

Experiment-6

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Subject Name: Java Lab

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Section/Group: IOT-618/A
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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:

```
//Shivam kumar
//22BCS16400

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:

```
//Shivam Kumar  
//22BCS16400  
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:

```
//Shivam Kumar  
//22BCS16400  
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
```