Experiment 6

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Branch: CSE **Section: IoT-642-B**
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Subject Name: Java with Lab **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)
        );
```

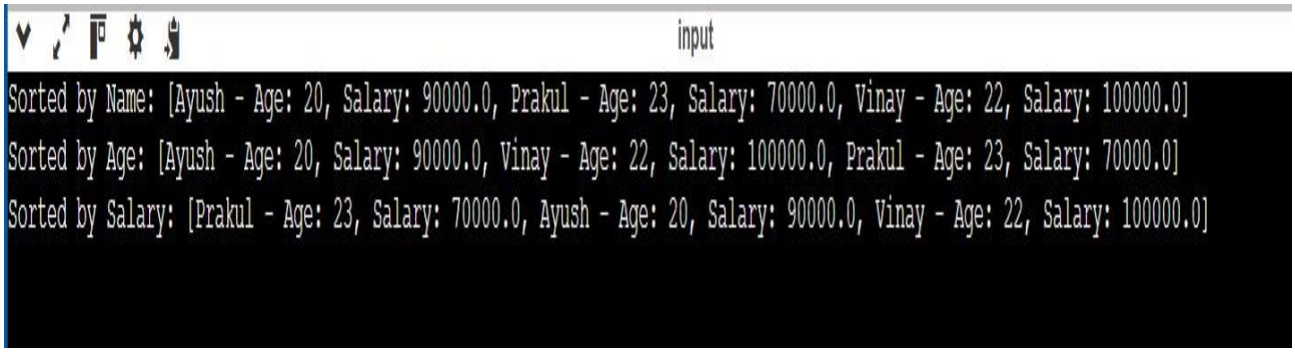
```
        List<String> topStudents = students.stream()
            .filter(s -> s.getMarks() > 75)
            .sorted(Comparator.comparingDouble(Student::getMarks).reversed())
            .map(Student::getName)
            .collect(Collectors.toList());
        System.out.println("Top Students: "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

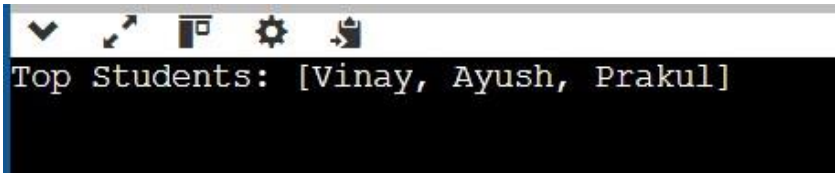
c. import java.util.*; import java.util.stream.Collectors; class Product { String name; String category; double price; public Product(String name, String category, double price) { this.name = name; this.category = category; this.price = price; } @Override public String toString() { return name + " ($" + 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));

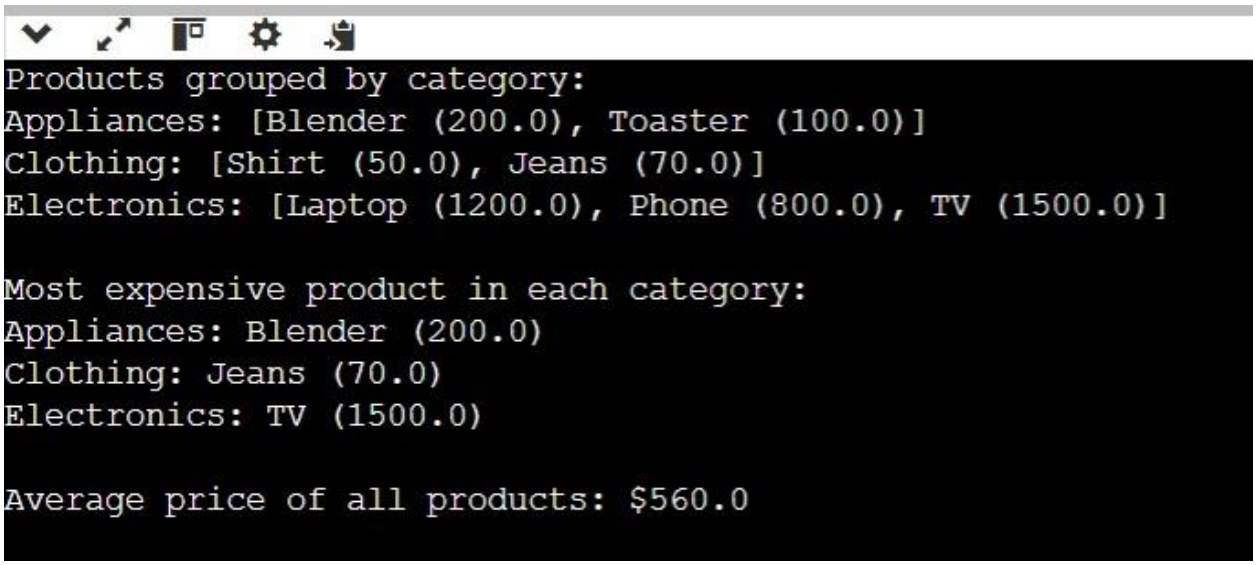
```
        Map<String, List<Product>> productsByCategory = products.stream()
```

```
            .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.groupingBy(
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.