Experiment 6

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Program 1: Lambda Expression

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.

Procedures:
Step 1: Create the Employee Class
-Define an Employee class with the following attributes:
name (String)
age (int)
salary (double)
-Create a constructor to initialize these values.
-Implement a display() method to print employee details.

Step 2: Create the Main Class
-Initialize an ArrayList<Employee> and add sample employee data.
-Use lambda expressions to sort the list:
Sort by Name (Alphabetical order)
Sort by Age (Ascending order)
Sort by Salary (Descending order)

Step 3: Display the Sorted List
Use forEach() with a method reference to print the sorted employees.

Test cases:

Program/Code:
```
import java.util.*;

class Employee {
    String name;
    int age;
```

```
    double salary;

    public Employee(String name, int age, double salary) {
        this.name = name;
        this.age = age;
        this.salary = salary;
    }

    public void display() {
        System.out.println(name + " (Age: " + age + ", Salary: " + salary + ")");
    }
}

public class EmployeeSorting {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        List<Employee> employees = new ArrayList<>();

        System.out.print("Enter number of employees: ");
        int n = scanner.nextInt();
        scanner.nextLine();

        for (int i = 0; i < n; i++) {
            System.out.println("Enter details for Employee " + (i + 1) + " (name, age,
salary):");
            String name = scanner.nextLine();
            int age = scanner.nextInt();
            double salary = scanner.nextDouble();
            scanner.nextLine();
            employees.add(new Employee(name, age, salary));
        }

        System.out.println("\nSorting by Name:");
        employees.sort((e1, e2) -> e1.name.compareTo(e2.name));
        employees.forEach(Employee::display);

        System.out.println("\nSorting by Age:");
        employees.sort((e1, e2) -> Integer.compare(e1.age, e2.age));
        employees.forEach(Employee::display);

        System.out.println("\nSorting by Salary (Descending):");
```

```
        employees.sort((e1, e2) -> Double.compare(e2.salary, e1.salary));
        employees.forEach(Employee::display);
    }
}
```

Output:

```
Enter number of employees: 5
Enter details for Employee 1 (name, age, salary):
Farhat
23
500000
Enter details for Employee 2 (name, age, salary):
Asya
24
300000
Enter details for Employee 3 (name, age, salary):
Hajra
25
200000
Enter details for Employee 4 (name, age, salary):
Yassir
26
100000
Enter details for Employee 5 (name, age, salary):
Ragheb
27
100000
```

```
Sorting by Name:
Asya (Age: 24, Salary: 300000.0)
Farhat (Age: 23, Salary: 500000.0)
Hajra (Age: 25, Salary: 200000.0)
Ragheb (Age: 27, Salary: 100000.0)
Yassir (Age: 26, Salary: 100000.0)

Sorting by Age:
Farhat (Age: 23, Salary: 500000.0)
Asya (Age: 24, Salary: 300000.0)
Hajra (Age: 25, Salary: 200000.0)
Yassir (Age: 26, Salary: 100000.0)
Ragheb (Age: 27, Salary: 100000.0)

Sorting by Salary (Descending):
Farhat (Age: 23, Salary: 500000.0)
Asya (Age: 24, Salary: 300000.0)
Hajra (Age: 25, Salary: 200000.0)
Yassir (Age: 26, Salary: 100000.0)
Ragheb (Age: 27, Salary: 100000.0)
```

Program 2: Lambda Expression

Aim: Create a program to use lambda expressions and stream operations to filter students scoring above 75%, sort them by marks, and display their names.

Procedure:

Test cases:

Program/Code:

```
import java.util.*;
import java.util.stream.Collectors;

class Student {
    String name;
    double marks;

    public Student(String name, double marks) {
        this.name = name;
        this.marks = marks;
    }

    public void display() {
        System.out.println(name + " (Marks: " + marks + ")");
    }
}

public class StudentFilterSort {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        List<Student> students = new ArrayList<>();

        System.out.print("Enter number of students: ");
        int n = scanner.nextInt();
        scanner.nextLine();

        for (int i = 0; i < n; i++) {
```

```
            System.out.println("Enter details for Student " + (i + 1) + " (name, marks):");
            String name = scanner.nextLine();
            double marks = scanner.nextDouble();
            scanner.nextLine();
            students.add(new Student(name, marks));
        }

        System.out.println("\nFiltered and Sorted Students (Marks > 75%):");
        List<Student> filteredStudents = students.stream()
                .filter(s -> s.marks > 75)
                .sorted(Comparator.comparingDouble((Student s) -> s.marks).reversed()
                        .thenComparing(s -> s.name))
                .collect(Collectors.toList());

        if (filteredStudents.isEmpty()) {
            System.out.println("No students scored above 75%.");
        } else {
            filteredStudents.forEach(Student::display);
        }
    }
}
```

Output:

```
Enter number of students: 3
Enter details for Student 1 (name, marks):
Farhat
85
Enter details for Student 2 (name, marks):
Asya
75
Enter details for Student 3 (name, marks):
Hajra
74

Filtered and Sorted Students (Marks > 75%):
Farhat (Marks: 85.0)
```

Program 3: Stream Class

Aim: Write a Java program to process a large dataset of products using streams. Perform operations such as grouping products by category, finding the most expensive product in each category, and calculating the average price of all products.

Procedure:

Test cases:

Program/Code:

```
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;
    }

    public void display() {
        System.out.println(name + " (Category: " + category + ", Price: " + price + ")");
    }
}

public class ProductProcessor {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        List<Product> products = new ArrayList<>();

        System.out.print("Enter number of products: ");
        int n = scanner.nextInt();
        scanner.nextLine();

        for (int i = 0; i < n; i++) {
            System.out.println("Enter details for Product " + (i + 1) + " (name, category,
price):");
            String name = scanner.nextLine();
            String category = scanner.nextLine();
            double price = scanner.nextDouble();
            scanner.nextLine();
            products.add(new Product(name, category, price));
        }


        Map<String, List<Product>> groupedByCategory = products.stream()
                .collect(Collectors.groupingBy(p -> p.category));

        System.out.println("\nProducts Grouped by Category:");
```

```
        groupedByCategory.forEach((category, productList) -> {
            System.out.println(category + ":");
            productList.forEach(Product::display);
        });


        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.map(p -> p.name + " (" + p.price
+ ")").orElse("No product")));


        double averagePrice = products.stream()
                .collect(Collectors.averagingDouble(p -> p.price));
        System.out.println("\nAverage Price of All Products: " + averagePrice);
    }
}
```

Output:

```
Enter number of products: 5
Enter details for Product 1 (name, category, price):
Pencil
Stationary
20
Enter details for Product 2 (name, category, price):
Ruler
Stationary
50
Enter details for Product 3 (name, category, price):
Shirt
Clothe
500
Enter details for Product 4 (name, category, price):
Scarf
Clothe
300
Enter details for Product 5 (name, category, price):
Biscuit
Snack
70
```

```
Products Grouped by Category:
Clothe:
Shirt (Category: Clothe, Price: 500.0)
Scarf (Category: Clothe, Price: 300.0)
Stationary:
Pencil (Category: Stationary, Price: 20.0)
Ruler (Category: Stationary, Price: 50.0)
Snack:
Biscuit (Category: Snack, Price: 70.0)

Most Expensive Product in Each Category:
Clothe: Shirt (500.0)
Stationary: Ruler (50.0)
Snack: Biscuit (70.0)

Average Price of All Products: 188.0
```