ASSIGNMENT NO.6

Note:

1. This assignment is designed to practice static fields, static initializers, and static methods.
2. Understand the problem statement and use static and non-static wisely to solve the problem.
3. Use constructors, proper getter/setter methods, and `toString()` wherever required.

1. Design and implement a class named `InstanceCounter` to track and count the number of instances created from this class.
   Solution:

```
package assignment5.in;

class InstanceCounter {
   private static int Count = 0;

   public InstanceCounter() {
     Count++;
   }

   public static int getInstanceCount() {
      return InstanceCounter.Count;
   }
}

public class Main {
    public static void main(String[] args) {
            InstanceCounter i = new InstanceCounter();
            InstanceCounter i1 = new InstanceCounter();

            System.out.println(InstanceCounter.getInstanceCount());
    }
}
```

   Output:

```
<terminated> Main [Java A
2
```

2. Design and implement a class named `Logger` to manage logging messages for an application. The class should be implemented as a singleton to ensure that only one instance of the `Logger` exists throughout the application.

   The class should include the following methods:

   - **`getInstance()`**: Returns the unique instance of the `Logger` class.
   - **`log(String message)`**: Adds a log message to the logger.
   - **`getLog()`**: Returns the current log messages as a `String`.
   - **`clearLog()`**: Clears all log messages.

ASSIGNMENT NO.6

Solution:

Logger class:

```
package assignment5.in;

import java.util.ArrayList;

public class Logger {
    private static Logger reference = null;
    private static int currentMessage = 0;
    private ArrayList<String> ar = new ArrayList<>();
    // Singleton instance method
    public static Logger getInstance() {
        if (Logger.reference == null) {
            Logger.reference = new Logger();
        }
        return reference;
    }
    // Method to log messages
    public void log(String message) {
        Logger.currentMessage++;
        this.ar.add(message);
    }
    // Method to retrieve the last log message
    public String getLog() {
        if (ar.size() > 0) {
            return this.ar.get(Logger.currentMessage - 1);
        } else {
```

```
            return "There is no Log Present";
        }
    }
    // Method to clear the logs
    public void clearLog() {
        Logger.currentMessage = 0;
        this.ar.clear();
    }
    // toString method to display all log messages
    @Override
    public String toString() {
        if (ar.isEmpty()) {
            return "No logs available.";
        }
        StringBuilder logs = new StringBuilder("Logs:\n");
        for (String log : ar) {
            logs.append(log).append("\n");
        }
        return logs.toString() }
}
```

Program class:

```
package assignment5.in;
public class Program {
    public static void main(String[] args) {
        // Accessing the singleton Logger instance
```

```
        Logger logger = Logger.getInstance();

        // Adding log messages

        logger.log("Application started");

        logger.log("Performing some operations");

        // Display all log messages

        System.out.println(logger);

        // Clearing the log

        logger.clearLog();

        System.out.println("Log after clearing:");

        System.out.println(logger);

    }

}
```

Output:

```
<terminated> Program [Java Application] D:\ESCLIP
Logs:
Application started
Performing some operations

Log after clearing:
No logs available.
```

3. Design and implement a class named `Employee` to manage employee data for a company. The class should include fields to keep track of the total number of employees and the total salary expense, as well as individual employee details such as their ID, name, and salary.

   The class should have methods to:

   - Retrieve the total number of employees (`getTotalEmployees()`)
   - Apply a percentage raise to the salary of all employees (`applyRaise(double percentage)`)
   - Calculate the total salary expense, including any raises (`calculateTotalSalaryExpense()`)

- Update the salary of an individual employee (`updateSalary(double newSalary)`)

Understand the problem statement and use static and non-static fields and methods appropriately. Implement static and non-static initializers, constructors, getter and setter methods, and a `toString()` method to handle the initialization and representation of employee data.

Write a menu-driven program in the `main` method to test the functionalities.

Solution:

Employee class

```
package assignment.in;

public class Employee {

    // Static fields to track total number of employees and total salary expense

    private static int totalEmployees = 0;

    private static double totalSalaryExpense = 0.0;



    // Non-static fields for individual employee details

    private int id;

    private String name;

    private double salary;

    // Static initializer to initialize total employees and salary expense

    static {

        System.out.println("Employee class loaded.");

    }

    // Non-static initializer to automatically update employee count and salary expense

    {

        totalEmployees++;

        totalSalaryExpense += this.salary;
```

```
}
// Constructor to initialize individual employee details
public Employee(int id, String name, double salary) {
    this.id = id;
    this.name = name;
    this.salary = salary;
}
public Employee(int id2, String name2, int salary2) {
            // TODO Auto-generated constructor stub
  }
  // Getter for employee ID
public int getId() {
    return id;
}
// Setter for employee ID
public void setId(int id) {
    this.id = id;
}
// Getter for employee name
public String getName() {
    return name;
}
// Setter for employee name
public void setName(String name) {
    this.name = name;
```

```
}
// Getter for employee salary
public double getSalary() {
    return salary;
}
// Setter for employee salary with adjustment in total salary expense
public void updateSalary(double newSalary) {
    totalSalaryExpense = totalSalaryExpense - this.salary + newSalary;
    this.salary = newSalary;
}
// Static method to retrieve the total number of employees
public static int getTotalEmployees() {
    return totalEmployees;
}
// Static method to apply a percentage raise to the salary of all employees
public static void applyRaise(double percentage, Employee[] employees) {
    for (Employee emp : employees) {
        double raiseAmount = emp.salary * (percentage / 100);
        emp.updateSalary(emp.salary + raiseAmount);
    }
}
// Static method to calculate the total salary expense
public static double calculateTotalSalaryExpense() {
    return totalSalaryExpense;
}
```

```
    // Overriding toString method to print individual employee details
    @Override
    public String toString() {
        return "Employee[ID=" + id + ", Name=" + name + ", Salary=" + salary + "]";
    }
}
```

Program class:

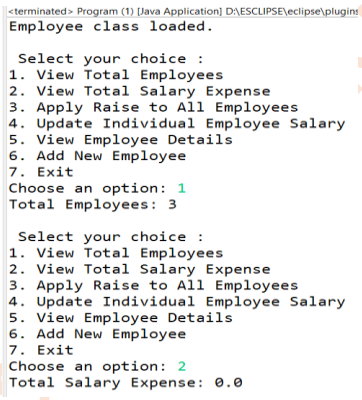
```
package assignment.in;
import java.util.*;
//import java.util.ArrayList;
//import java.util.Scanner;

public class Program {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        ArrayList<Employee> employees = new ArrayList<>();
        // Initial employees for exploring more in details
        employees.add(new Employee(1, "Shweta", 60000));
        employees.add(new Employee(2, "Nisha", 50000));
        employees.add(new Employee(3, "Radha", 46000));
        boolean exit = false;
        // Menu-driven program
        while (!exit) {
            System.out.println("\n Select your choice :");
```

```
            System.out.println("1. View Total Employees");
            System.out.println("2. View Total Salary Expense");
            System.out.println("3. Apply Raise to All Employees");
            System.out.println("4. Update Individual Employee Salary");
            System.out.println("5. View Employee Details");
            System.out.println("6. Add New Employee");
            System.out.println("7. Exit");
            System.out.print("Choose an option: ");
            int choice = scanner.nextInt();
            scanner.nextLine();
            switch (choice) {
                case 1:
                    System.out.println("Total Employees: " + Employee.getTotalEmployees());
                    break;
                case 2:
                    System.out.println("Total Salary Expense: " +
Employee.calculateTotalSalaryExpense());
                    break;
                case 3:
                    System.out.print("Enter raise percentage: ");
                    double percentage = scanner.nextDouble();
                    Employee.applyRaise(percentage, employees.toArray(new Employee[0]));
                    System.out.println("Applied " + percentage + "% raise to all employees.");
                    break;
                case 4:
```

```
        System.out.print("Enter employee ID to update salary: ");
        int id = scanner.nextInt();
        System.out.print("Enter new salary: ");
        double newSalary = scanner.nextDouble();
        for (Employee emp : employees) {
            if (emp.getId() == id) {
                emp.updateSalary(newSalary);
                System.out.println("Updated salary for employee ID " + id);
                break;
            }
        }
        break;
    case 5
     for (Employee emp : employees) {
            System.out.println(emp);
        }
        break;
    case 6: System.out.print("Enter new employee ID: ");
        int newId = scanner.nextInt();
        scanner.nextLine();
        System.out.print("Enter new employee name: ");
        String newName = scanner.nextLine();
        System.out.print("Enter new employee salary: ");
        double newSalaryForNewEmp = scanner.nextDouble();
```

```
                Employee newEmployee = new Employee(newId, newName,
newSalaryForNewEmp);

                employees.add(newEmployee);

                System.out.println("Added new employee: " + newEmployee);

                break;

            case 7 exit = true;

                break;

            default:

                System.out.println("Invalid option. Please choose again.");

          }

       }

      scanner.close();

   }

}
```

Output:



ASSIGNMENT NO.6

```
<terminated> Program (1) [Java Application] D:\ESCLIPSE\eclipse\plugins\org.eclip
 Select your choice :
1. View Total Employees
2. View Total Salary Expense
3. Apply Raise to All Employees
4. Update Individual Employee Salary
5. View Employee Details
6. Add New Employee
7. Exit
Choose an option: 3
Enter raise percentage: 70
Applied 70.0% raise to all employees.

 Select your choice :
1. View Total Employees
2. View Total Salary Expense
3. Apply Raise to All Employees
4. Update Individual Employee Salary
5. View Employee Details
6. Add New Employee
7. Exit
Choose an option: 4
Enter employee ID to update salary: 56000
Enter new salary: 65000
```

```
 Select your choice :
1. View Total Employees
2. View Total Salary Expense
3. Apply Raise to All Employees
4. Update Individual Employee Salary
5. View Employee Details
6. Add New Employee
7. Exit
Choose an option: 5
Employee[ID=0, Name=null, Salary=0.0]
Employee[ID=0, Name=null, Salary=0.0]
Employee[ID=0, Name=null, Salary=0.0]

 Select your choice :
1. View Total Employees
2. View Total Salary Expense
3. Apply Raise to All Employees
4. Update Individual Employee Salary
5. View Employee Details
6. Add New Employee
7. Exit
Choose an option: 6
Enter new employee ID: 4567
Enter new employee name: Shweta Rohankar
Enter new employee salary: 74000
Added new employee: Employee[ID=4567, Name=Shweta Rohankar, Salary=74000.0]
```

```
 Select your choice :
1. View Total Employees
2. View Total Salary Expense
3. Apply Raise to All Employees
4. Update Individual Employee Salary
5. View Employee Details
6. Add New Employee
7. Exit
Choose an option: 7
```