



Experiment 6

Student Name: Aditya Mehta

Branch: CSE

Semester: 6

Subject Name: Java with Lab

UID: 22BCS17094

Section/Group: IOT – 642 -B

Date of Performance: 3/3/025

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),
```

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



Discover. Learn. Empower.

```
        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()
```

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



Discover. Learn. Empower.

```
.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));
```

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



Discover. Learn. Empower.

```
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:

A screenshot of a terminal window with a dark background and light-colored text. The terminal shows the output of a Java program sorting student data. The output consists of three lines, each starting with a sort criterion followed by a list of student names, ages, and salaries in brackets. The first line is 'Sorted by Name: [Ayush - Age: 20, Salary: 90000.0, Prakul - Age: 23, Salary: 70000.0, Vinay - Age: 22, Salary: 100000.0]', the second is 'Sorted by Age: [Ayush - Age: 20, Salary: 90000.0, Vinay - Age: 22, Salary: 100000.0, Prakul - Age: 23, Salary: 70000.0]', and the third is 'Sorted by Salary: [Prakul - Age: 23, Salary: 70000.0, Ayush - Age: 20, Salary: 90000.0, Vinay - Age: 22, Salary: 100000.0]'. The terminal has a standard toolbar at the top with icons for back, forward, search, and other functions.

```
Sorted by Name: [Ayush - Age: 20, Salary: 90000.0, Prakul - Age: 23, Salary: 70000.0, Vinay - Age: 22, Salary: 100000.0]
Sorted by Age: [Ayush - Age: 20, Salary: 90000.0, Vinay - Age: 22, Salary: 100000.0, Prakul - Age: 23, Salary: 70000.0]
Sorted by Salary: [Prakul - Age: 23, Salary: 70000.0, Ayush - Age: 20, Salary: 90000.0, Vinay - Age: 22, Salary: 100000.0]
```

A screenshot of a terminal window with a dark background and light-colored text. The terminal shows the output of a Java program identifying the top students by salary. The output is a single line: 'Top Students: [Vinay, Ayush, Prakul]'. The terminal has a standard toolbar at the top with icons for back, forward, search, and other functions.

```
Top Students: [Vinay, Ayush, Prakul]
```

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



```
Products grouped by category:
Appliances: [Blender (200.0), Toaster (100.0)]
Clothing: [Shirt (50.0), Jeans (70.0)]
Electronics: [Laptop (1200.0), Phone (800.0), TV (1500.0)]

Most expensive product in each category:
Appliances: Blender (200.0)
Clothing: Jeans (70.0)
Electronics: TV (1500.0)

Average price of all products: $560.0
```

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.