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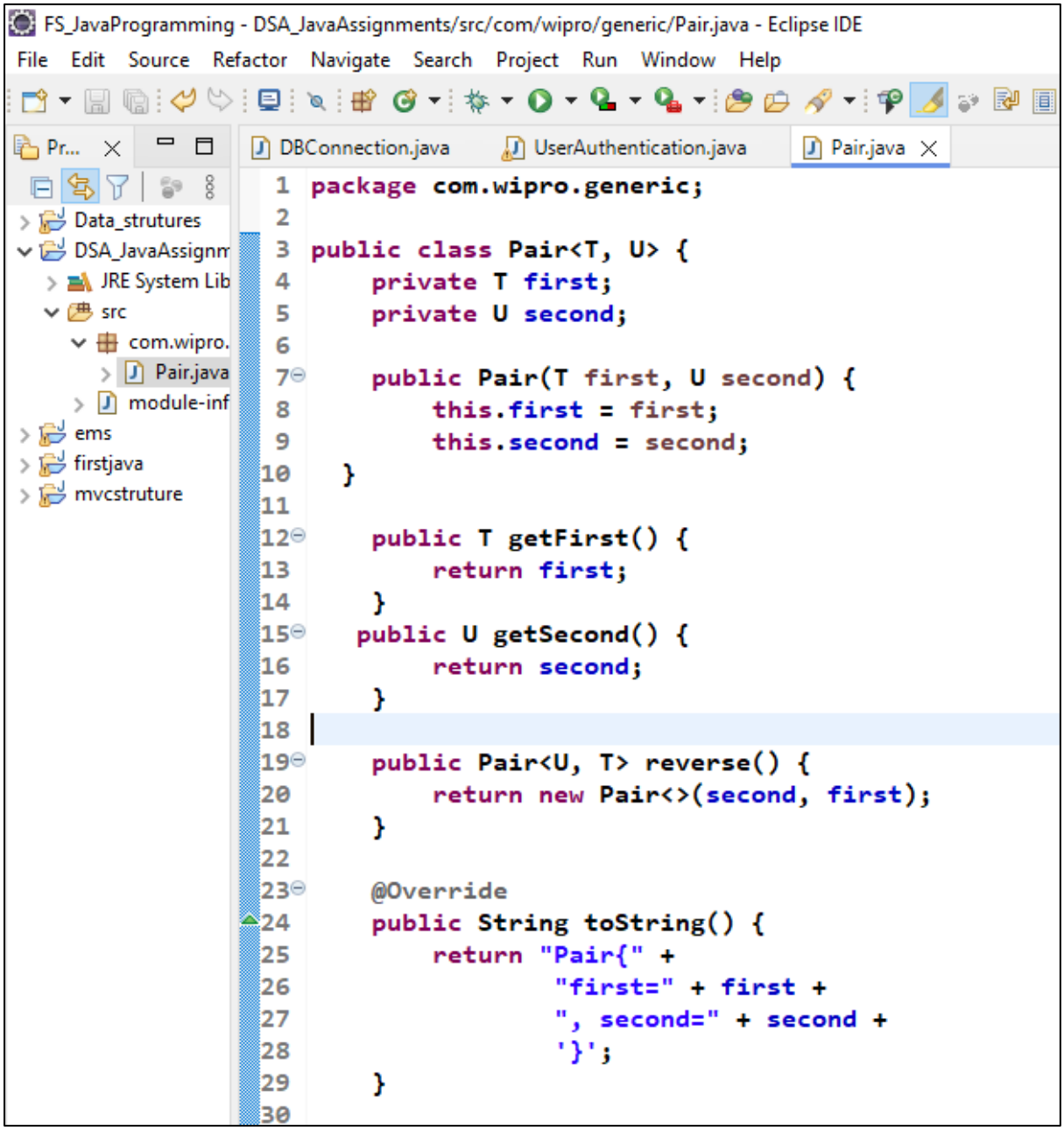
Day 19 : Assignments

Task 1: Generics and Type Safety

Create a generic Pair class that holds two objects of different types, and write a method to return a reversed version of the pair.

Ans: Source Code




```java
package com.wipro.generic;

public class Pair<T, U> {
    private T first;
    private U second;

    public Pair(T first, U second) {
        this.first = first;
        this.second = second;
  }

    public T getFirst() {
        return first;
    }
   public U getSecond() {
        return second;
    }

    public Pair<U, T> reverse() {
        return new Pair<>(second, first);
    }

    @Override
    public String toString() {
        return "Pair{" +
                "first=" + first +
                ", second=" + second +
                '}';
    }

```

```java

    public static void main(String[] args) {
        Pair<Integer, String> originalPair = new Pair<>(1, "one");
        System.out.println("Original Pair: " + originalPair);

        Pair<String, Integer> reversedPair = originalPair.reverse();
        System.out.println("Reversed Pair: " + reversedPair);
    }
}

```

Output:

```
Console
<terminated> Pair [Java Application] C:\Program Files\Java\jdk-17\bin\javaw.exe (Jun 1, 2024, 9:51:06 PM – 9:51:07 PM) [pid: 13576]
Original Pair: Pair{first=1, second=one}
Reversed Pair: Pair{first=one, second=1}
```

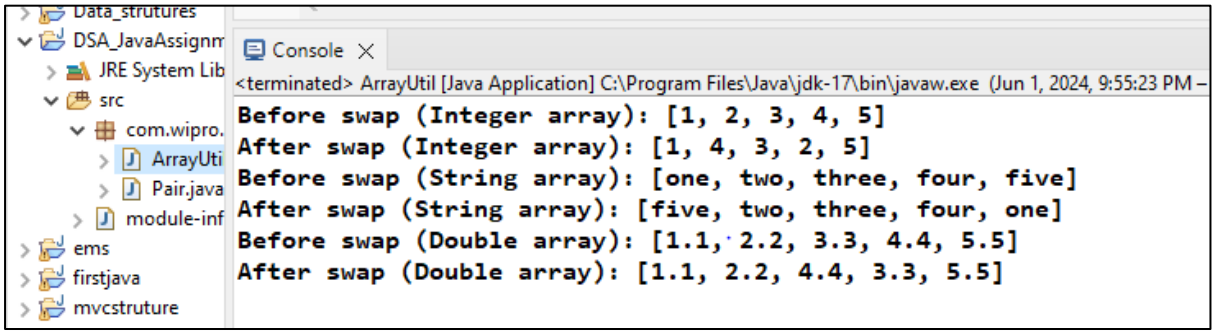
Task 2: Generic Classes and Methods

Implement a generic method that swaps the positions of two elements in an array, regardless of their type, and demonstrate its usage with different object types.

Ans: Source Code

```java
package com.wipro.generic;

public class ArrayUtil {
    public static <T> void swap(T[] array, int index1, int index2) {
        if (index1 < 0 || index1 >= array.length || index2 < 0 || index2 >= array.length) {
            throw new IndexOutOfBoundsException("Index out of bounds");
        }

        T temp = array[index1];
        array[index1] = array[index2];
        array[index2] = temp;
    }

    public static void main(String[] args) {

        Integer[] intArray = {1, 2, 3, 4, 5};
        System.out.println("Before swap (Integer array): " + java.util.Arrays.toString(intArray));
        swap(intArray, 1, 3);
        System.out.println("After swap (Integer array): " + java.util.Arrays.toString(intArray));

        String[] strArray = {"one", "two", "three", "four", "five"};
        System.out.println("Before swap (String array): " + java.util.Arrays.toString(strArray));
        swap(strArray, 0, 4);
        System.out.println("After swap (String array): " + java.util.Arrays.toString(strArray));

        Double[] doubleArray = {1.1, 2.2, 3.3, 4.4, 5.5};
        System.out.println("Before swap (Double array): " + java.util.Arrays.toString(doubleArray));
        swap(doubleArray, 2, 3);
        System.out.println("After swap (Double array): " + java.util.Arrays.toString(doubleArray));
    }
}
```

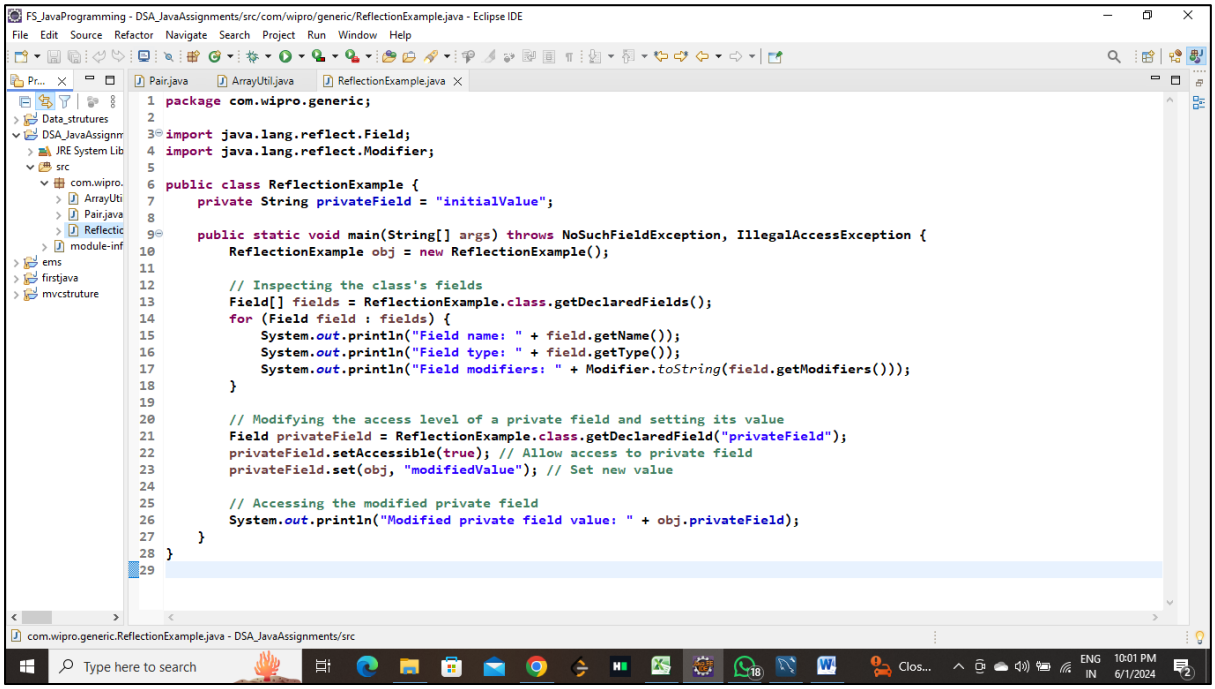
Output:-



Task 3: Reflection API

Use reflection to inspect a class's methods, fields, and constructors, and modify the access level of a private field, setting its value during runtime

Ans: Source Code



Output:-

```
ents Console
<terminated> ReflectionExample [Java Application] C:\Program Files\Java\jdk-17\bin\javaw.exe (Jun 1, 2024, 10:00:37 PM – 10:00:37 PM) [pid: 816]
Field name: privateField
Field type: class java.lang.String
Field modifiers: private
Modified private field value: modifiedValue
```

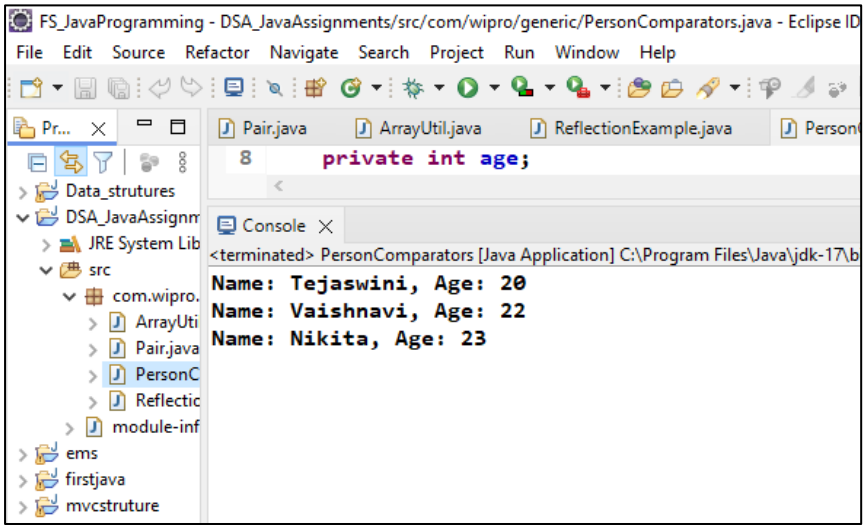
Task 4: Lambda Expressions

Implement a Comparator for a Person class using a lambda expression, and sort a list of Person objects by their age..

Ans: Source Code

```java
package com.wipro.generic;
import java.util.ArrayList;
import java.util.Comparator;
import java.util.List;

public class PersonComparators {
    private String name;
    private int age;

    public PersonComparators(String name, int age) {
        this.name = name;
        this.age = age;
    }

    public String getName() {
        return name;
    }

    public int getAge() {
        return age;
    }

    public static void main(String[] args) {
        List<PersonComparators> personList = new ArrayList<>();
        personList.add(new PersonComparators("Tejaswini", 20));
        personList.add(new PersonComparators("Vaishnavi", 22));
        personList.add(new PersonComparators("Nikita", 23));

        // Sorting the list by age using a lambda expression
        personList.sort(Comparator.comparingInt(PersonComparators::getAge));

        // Printing the sorted list
        for (PersonComparators person : personList) {
            System.out.println("Name: " + person.getName() + ", Age: " + person.getAge());
        }
    }
}
```

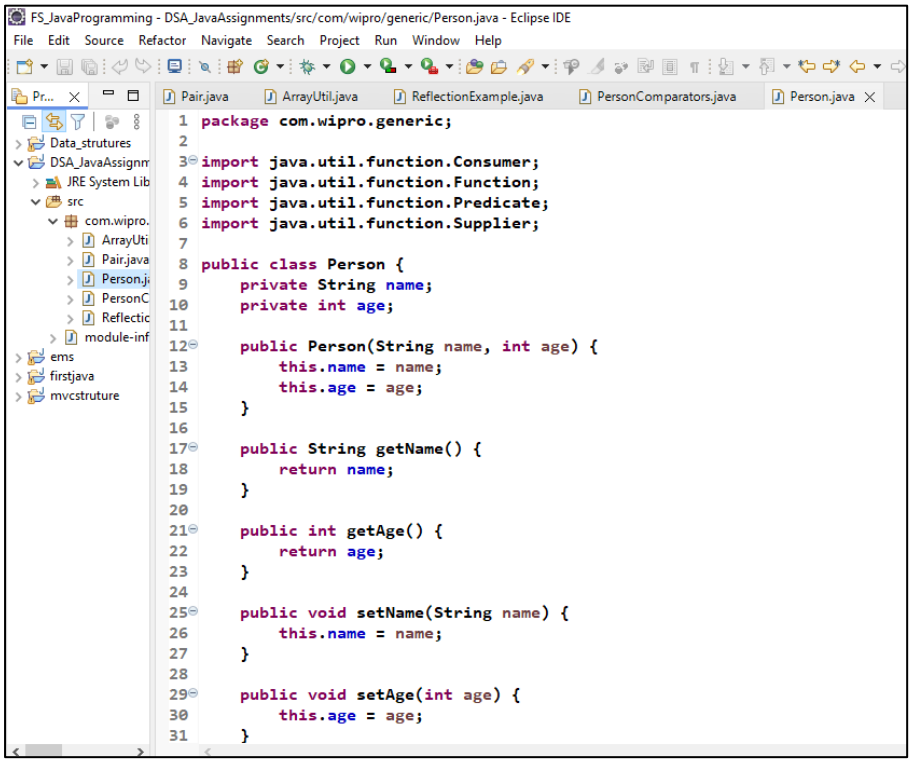
Output :

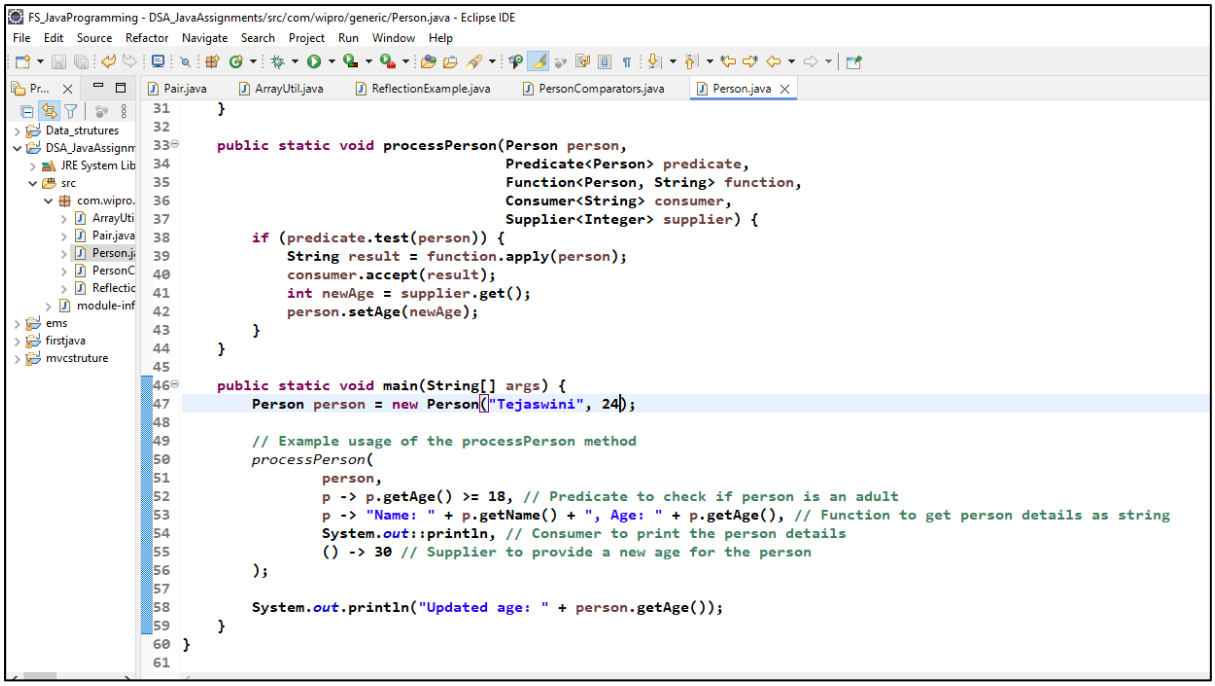


Task 5: Functional Interfaces

Create a method that accepts functions as parameters using Predicate, Function, Consumer, and Supplier interfaces to operate on a Person object.

Ans: Source Code




FS_JavaProgramming - DSA_JavaAssignments/src/com/wipro/generic/Person.java - Eclipse IDE
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ArrayUtil.java
ReflectionExample.java
PersonComparators.java
Person.java
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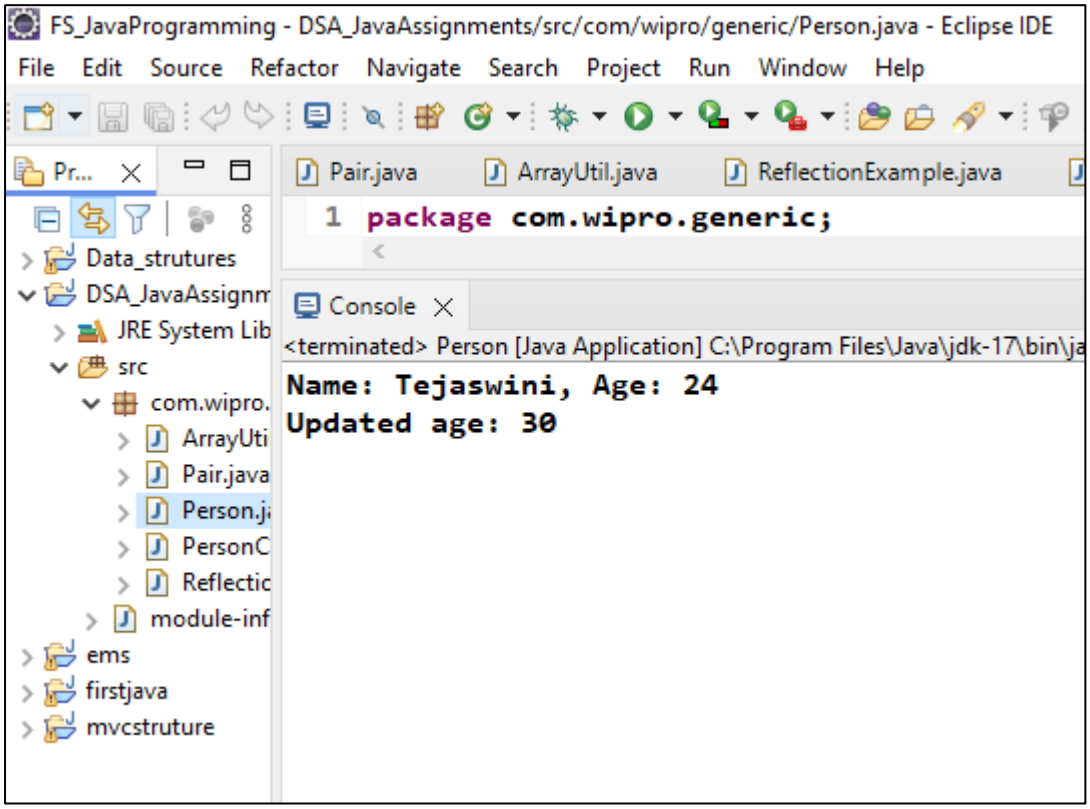
}
public static void processPerson(Person person,
Predicate<Person> predicate,
Function<Person, String> function,
Consumer<String> consumer,
Supplier<Integer> supplier) {
if (predicate.test(person)) {
String result = function.apply(person);
consumer.accept(result);
int newAge = supplier.get();
person.setAge(newAge);
}
}
public static void main(String[] args) {
Person person = new Person("Tejaswini", 24);
// Example usage of the processPerson method
processPerson(
person,
p -> p.getAge() >= 18, // Predicate to check if person is an adult
p -> "Name: " + p.getName() + ", Age: " + p.getAge(), // Function to get person details as string
System.out::println, // Consumer to print the person details
() -> 30 // Supplier to provide a new age for the person
);
System.out.println("Updated age: " + person.getAge());
}
}

Output: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package com.wipro.generic;
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com.wipro.
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Pair.java
Person.j
PersonC
Reflectic
module-inf
ems
firstjava
mvcstruture
Console
<terminated> Person [Java Application] C:\Program Files\Java\jdk-17\bin\ja
Name: Tejaswini, Age: 24
Updated age: 30