



# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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## Experiment 6

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**Branch:** CSE

**Semester:** 6

**Subject Name:** Java with Lab

**UID:** 22BCS1270 2

**Section/Group:** 22BCS\_IOT-640 /B

**Date of Performance:**

**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),
```



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```
        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)
        );
    }
}
```



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```
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)
        );
    }
}
```



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```
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:

```
input
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]
```



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

```
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.