Experiment 6

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Subject Name: PBLJ **Subject Code: 22CSH-359**

1. **Aim:** Develop Java programs using lambda expressions and stream operations for sorting, filtering, and processing large datasets efficiently.

2. **Objective:**

- Develop Java programs using lambda expressions and stream operations for sorting, filtering, and processing large datasets efficiently.
- Implement easy, medium, and hard-level tasks involving sorting employees, filtering and sorting students, and processing products using streams.

3. **Implementation/Code:**

a.
```
import
java.util.*; class
Employee {
   String
   name; int
   age; double
   salary;
Employee(String name, int age, double salary) {
  this.name = name;
  this.age = age; this.salary =
  salary;
    }
    @Override
    public String toString() {
  return name + " - Age: " + age + ", Salary: " + salary;
    }
  }
  public class EmployeeSort {
```

```
public static void main(String[] args) {
   List<Employee> employees = Arrays.asList(
            new Employee("Ayush", 20, 90000),
            new Employee("Vinay", 22, 100000),

            new Employee("Prakul", 23, 70000)
         );
   employees.sort(Comparator.comparing(emp -> emp.name));
   System.out.println("Sorted by Name: " + employees);
   employees.sort(Comparator.comparingInt(emp -> emp.age));
   System.out.println("Sorted by Age: " + employees);
   employees.sort(Comparator.comparingDouble(emp -> emp.salary));
   System.out.println("Sorted by Salary: " + employees);
       }
    }
```

b.

```
import java.util.*;
import
java.util.stream.Collectors;
class Student {
   private String name;
   private double marks;
public Student(String name, double marks) {
   this.name = name;
   this.marks = marks;
       }
public String getName() {
   return name;
       }
public double getMarks() { return
   marks;
       }
    }
    public class StudentFilter {
public static void main(String[] args) {
   List<Student> students = List.of(
            new Student("Ayush", 85),
            new Student("Rajeev", 70),
            new Student("Vinay", 90),
            new Student("David", 60),
            new Student("Prakul", 80)
```

```
            );

    List<String> topStudents = students.stream()
                .filter(s -> s.getMarks() > 75)
                .sorted(Comparator.comparingDouble(Student::getMarks).reversed())
                .map(Student::getName)
       .collect(Collectors.toList()); System.out.println("Top
    Students: " + topStudents);
        }
     }
```

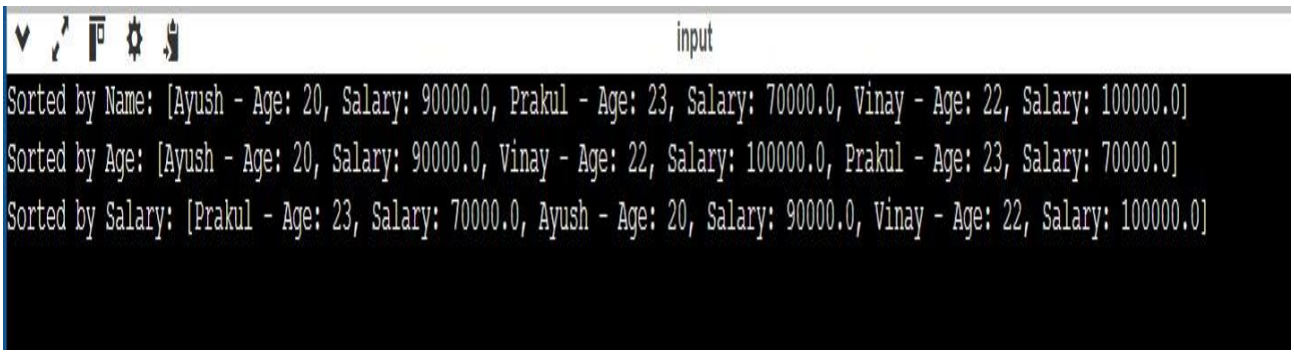
c.

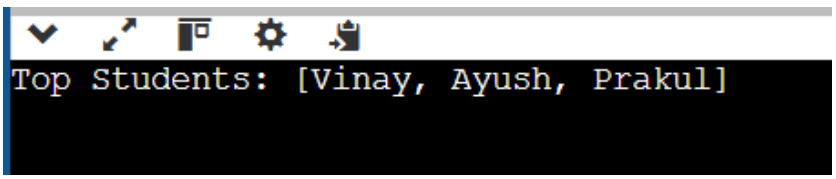
```
import java.util.*;
import
java.util.stream.Collectors;
class Product {
   String name;
   String
   category;
   double price;
public Product(String name, String category, double price) {
   this.name = name;
   this.category = category;
   this.price = price;
        }
        @Override
        public String toString() {
   return name + " ($" + price + ")";
        }
     }
     public class ProductProcessor {
public static void main(String[] args) {
   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("Jeans", "Clothing", 70),
                new Product("Blender", "Appliances",
                200), new Product("Toaster",
                "Appliances", 100)
```

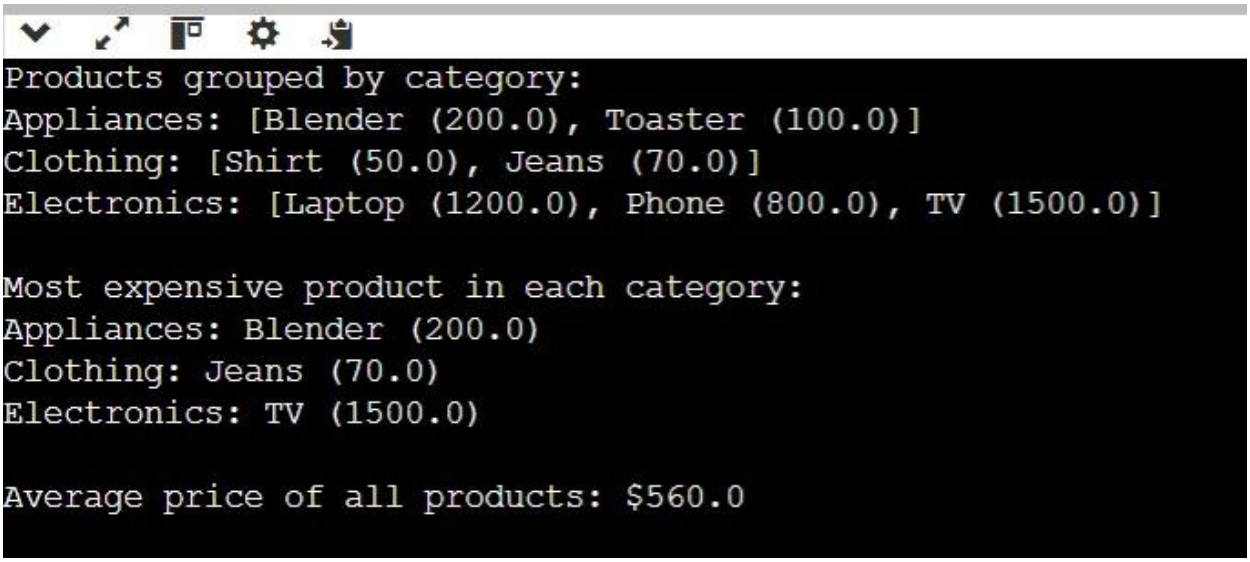
```
        );

Map<String, List<Product>> productsByCategory = products.stream()
   .collect(Collectors.groupingBy(p -> p.category));
System.out.println("Products grouped by category:");
productsByCategory.forEach((category, productList) ->
          System.out.println(category + ": " + productList));
Map<String, Optional<Product>> mostExpensiveByCategory = products.stream()
          .collect(Collectors.grouping
             By( p -> p.category,
             Collectors.maxBy(Comparator.comparingDouble(p -> p.price))
          ));
System.out.println("\nMost expensive product in each category:");
mostExpensiveByCategory.forEach((category, product) ->
   System.out.println(category + ": " + product.orElse(null)));
double averagePrice = products.stream()
          .mapToDouble(p -> p.price)
          .average()
          .orElse(0);
System.out.println("\nAverage price of all products: $" + averagePrice);
    }
 }
```

4. Output:







5. Learning Outcome:

- Understand and implement **lambda expressions** for sorting objects in a list based on different attributes.
- Utilize **Java Streams API** to perform operations like **filtering, sorting, and mapping** efficiently on large datasets.
- Learn **Comparator and method references** to simplify object comparisons for sorting.
- Apply **grouping and aggregation functions** using Collectors.groupingBy() and Collectors.maxBy() for processing categorized data.
- Gain hands-on experience in computing **statistical values** like the **average** from a dataset using mapToDouble() and average().
- Improve **code efficiency and readability** by using **functional programming** techniques in Java.

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