Experiment 6

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Semester: 6th **Date of Performance: 28/02/25**

Subject Name: Project based learning in Java

Subject Code: 22CSH- 359

Easy Level

1. **Aim:** Write a program to sort a list of Employee objects (name, age, salary) using lambda expressions.

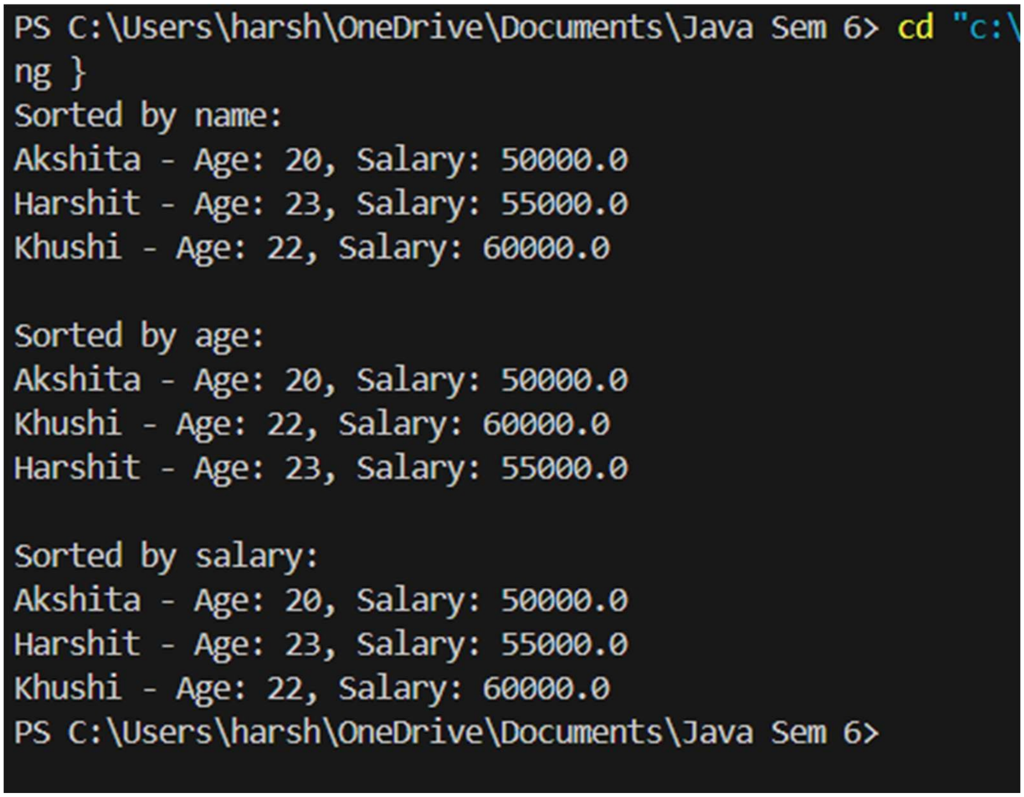
2. **Objective:** The objective of this Java program is to demonstrate how to sort a list of Employee objects based on different attributes (name, age, salary) using **lambda expressions** and the Comparator interface

3. **Implementation/Code:**

```
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 EmployeeSorting {
    public static void main(String[] args)
        { List<Employee> employees = new ArrayList<>();
        employees.add(new Employee("Akshita", 20, 50000));
        employees.add(new Employee("Khushi", 22, 60000));
        employees.add(new Employee("Harshit", 23, 55000));
        // Sorting by name
        employees.sort(Comparator.comparing(emp -> emp.name));
        System.out.println("Sorted by name:");
        employees.forEach(System.out::println);
        // Sorting by age
        employees.sort(Comparator.comparingInt(emp -> emp.age));
        System.out.println("\nSorted by age:");
        employees.forEach(System.out::println);
        // Sorting by salary
        employees.sort(Comparator.comparingDouble(emp -> emp.salary));
        System.out.println("\nSorted by salary:");
        employees.forEach(System.out::println);
    }
}
```

4. Output:



```
PS C:\Users\harsh\OneDrive\Documents\Java Sem 6> cd "c:\
ng }
Sorted by name:
Akshita - Age: 20, Salary: 50000.0
Harshit - Age: 23, Salary: 55000.0
Khushi - Age: 22, Salary: 60000.0

Sorted by age:
Akshita - Age: 20, Salary: 50000.0
Khushi - Age: 22, Salary: 60000.0
Harshit - Age: 23, Salary: 55000.0

Sorted by salary:
Akshita - Age: 20, Salary: 50000.0
Harshit - Age: 23, Salary: 55000.0
Khushi - Age: 22, Salary: 60000.0
PS C:\Users\harsh\OneDrive\Documents\Java Sem 6>
```

5. Learning Outcomes:

- Learnt about Comparator interface
- Efficient Data Handling
- Learn to handle user input from the command line.
- Looping and Computation.
- Understanding Java Sorting and Filteration.

Medium Level

1. **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.

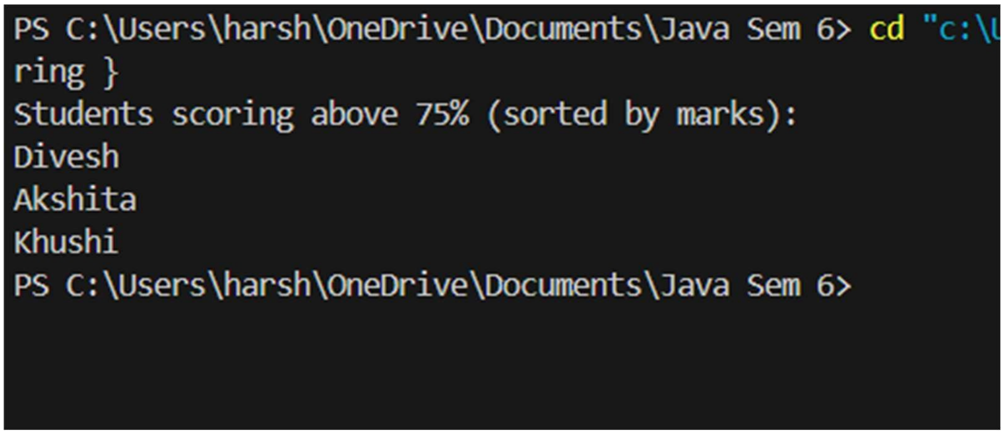
2. **Objective:** The objective of this Java program is to demonstrate the use of **lambda expressions** and **stream operations** to efficiently process and manipulate collections.

3. **Implementation/Code:**

```
import java.util.*;
import java.util.stream.Collectors;
class Student {
    String name;
    double marks;
    Student(String name, double marks)
        { this.name = name;
        this.marks = marks;
    }
    @Override
    public String toString() {
        return name + " - Marks: " + marks;
    }
}
```

```
public class StudentFiltering {
    public static void main(String[] args)
        { List<Student> students = new ArrayList<>();
        students.add(new Student("Akshita", 85));
        students.add(new Student("Harshit", 70));
        students.add(new Student("Khushi", 90));
        students.add(new Student("Shrey", 60));
        students.add(new Student("Divesh", 80));
        // Filtering students scoring above 75% and sorting by marks
        List<Student> filteredStudents = students.stream()
                .filter(student -> student.marks > 75)
                .sorted(Comparator.comparingDouble(student -> student.marks))
                .collect(Collectors.toList());
        System.out.println("Students scoring above 75% (sorted by marks):");
        filteredStudents.forEach(student -> System.out.println(student.name));
    }
}
```

4. Output:



```
PS C:\Users\harsh\OneDrive\Documents\Java Sem 6> cd "c:\
ring }
Students scoring above 75% (sorted by marks):
Divesh
Akshita
Khushi
PS C:\Users\harsh\OneDrive\Documents\Java Sem 6>
```

5. Learning Outcomes:

- Understanding Java streams for Data Processing.
- Implement key-value storage.
- Add and retrieve elements dynamically without predefined limits.
- Use Scanner to take user input and process it efficiently.

Hard Level

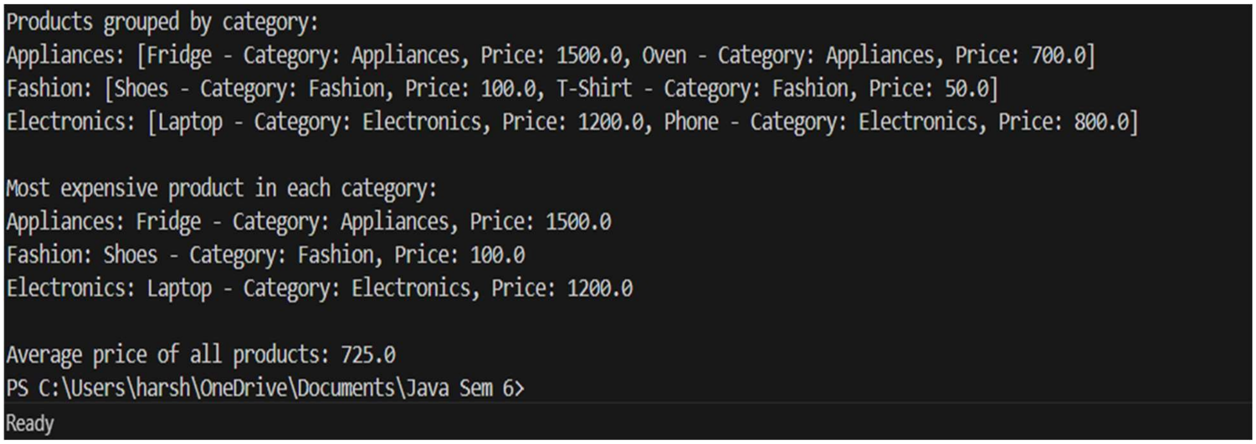
1. **Aim:** Write a Java program to process a large dataset of products using streams. Perform operations such as grouping products by category, finding the most expensive product in each category, and calculating the average price of all products.

2. **Objective:** The objective of this Java program is to demonstrate the use of **Java Streams** to efficiently process a large dataset of products.

3. **Implementation/Code:**

```
import java.util.*;

import java.util.stream.Collectors;

class Product {

    String name;

    String category;

    double price;

    Product(String name, String category, double price)

        { this.name = name;

        this.category = category;

        this.price = price;

    }
    @Override
    public String toString() {
        return name + " - Category: " + category + ", Price: " + price;
    }
}
public class ProductProcessing {
    public static void main(String[] args)
        { List<Product> products = Arrays.asList(
                new Product("Laptop", "Electronics", 1200),
                new Product("Phone", "Electronics", 800),
                new Product("Shoes", "Fashion", 100),
                new Product("T-Shirt", "Fashion", 50),
                new Product("Fridge", "Appliances", 1500),
                new Product("Oven", "Appliances", 700)
        );
        Map<String, List<Product>> groupedByCategory = products.stream()
                .collect(Collectors.groupingBy(product -> product.category));
        // 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))));
        double averagePrice = products.stream()
            .mapToDouble(product -> product.price)
            .average()
            .orElse(0);
        System.out.println("Products grouped by category:");
        groupedByCategory.forEach((category, productList) ->
            System.out.println(category + ": " + productList));
        System.out.println("\nMost expensive product in each category:");
        mostExpensiveByCategory.forEach((category, product) ->
            System.out.println(category + ": " + product.orElse(null)));
        System.out.println("\nAverage price of all products: " + averagePrice);
    }
}
```

4. Output:



```
Products grouped by category:
Appliances: [Fridge - Category: Appliances, Price: 1500.0, Oven - Category: Appliances, Price: 700.0]
Fashion: [Shoes - Category: Fashion, Price: 100.0, T-Shirt - Category: Fashion, Price: 50.0]
Electronics: [Laptop - Category: Electronics, Price: 1200.0, Phone - Category: Electronics, Price: 800.0]

Most expensive product in each category:
Appliances: Fridge - Category: Appliances, Price: 1500.0
Fashion: Shoes - Category: Fashion, Price: 100.0
Electronics: Laptop - Category: Electronics, Price: 1200.0

Average price of all products: 725.0
PS C:\Users\harsh\OneDrive\Documents\Java Sem 6>
Ready
```

5. Learning Outcomes:

- Grouping Data.
- Using Java Streams.
- Handling race conditions in a multi-threaded environment.
- Taking user input for dynamic seat selection and priority assignment.
- Efficient Data Analysis.