Experiment-6

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Subject Name: Java Lab
Subject Code: 22CSH-359

Problem-1 (Easy)

1. Aim:

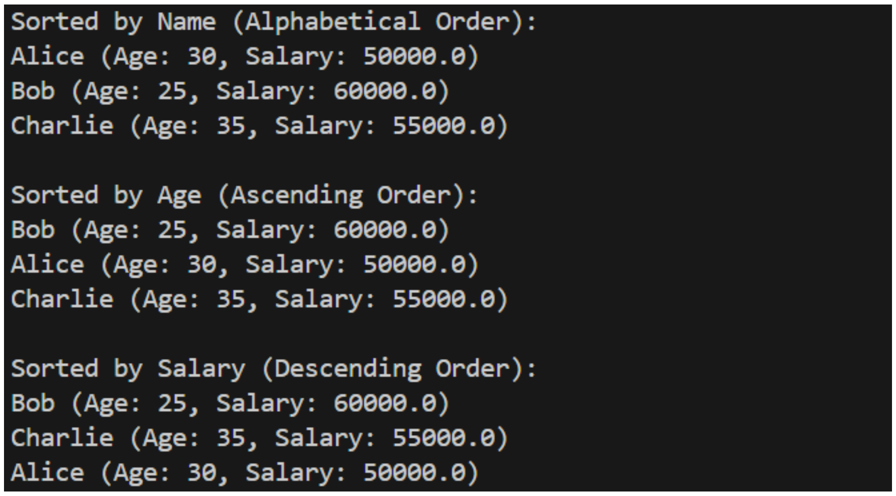
To implement a Java program that sorts a list of Employee objects (based on name, age, and salary) using lambda expressions and stream operations to demonstrate efficient data processing.

2. Implementation/Code:

```
//Aditya Prabhakar
//22BCS12889

import java.util.*;


class Employee {
    String name;
    int age;
    double salary;


    // Constructor
    public Employee(String name, int age, double salary) {
        this.name = name;
        this.age = age;
        this.salary = salary;
    }

    // Display method
    public void display() {
        System.out.println(name + " (Age: " + age + ", Salary: " + salary + ")");
    }
}

public class EmployeeSort {
    public static void main(String[] args) {
        // Creating a list of Employees
        List<Employee> employees = new ArrayList<>();
        employees.add(new Employee("Alice", 30, 50000));
        employees.add(new Employee("Bob", 25, 60000));
        employees.add(new Employee("Charlie", 35, 55000));

        System.out.println("Sorted by Name (Alphabetical Order):");
        employees.stream()
                .sorted(Comparator.comparing(emp -> emp.name))
                .forEach(Employee::display);

        System.out.println("\nSorted by Age (Ascending Order):");
        employees.stream()
                .sorted(Comparator.comparingInt(emp -> emp.age))
                .forEach(Employee::display);

        System.out.println("\nSorted by Salary (Descending Order):");
        employees.stream()
```

```
                .sorted(Comparator.comparingDouble(emp -> -emp.salary))
                .forEach(Employee::display);
    }
}}
```

3. Output:



```
Sorted by Name (Alphabetical Order):
Alice (Age: 30, Salary: 50000.0)
Bob (Age: 25, Salary: 60000.0)
Charlie (Age: 35, Salary: 55000.0)

Sorted by Age (Ascending Order):
Bob (Age: 25, Salary: 60000.0)
Alice (Age: 30, Salary: 50000.0)
Charlie (Age: 35, Salary: 55000.0)

Sorted by Salary (Descending Order):
Bob (Age: 25, Salary: 60000.0)
Charlie (Age: 35, Salary: 55000.0)
Alice (Age: 30, Salary: 50000.0)
```

Problem-2 (Medium)

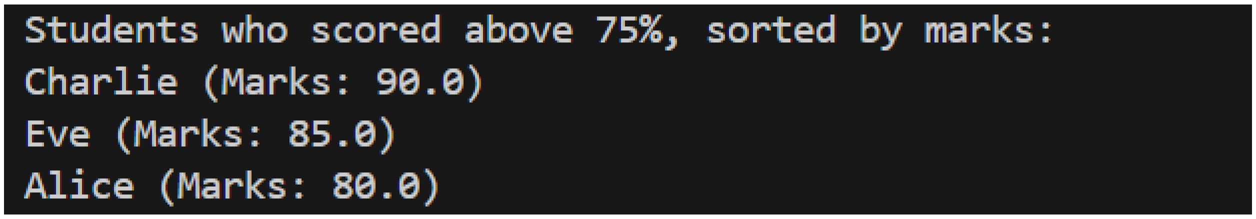
1. Aim:

Implement Java program that uses lambda expressions and Stream API to filter students who scored above 75%, sort them by marks, and display their names.

2. Implementation/Code:

```
//Aditya Prabhakar
//22BCS12889
import java.util.*;
import java.util.stream.Collectors;

class Student {
    String name;
    double marks;

    // Constructor
    public Student(String name, double marks) {
        this.name = name;
        this.marks = marks;
    }

    // Display method
    public void display() {
        System.out.println(name + " (Marks: " + marks + ")");
    }
}

public class StudentFilterSort {
    public static void main(String[] args) {
        // Creating a list of students
        List<Student> students = new ArrayList<>();
        students.add(new Student("Alice", 80));
        students.add(new Student("Bob", 72));
        students.add(new Student("Charlie", 90));
        students.add(new Student("David", 65));
        students.add(new Student("Eve", 85));

        System.out.println("Students who scored above 75%, sorted by marks:");

        // Filtering students with marks > 75%, sorting in descending order, and collecting
results
        List<Student> filteredStudents = students.stream()
            .filter(student -> student.marks > 75)  // Filter students above 75%
            .sorted(Comparator.comparingDouble((Student student) -> -student.marks)
                .thenComparing(student -> student.name))  // Sort by marks (descending) &
name (ascending)
            .collect(Collectors.toList());

        // Displaying the sorted students
        if (filteredStudents.isEmpty()) {
            System.out.println("No students scored above 75%.");
        } else {
            filteredStudents.forEach(Student::display);
        }
    }
}
```

3. Output:



```
Students who scored above 75%, sorted by marks:
Charlie (Marks: 90.0)
Eve (Marks: 85.0)
Alice (Marks: 80.0)
```

Problem-3 (Hard)

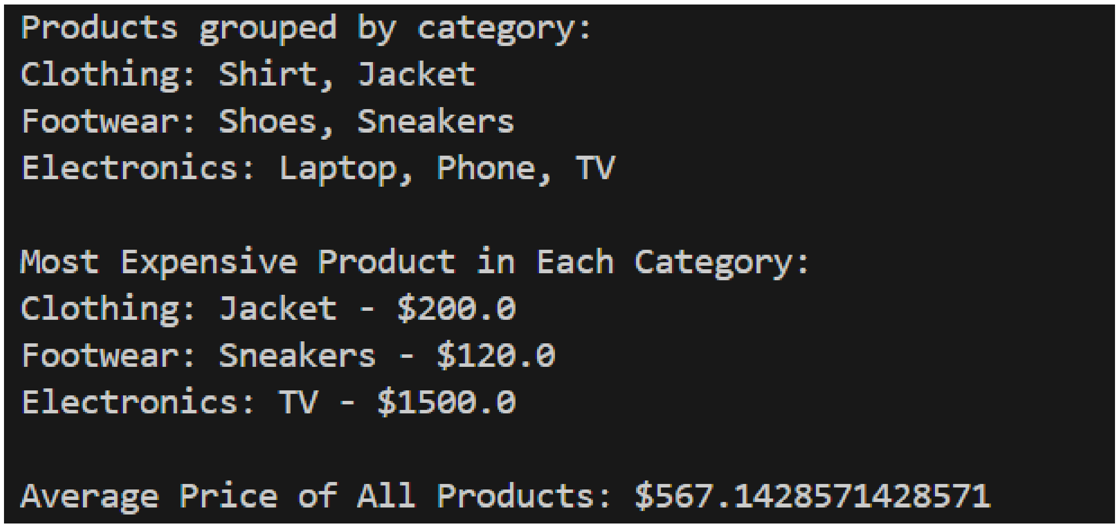
1. Aim:

To develop a Java program that processes a large dataset of products using Streams class to:
- Group products by category
- Find the most expensive product in each category
- Calculate the average price of all products

2. Implementation/Code:

```
//Aditya Prabhakar
//22BCS12889
import java.util.*;
import java.util.stream.Collectors;
import java.util.Comparator;
import java.util.Optional;

class Product {
    String name;
    String category;
    double price;

    // Constructor
    public Product(String name, String category, double price) {
        this.name = name;
        this.category = category;
        this.price = price;
    }

    // Display method
    public void display() {
        System.out.println(name + " (" + category + ") - $" + price);
    }
}

public class ProductProcessor {
    public static void main(String[] args) {
        // Creating a list of products
        List<Product> products = Arrays.asList(
            new Product("Laptop", "Electronics", 1200),
            new Product("Phone", "Electronics", 800),
            new Product("TV", "Electronics", 1500),
            new Product("Shirt", "Clothing", 50),
            new Product("Shoes", "Footwear", 100),
            new Product("Sneakers", "Footwear", 120),
            new Product("Jacket", "Clothing", 200)
        );

        // Grouping products by category
        Map<String, List<Product>> groupedProducts = products.stream()
                .collect(Collectors.groupingBy(product -> product.category));

        System.out.println("Products grouped by category:");
        groupedProducts.forEach((category, productList) -> {
            System.out.println(category + ": " + productList.stream()
                    .map(p -> p.name)
                    .collect(Collectors.joining(", ")));
        });
        // Finding the most expensive product in each category
        Map<String, Optional<Product>> mostExpensiveByCategory = products.stream()
            .collect(Collectors.groupingBy(
                product -> product.category,
                Collectors.maxBy(Comparator.comparingDouble(product ->
product.price))
            ));

        System.out.println("\nMost Expensive Product in Each Category:");
        mostExpensiveByCategory.forEach((category, product) ->
          System.out.println(category + ": " +
            (product.isPresent() ? product.get().name + " - $" + product.get().price : "No
products")));

        // Calculating the average price of all products
        double averagePrice = products.stream()
            .collect(Collectors.averagingDouble(product -> product.price));

        System.out.println("\nAverage Price of All Products: $" + averagePrice);
    }
}
```

3. Output:



```
Products grouped by category:
Clothing: Shirt, Jacket
Footwear: Shoes, Sneakers
Electronics: Laptop, Phone, TV

Most Expensive Product in Each Category:
Clothing: Jacket - $200.0
Footwear: Sneakers - $120.0
Electronics: TV - $1500.0

Average Price of All Products: $567.1428571428571
```