

Experiment 6

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Branch: BE-CSE

Semester: 6th

**Subject Name: Project Based Learning in
Java with Lab**

UID: 22BCS12789

Section/Group: 22BC_IOT-639/A

Date of Performance: 07/03/25

Subject Code: 22CSH-359

EASY:

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

2. **Implementation/Code:**

```
package Java;
import java.util.*;

class Emp
{
    String name;
    int age;
    double salary;

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

    public String toString() {
        return name + " - Age: " + age + ", Salary: " + salary;
    }
}

public class EmployeeSorter {
    public static void main(String[] args)
    {
        List<Emp> employees = Arrays.asList(
            new Emp("Hardik", 30, 50000),
            new Emp("Om", 25, 60000),
            new Emp("Anish", 35, 55000)
        );
        employees.sort(Comparator.comparing((Emp e) -> e.name).thenComparing(e -> e.age)
            .thenComparing(e -> e.salary));
        employees.forEach(System.out::println);
    }
}
```

3. Output:

```
Anish - Age: 35, Salary: 55000.0  
Hardik - Age: 30, Salary: 50000.0  
Om - Age: 25, Salary: 60000.0
```

MEDIUM:

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. **Implementation/Code:**

```
package Java;  
import java.util.*;  
import java.util.stream.*;  
  
class Student  
{ String name;  
  double marks;  
  
  Student(String name, double marks)  
  { this.name = name;  
    this.marks = marks;  
  }  
}  
  
public class StudentFilter {  
  public static void main(String[] args)  
  { List<Student> students = Arrays.asList(  
    new Student("Rahul", 80),  
    new Student("Chahat", 70),  
    new Student("Tanmay", 85),  
    new Student("Dev", 60),  
    new Student("Hardik", 90)  
  );  
  
  List<Student> filteredStudents = students.stream().filter(s -> s.marks > 75).sorted  
(Comparator.comparingDouble(s -> -s.marks)).collect(Collectors.toList());  
  
  System.out.println("Students scoring above 75%:");  
  filteredStudents.forEach(s -> System.out.println(s.name + " - Marks: " + s.marks));  
}  
}
```

3. Output:

```
Students scoring above 75%:  
Radha - Marks: 90.0  
Tina - Marks: 85.0  
Reena - Marks: 80.0
```

HARD:

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. Implementation/Code:

```
package Java;  
import java.util.*;  
import java.util.stream.*;  
  
class Product {  
    String name, 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 = List.of(  
        new Product("Laptop", "Electronics", 1200.0),  
        new Product("Phone", "Electronics", 800.0),  
        new Product("Tablet", "Electronics", 600.0),  
    )  
}
```

```
        new Product("Shoes", "Fashion", 100.0),
        new Product("Jacket", "Fashion", 150.0),
        new Product("T-shirt", "Fashion", 50.0)

    );

    Map<String, List<Product>> groupedByCategory = products.stream()
        .collect(Collectors.groupingBy(p -> p.category));
    System.out.println("Products grouped by category:");
    groupedByCategory.forEach((category, productList) -> {
        System.out.println(category + ":");
        productList.forEach(product -> System.out.println("  " + product));
    });

    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()
        .collect(Collectors.averagingDouble(p -> p.price));
    System.out.println("\nAverage price of all products: " + averagePrice);
}
}
```

3. Output:

```
Products grouped by category:
Fashion:
  Shoes ($100.0)
  Jacket ($150.0)
  T-shirt ($50.0)
Electronics:
  Laptop ($1200.0)
  Phone ($800.0)
  Tablet ($600.0)

Most expensive product in each category:
Fashion: Jacket ($150.0)
Electronics: Laptop ($1200.0)

Average price of all products: 483.3333333333333
```

4. Learning Outcome

- a) Understanding Lambda Expressions – Learn how to use lambda expressions to simplify function definitions and make code more concise.
- b) Sorting with Lambda and Comparator – Utilize `Comparator.comparing()` and `thenComparing()` for multi-criteria sorting of objects.
- c) Using Java Streams for Data Processing – Gain proficiency in filtering, sorting, mapping, and collecting data using Java's Stream API.
- d) Filtering Data with Stream API – Use `filter()` to extract specific elements from collections based on given conditions.
- e) Grouping Data Using Collectors – Understand how to use `groupingBy()` to categorize and structure data effectively.
- f) Finding Max and Min Values in a Dataset – Use `maxBy()` and `minBy()` to determine the most expensive or least expensive items in a category.
- g) Calculating Aggregates Using Streams – Apply `averagingDouble()` to compute the average price or marks of a dataset.