

Rajalakshmi Engineering College

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Batch: 2028

Degree: B.E - CSE

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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

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

```
public static void addItem(Connection conn, Scanner scanner) {
    try {
        int item_id = scanner.nextInt();
        String name = scanner.next();
        int quantity = scanner.nextInt();
        double price = scanner.nextDouble();

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

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

```
public static void restockItem(Connection conn, Scanner scanner) {
    try {
        int item_id = scanner.nextInt();
        int quantity_to_add = scanner.nextInt();

        String selectSql = "SELECT quantity FROM items WHERE item_id = ?";
        PreparedStatement selectStmt = conn.prepareStatement(selectSql);
        selectStmt.setInt(1, item_id);
```

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

if (rs.next()) {
    int currentQty = rs.getInt("quantity");
    int newQty = currentQty + quantity_to_add;

    String updateSql = "UPDATE items SET quantity = ? WHERE item_id = ?";
    PreparedStatement updateStmt = conn.prepareStatement(updateSql);
    updateStmt.setInt(1, newQty);
    updateStmt.setInt(2, item_id);
    updateStmt.executeUpdate();

    System.out.print("Item restocked successfully");
} else {
    System.out.print("Item not found.");
}
} catch (SQLException e) {
    System.out.print("Item not found.");
}
}

public static void reduceStock(Connection conn, Scanner scanner) {
    try {
        int item_id = scanner.nextInt();
        int quantity_to_remove = scanner.nextInt();

        String selectSql = "SELECT quantity FROM items WHERE item_id = ?";
        PreparedStatement selectStmt = conn.prepareStatement(selectSql);
        selectStmt.setInt(1, item_id);
        ResultSet rs = selectStmt.executeQuery();

        if (rs.next()) {
            int currentQty = rs.getInt("quantity");

            if (currentQty >= quantity_to_remove) {
                int newQty = currentQty - quantity_to_remove;

                String updateSql = "UPDATE items SET quantity = ? WHERE item_id
= ?";
                PreparedStatement updateStmt =
conn.prepareStatement(updateSql);
                updateStmt.setInt(1, newQty);
            }
        }
    }
}
```

```

        updateStmt.setInt(2, item_id);
        updateStmt.executeUpdate();

        System.out.print("Stock reduced successfully");
    } else {
        System.out.print("Not enough stock to remove.");
    }
} else {
    System.out.print("Item not found.");
}
} catch (SQLException e) {
    System.out.print("Item not found.");
}
}

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

    while (rs.next()) {
        int id = rs.getInt("item_id");
        String name = rs.getString("name");
        int quantity = rs.getInt("quantity");
        double price = rs.getDouble("price");

        System.out.print("ID | Name | Quantity | Price\n");
        System.out.print(id + " | " + name + " | " + quantity + " | " +
String.format("%.2f", price));
        if (!rs.isLast()) System.out.print("\n");
    }
} catch (SQLException e) {
    System.out.print("");
}
}
}

```

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;  
  
import java.sql.*;  
import java.util.ArrayList;  
import java.util.List;  
import java.util.Scanner;  
  
// Employee POJO Class  
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) {  
        this.employeeId = employeeId;  
        this.name = name;  
        this.department = department;  
        this.salary = salary;  
    }  
  
    // Getters  
    public int getEmployeeId() {  
        return employeeId;  
    }  
  
    public String getName() {  
        return name;  
    }  
  
    public String getDepartment() {  
        return department;  
    }
```

```
public double getSalary() {
    return salary;
}

// Setters
public void setEmployeeId(int employeeId) {
    this.employeeId = employeeId;
}

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

public void setDepartment(String department) {
    this.department = department;
}

public void setSalary(double salary) {
    this.salary = salary;
}

// Data Access Object Class
class EmployeeDAO {

    public void addEmployee(Connection conn, Employee employee) throws
SQLException {
        String sql = "INSERT INTO employees (employee_id, name, department,
salary) VALUES (?, ?, ?, ?)";
        try (PreparedStatement pstmt = conn.prepareStatement(sql)) {
            pstmt.setInt(1, employee.getEmployeeId());
            pstmt.setString(2, employee.getName());
            pstmt.setString(3, employee.getDepartment());
            pstmt.setDouble(4, employee.getSalary());
            pstmt.executeUpdate();
        }
    }

    public void updateSalary(Connection conn, int employeeId, double newSalary)
throws SQLException {
        String sql = "UPDATE employees SET salary = ? WHERE employee_id = ?";
    }
}
```

```
try (PreparedStatement pstmt = conn.prepareStatement(sql)) {
    pstmt.setDouble(1, newSalary);
    pstmt.setInt(2, employeeId);
    pstmt.executeUpdate();
}
}

public void deleteEmployee(Connection conn, int employeeId) throws
SQLException {
    String sql = "DELETE FROM employees WHERE employee_id = ?";
    try (PreparedStatement pstmt = conn.prepareStatement(sql)) {
        pstmt.setInt(1, employeeId);
        pstmt.executeUpdate();
    }
}

public Employee viewEmployeeRecord(Connection conn, int employeeId) throws
SQLException {
    String sql = "SELECT * FROM employees WHERE employee_id = ?";
    try (PreparedStatement pstmt = conn.prepareStatement(sql)) {
        pstmt.setInt(1, employeeId);
        try (ResultSet rs = pstmt.executeQuery()) {
            if (rs.next()) {
                return mapToEmployee(rs);
            }
        }
    }
    return null;
}

public List<Employee> displayAllEmployees(Connection conn) throws
SQLException {
    List<Employee> employees = new ArrayList<>();
    String sql = "SELECT * FROM employees";
    try (Statement stmt = conn.createStatement()) {
        ResultSet rs = stmt.executeQuery(sql);
        while (rs.next()) {
            employees.add(mapToEmployee(rs));
        }
    }
    return employees;
}
```

```
private Employee mapToEmployee(ResultSet rs) throws SQLException {  
    return new Employee(  
        rs.getInt("employee_id"),  
        rs.getString("name"),  
        rs.getString("department"),  
        rs.getDouble("salary")  
    );  
}
```

```
// Main Application Class  
class EmployeeManagementSystem {
```

```
private static final double MIN_SALARY = 30000.0;
```

```
public static void addEmployee(Connection conn, Scanner scanner) {
```

```
try {
```

```
int employeeId = scanner.nextInt();
scanner.nextLine(); // consume newline
String name = scanner.nextLine();
String department = scanner.nextLine();
double salary = scanner.nextDouble();
```

```
if (salary < MIN_SALARY) {
```

```
System.out.println("Salary must be at least 30000.");
```

return;

}

```
Employee employee = new Employee(employeeId, name, department, salary);
```

```
EmployeeDAO dao = new EmployeeDAO();
```

```
dao.addEmployee(conn, employee);
```

```
System.out.println("Employee added successfully");
```

```
} catch (SQLException e) {
```

```
System.out.println("Error adding employee: " + e.getMessage());
```

}

}

```
public static void updateSalary(Connection conn, Scanner scanner) {  
    try {
```

```
int employeeId = scanner.nextInt();
```

```
        double newSalary = scanner.nextDouble();

        if (newSalary < MIN_SALARY) {
            System.out.println("Salary must be at least 30000.");
            return;
        }

EmployeeDAO dao = new EmployeeDAO();
Employee employee = dao.viewEmployeeRecord(conn, employeeld);

if (employee == null) {
    System.out.println("Employee not found.");
    return;
}

        dao.updateSalary(conn, employeeld, newSalary);
        System.out.println("Salary updated successfully");
} catch (SQLException e) {
    System.out.println("Error updating salary: " + e.getMessage());
}
}

public static void viewEmployeeRecord(Connection conn, Scanner scanner) {
try {
    int employeeld = scanner.nextInt();
    EmployeeDAO dao = new EmployeeDAO();
    Employee employee = dao.viewEmployeeRecord(conn, employeeld);

    if (employee == null) {
        System.out.println("Employee not found.");
    } else {
        System.out.printf("ID: %d | Name: %s | Department: %s | Salary: %.2f%n",
            employee.getEmployeeId(), employee.getName(),
            employee.getDepartment(), employee.getSalary());
    }
} catch (SQLException e) {
    System.out.println("Error viewing employee: " + e.getMessage());
}
}

public static void displayAllEmployees(Connection conn) {
try {
```

```
EmployeeDAO dao = new EmployeeDAO();
List<Employee> employees = dao.displayAllEmployees(conn);

System.out.println("ID | Name | Department | Salary");
for (Employee emp : employees) {
    System.out.printf("%d | %s | %s | %.2f%n",
                      emp.getEmployeeId(), emp.getName(),
                      emp.getDepartment(), emp.getSalary());
}
} catch (SQLException e) {
    System.out.println("Error displaying employees: " + 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