Employee Name (String)

department Employee Department (String)

salary Employee Salary (Double)

Students must write code in the marked area:

```
class Employee {  
    private int employeeId;  
    private String name;  
    private String department;  
    private double salary;  
    public Employee() {}
```

```
public Employee(int employeeId, String name, String department, double salary) {  
    // write your code here  
}  
  
// Include getters and setters  
}
```

Expected in this part:

Assign parameter values to instance variables inside the constructor.

Add getters and setters for all attributes.

File 2: EmployeeDAO.java (Data Access Layer)

This class handles all database operations using JDBC.

Students must complete the missing JDBC logic in the following methods:

```
class EmployeeDAO {
```

```
    public void addEmployee(Connection conn, Employee employee) throws  
SQLException {
```

// write your code here

```
}
```

```
    public void updateSalary(Connection conn, int employeeId, double  
newSalary) throws SQLException {
```

// write your code here

```
}
```

```
    public void deleteEmployee(Connection conn, int employeeId) throws  
SQLException {
```

// write your code here

```
}

public Employee viewEmployeeRecord(Connection conn, int employeeId)
throws SQLException {
    // write your code here
}

public List<Employee> displayAllEmployees(Connection conn) throws
SQLException {
    // write your code here
}

private Employee mapToEmployee(ResultSet rs) throws SQLException {
    return new Employee(
        // write your code here
    );
}

}
```

Expected in this part:

Write SQL queries for INSERT, UPDATE, DELETE, SELECT.

Execute queries using PreparedStatement or Statement.

Map ResultSet rows to Employee objects using mapToEmployee().

Return a List<Employee> where required.

The system should connect to a MySQL database using the following default credentials:

DB URL: jdbc:mysql://localhost/ri\_db  
Username: test  
Password: test123

The employees table has already been created with the following structure:

### ***Input Format***

The first line of input consists of an integer choice, representing the operation to be performed:

(1 for Add Employee, 2 for Update Salary, 3 for View Employee Record, 4 for Display All Employees, 5 for Exit)

For choice 1 (Add Employee):

1. The second line consists of an integer employee\_id.
2. The third line consists of a string name.
3. The fourth line consists of a string department.
4. The fifth line consists of a double salary (must be at least 30000).

For choice 2 (Update Salary):

1. The second line consists of an integer employee\_id.
2. The third line consists of a double new\_salary (must be at least 30000).

For choice 3 (View Employee Record):

1. The second line consists of an integer employee\_id.

For choice 4 (Display All Employees).

For choice 5 (Exit).

### ***Output Format***

For choice 1 (Add Employee),

1. Print "Employee added successfully" if the employee was added.

For choice 2 (Update Salary),

1. Print "Salary updated successfully" if the salary update was successful.
2. Print "Employee not found." if the specified employee ID does not exist.
3. Print "Salary must be at least 30000." if the provided salary is below the minimum.

For choice 3 (View Employee Record),

1. Display the employee details in the format:
2. ID: [employee\_id] | Name: [name] | Department: [department] | Salary: [salary]
3. Print "Employee not found." if the specified employee ID does not exist.

For choice 4 (Display All Employees),

1. Display each employee on a new line in the format:
2. ID | Name | Department | Salary

For choice 5 (Exit),

1. Print "Exiting Employee Management System."

For invalid input:

1. Print "Invalid choice. Please try again."

#### ***Sample Test Case***

Input: 1

101

Alice Johnson

Engineering

31000.75

4

6

5

Output: Employee added successfully

ID | Name | Department | Salary  
101 | Alice Johnson | Engineering | 31000.75  
Invalid choice. Please try again.  
Exiting Employee Management System.

### Answer

```
import java.sql.*;  
import java.util.Scanner;  
  
class Employee {  
    private int employeeId;  
    private String name;  
    private String department;  
    private double salary;  
  
    // Constructor  
    public Employee(int employeeId, String name, String department, double salary) {  
        this.employeeId = employeeId;  
        this.name = name;  
        this.department = department;  
        this.salary = salary;  
    }  
  
    // Getters and Setters  
    public int getEmployeeId() {  
        return employeeId;  
    }  
  
    public String getName() {  
        return name;  
    }  
  
    public String getDepartment() {  
        return department;  
    }  
  
    public double getSalary() {  
        return salary;  
    }  
  
    public void setSalary(double salary) {  
        this.salary = salary;  
    }  
}
```

```
        }  
    }  
  
    class EmployeeManagementSystem {  
  
        public static void addEmployee(Connection conn, Scanner scanner) {  
            int id = scanner.nextInt();  
            scanner.nextLine();  
            String name = scanner.nextLine();  
            String department = scanner.nextLine();  
            double salary = scanner.nextDouble();  
  
            if (salary < 30000) {  
                System.out.println("Salary must be at least 30000.");  
                return;  
            }  
  
            String sql = "INSERT INTO employees (employee_id, name, department,  
salary) VALUES (?, ?, ?, ?);  
  
            try (PreparedStatement ps = conn.prepareStatement(sql)) {  
                ps.setInt(1, id);  
                ps.setString(2, name);  
                ps.setString(3, department);  
                ps.setDouble(4, salary);  
                ps.executeUpdate();  
                System.out.println("Employee added successfully");  
            } catch (SQLException e) {  
                System.out.println("Database Error: " + e.getMessage());  
            }  
        }  
  
        public static void updateSalary(Connection conn, Scanner scanner) {  
            int id = scanner.nextInt();  
            double newSalary = scanner.nextDouble();  
  
            if (newSalary < 30000) {  
                System.out.println("Salary must be at least 30000.");  
                return;  
            }  
        }  
    }  
}
```

```
String sqlCheck = "SELECT * FROM employees WHERE employee_id = ?";
String sqlUpdate = "UPDATE employees SET salary = ? WHERE employee_id
= ?";

try (PreparedStatement psCheck = conn.prepareStatement(sqlCheck)) {
    psCheck.setInt(1, id);
    ResultSet rs = psCheck.executeQuery();

    if (!rs.next()) {
        System.out.println("Employee not found.");
        return;
    }
} catch (SQLException e) {
    System.out.println("Database Error: " + e.getMessage());
    return;
}

try (PreparedStatement ps = conn.prepareStatement(sqlUpdate)) {
    ps.setDouble(1, newSalary);
    ps.setInt(2, id);
    ps.executeUpdate();
    System.out.println("Salary updated successfully");
} catch (SQLException e) {
    System.out.println("Database Error: " + e.getMessage());
}
}

public static void viewEmployeeRecord(Connection conn, Scanner scanner) {
    int id = scanner.nextInt();
    String sql = "SELECT * FROM employees WHERE employee_id = ?;

    try (PreparedStatement ps = conn.prepareStatement(sql)) {
        ps.setInt(1, id);
        ResultSet rs = ps.executeQuery();

        if (rs.next()) {
            System.out.println("ID: " + rs.getInt("employee_id") +
                " | Name: " + rs.getString("name") +
                " | Department: " + rs.getString("department") +
                " | Salary: " + String.format("%.2f", rs.getDouble("salary")));
        } else {
            System.out.println("Employee not found.");
        }
    }
}
```

```
        }
    } catch (SQLException e) {
        System.out.println("Database Error: " + e.getMessage());
    }
}

public static void displayAllEmployees(Connection conn) {
    String sql = "SELECT * FROM employees";
    try (Statement st = conn.createStatement()) {
        ResultSet rs = st.executeQuery(sql);
        System.out.println("ID | Name | Department | Salary");
        while (rs.next()) {
            System.out.println(rs.getInt("employee_id") + " | " +
                               rs.getString("name") + " | " +
                               rs.getString("department") + " | " +
                               String.format("%.2f", rs.getDouble("salary")));
        }
    } catch (SQLException e) {
        System.out.println("Database Error: " + e.getMessage());
    }
}

public static void main(String[] args) {
    String url = "jdbc:mysql://localhost/ri_db";
    String username = "test";
    String password = "test123";

    try (Connection conn = DriverManager.getConnection(url, username,
                                                       password);
         Scanner scanner = new Scanner(System.in)) {

        int choice;
        do {
            choice = scanner.nextInt();

            switch (choice) {
                case 1 -> addEmployee(conn, scanner);
                case 2 -> updateSalary(conn, scanner);
                case 3 -> viewEmployeeRecord(conn, scanner);
                case 4 -> displayAllEmployees(conn);
                case 5 -> System.out.println("Exiting Employee Management
System.");
                default -> System.out.println("Invalid choice. Please try again.");
            }
        }
    }
}
```

```
        }
    } while (choice != 5);

} catch (SQLException e) {
    System.out.println("Database Error: " + e.getMessage());
}
}
```

**Status :** Correct

**Marks :** 10/10