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Batch: 2028

Degree: B.E - AI & DS

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2024_28_III_OOPS Using Java Lab

REC_2028_OOPS using Java_Week 11

Attempt : 2

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();
}
}

// You are using Java
public static void addItem(Connection conn, Scanner scanner)

{

try

{

int id = scanner.nextInt();
scanner.nextLine();
String name = scanner.nextLine();
int quantity = scanner.nextInt();
double price = scanner.nextDouble();

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 result = stmt.executeUpdate();

if (result > 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)
{
    try
    {
        int id = scanner.nextInt();
        int qty = scanner.nextInt();

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

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

    String updateSql = "UPDATE items SET quantity = quantity + ? WHERE
item_id = ?";
    PreparedStatement stmt = conn.prepareStatement(updateSql);
    stmt.setInt(1, qty);
    stmt.setInt(2, id);

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

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

}
}

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

```
int id = scanner.nextInt();
int qty = scanner.nextInt();

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

if (!rs.next())

{

    System.out.println("Item not found.");
    return;

}

int currentQty = rs.getInt("quantity");

if (qty > currentQty)

{

    System.out.println("Not enough stock to remove.");
    return;

}

String updateSql = "UPDATE items SET quantity = quantity - ? WHERE
item_id = ?";
PreparedStatement stmt = conn.prepareStatement(updateSql);
stmt.setInt(1, qty);
stmt.setInt(2, id);

stmt.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";
        Statement stmt = conn.createStatement();
        ResultSet rs = stmt.executeQuery(sql);

        // Print header ALWAYS
        System.out.println("ID | Name | Quantity | Price");

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

            System.out.println(id + " | " + name + " | " + qty + " | " + String.format("%.2f",
                price));
        }
    }
}
```

```
    }

} catch (SQLException e)

{

    System.out.println("Error displaying inventory.");

}

}

}
```

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;
```

```
public Employee()  
{  
}  
  
public Employee(int employeeld, String name, String department, double  
salary)  
{  
  
    this.employeeld = employeeld;  
    this.name = name;  
    this.department = department;  
    this.salary = salary;  
  
}  
  
public int getEmployeeld()  
{  
  
    return employeeld;  
}  
  
public void setEmployeeld(int employeeld)  
{  
  
    this.employeeld = employeeld;  
}  
  
public String getName()  
{  
  
    return name;  
}
```

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

public String getDepartment()
{
    return department;
}

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

public double getSalary()
{
    return salary;
}

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

class EmployeeDAO
```

```
{  
  
    public void addEmployee(Connection conn, Employee employee) throws  
SQLException  
  
    {  
  
        String query = "INSERT INTO employees(employee_id, name, department,  
salary) VALUES(?, ?, ?, ?);  
        PreparedStatement ps = conn.prepareStatement(query);  
        ps.setInt(1, employee.getEmployeeId());  
        ps.setString(2, employee.getName());  
        ps.setString(3, employee.getDepartment());  
        ps.setDouble(4, employee.getSalary());  
        ps.executeUpdate();  
  
    }  
  
    public void updateSalary(Connection conn, int employeeId, double newSalary)  
throws SQLException  
  
    {  
  
        String query = "UPDATE employees SET salary = ? WHERE employee_id = ?";  
        PreparedStatement ps = conn.prepareStatement(query);  
        ps.setDouble(1, newSalary);  
        ps.setInt(2, employeeId);  
        ps.executeUpdate();  
  
    }  
  
    public void deleteEmployee(Connection conn, int employeeId) throws  
SQLException  
  
    {
```

```
String query = "DELETE FROM employees WHERE employee_id = ?";
PreparedStatement ps = conn.prepareStatement(query);
ps.setInt(1, employeeId);
ps.executeUpdate();

}

public Employee viewEmployeeRecord(Connection conn, int employeeId)
throws SQLException

{

String query = "SELECT * FROM employees WHERE employee_id = ?";
PreparedStatement ps = conn.prepareStatement(query);
ps.setInt(1, employeeId);
ResultSet rs = ps.executeQuery();

if (rs.next())

{

    return mapToEmployee(rs);

}

return null;

}

public java.util.List<Employee> displayAllEmployees(Connection conn) throws
SQLException

{

java.util.List<Employee> list = new java.util.ArrayList<>();
```

```
String query = "SELECT * FROM employees";
PreparedStatement ps = conn.prepareStatement(query);
ResultSet rs = ps.executeQuery();

while (rs.next())

{
    list.add(mapToEmployee(rs));
}

return list;

}

private Employee mapToEmployee(ResultSet rs) throws SQLException

{
    return new Employee(
        rs.getInt("employee_id"),
        rs.getString("name"),
        rs.getString("department"),
        rs.getDouble("salary")
    );
}

}

public class Main

{

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

```
public static void addEmployee(Connection conn, Scanner sc)

{

    int id = sc.nextInt();
    sc.nextLine();
    String name = sc.nextLine();
    String dept = sc.nextLine();
    double salary = sc.nextDouble();

    if (salary < 30000)

    {

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

    }

    try

    {

        dao.addEmployee(conn, new Employee(id, name, dept, salary));
        System.out.println("Employee added successfully");

    } catch (Exception e)

    {

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

    }

}
```

```
}

public static void updateSalary(Connection conn, Scanner sc)

{

    int id = sc.nextInt();
    double newSalary = sc.nextDouble();

    if (newSalary < 30000)

    {

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

    }

    try

    {

        Employee emp = dao.viewEmployeeRecord(conn, id);

        if (emp == null)

        {

            System.out.println("Employee not found.");
            return;

        }

        dao.updateSalary(conn, id, newSalary);
        System.out.println("Salary updated successfully");

    }

}
```

```
        } catch (Exception e)
    {
        System.out.println("Employee not found.");
    }
}

public static void viewEmployeeRecord(Connection conn, Scanner sc)
{
    int id = sc.nextInt();
    try
    {
        Employee emp = dao.viewEmployeeRecord(conn, id);
        if (emp == null)
        {
            System.out.println("Employee not found.");
            return;
        }

        System.out.println(
            "ID: " + emp.getEmployeeId() +
```

```
        " | Name: " + emp.getName() +
        " | Department: " + emp.getDepartment() +
        " | Salary: " + String.format("%.2f", emp.getSalary())
    );
}

} catch (Exception e)

{
    System.out.println("Employee not found.");
}

}

public static void displayAllEmployees(Connection conn)
{
    try
    {
        java.util.List<Employee> list = dao.displayAllEmployees(conn);
        System.out.println("ID | Name | Department | Salary");
        for (Employee e : list)
        {
            System.out.println(
                e.getEmployeeId() + " | " +
                e.getName() + " | " +
                e.getDepartment() + " | " +

```

```
        String.format("%.2f", e.getSalary())
    );
}

} catch (Exception e) {

    // ignore

}

}

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