Assignment Day-19

Core Java with DS and Algorithms

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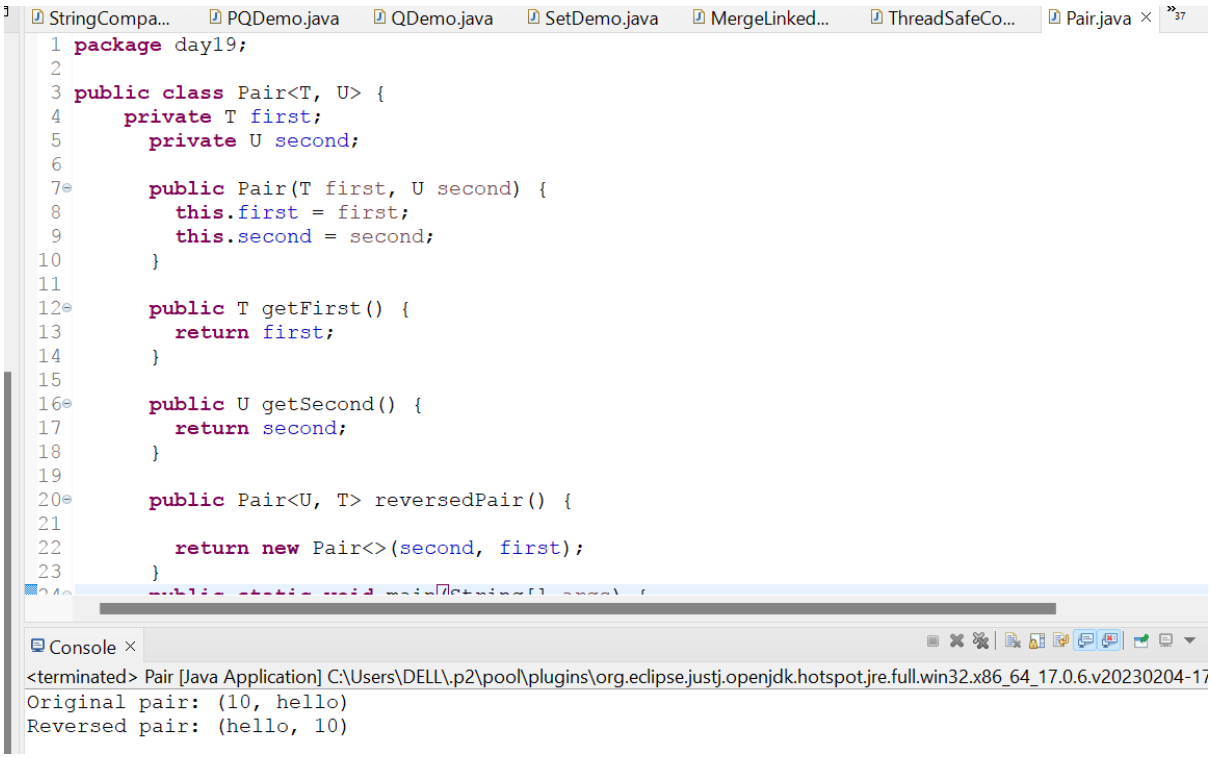
Task 1: Generics and Type Safety

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

```
package day19;

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> reversedPair() {

return new Pair<>(second, first);

}

public static void main(String[] args) {

Pair<Integer, String> myPair = new Pair<>(10, "hello");

Pair<String, Integer> reversedPair = myPair.reversedPair();
```

```
System.out.println("Original pair: (" + myPair.getFirst() + ", " +
myPair.getSecond() + ")");

System.out.println("Reversed pair: (" + reversedPair.getFirst() + ", " +
reversedPair.getSecond() + ")");

}

}
```

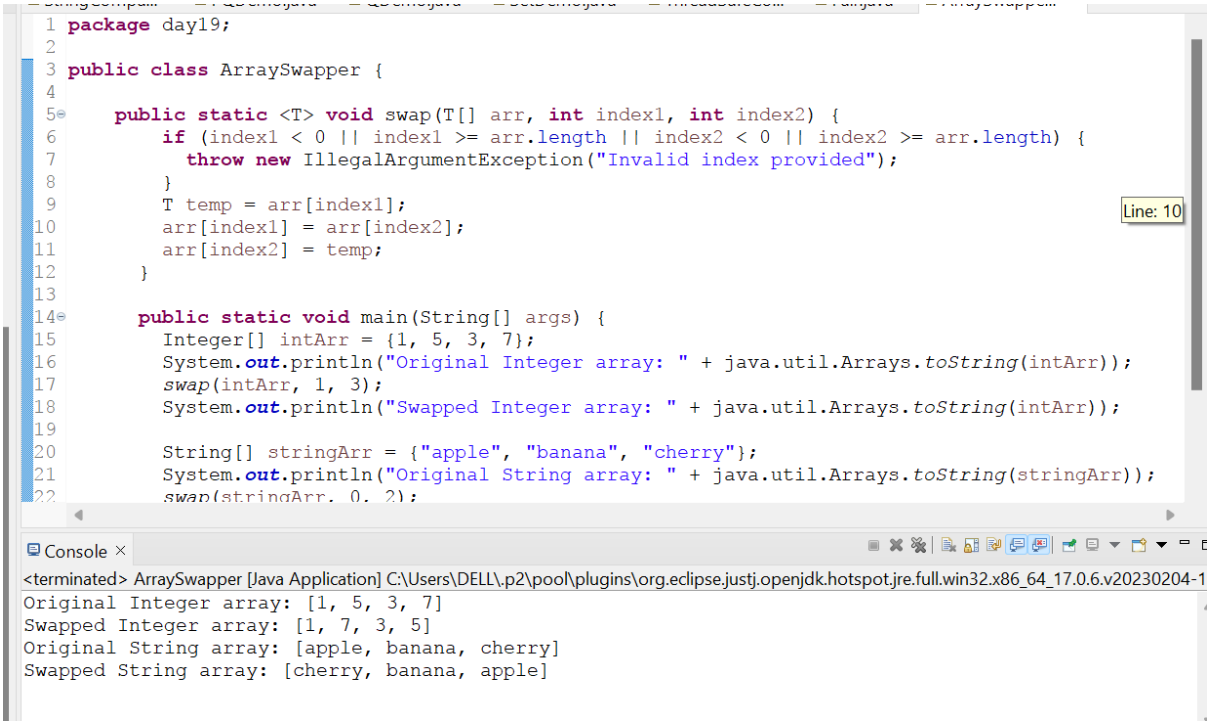


Task 2: Generic Classes and Methods

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.

```
package day19;

public class ArraySwapper {

public static <T> void swap(T[] arr, int index1, int index2) {

if (index1 < 0 || index1 >= arr.length || index2 < 0 || index2 >=
arr.length) {

throw new IllegalArgumentException("Invalid index provided");

}

T temp = arr[index1];
```

```
arr[index1] = arr[index2];

arr[index2] = temp;

}

public static void main(String[] args) {

Integer[] intArr = {1, 5, 3, 7};

System.out.println("Original Integer array: " +
java.util.Arrays.toString(intArr));

swap(intArr, 1, 3);

System.out.println("Swapped Integer array: " +
java.util.Arrays.toString(intArr));

String[] stringArr = {"apple", "banana", "cherry"};

System.out.println("Original String array: " +
java.util.Arrays.toString(stringArr));

swap(stringArr, 0, 2);

System.out.println("Swapped String array: " +
java.util.Arrays.toString(stringArr));

}

}
```



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.

```
    private String name;
    private int age;

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

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public intgetAge() {
        return age;
    }

    public void setAge(int age) {
this.age = age;
    }
    private void printPrivateMessage() {
System.out.println("This is a private method.");
    }
```

```
}
ReflectionExample Class:
import java.lang.reflect.Constructor;
import java.lang.reflect.Field;
import java.lang.reflect.Method;
public class ReflectionExample {
    public static void main(String[] args) {
        try {
  Class<?>personClass = Class.forName("Person");
System.out.println("Constructors:");
            Constructor<?>[] constructors = personClass.getConstructors();
            for (Constructor<?>constructor : constructors) {
System.out.println(constructor);
            }
System.out.println("\nMethods:");
Method[] methods = personClass.getMethods();
            for (Method method : methods) {
System.out.println(method);
            }
System.out.println("\nFields:");
Field[] fields = personClass.getDeclaredFields();
            for (Field field : fields) {
System.out.println(field);
            }
            Object personInstance = personClass.getConstructor().newInstance();
            Field nameField = personClass.getDeclaredField("name");
            nameField.setAccessible(true);
            nameField.set(personInstance, "John Doe");
            Method getNameMethod = personClass.getMethod("getName");
            String name = (String) getNameMethod.invoke(personInstance);
             System.out.println("\nModified name field: " + name);
```

```
            Field ageField = personClass.getDeclaredField("age");
            ageField.setAccessible(true);
           ageField.setInt(personInstance, 30);
            Method getAgeMethod = personClass.getMethod("getAge");
            int age = (int) getAgeMethod.invoke(personInstance);
            System.out.println("Modified age field: " + age);
           Method privateMethod = personClass.getDeclaredMethod("printPrivateMessage");
        privateMethod.setAccessible(true);
        privateMethod.invoke(personInstance);
         } catch (Exception e) {
        e.printStackTrace();
         }
     }
}
```

Output:

Constructors:

public Person()

public Person(java.lang.String,int)

Methods:

public java.lang.StringPerson.getName()

public void Person.setName(java.lang.String)

public intPerson.getAge()

public void Person.setAge(int)

public final void java.lang.Object.wait(long,int) throws java.lang.InterruptedException

public final void java.lang.Object.wait() throws java.lang.InterruptedException

public final native void java.lang.Object.wait(long) throws java.lang.InterruptedException

public booleanjava.lang.Object.equals(java.lang.Object)

public java.lang.Stringjava.lang.Object.toString()

public native intjava.lang.Object.hashCode()

public final native java.lang.Class<?>java.lang.Object.getClass()

public final native void java.lang.Object.notify()

public final native void java.lang.Object.notifyAll()

Fields:

private java.lang.String Person.name

private intPerson.age

Modified name field: John Doe

Modified age field: 30

This is a private method.

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..

```
package day19;

import java.util.ArrayList;

import java.util.List;

public class Person {

private String name;

private int age;

public Person(String name, int age) {

this.name = name;

this.age = age;

}

public String getName() {

return name;

}
```

```
public int getAge() {

return age;

}

@Override

public String toString() {

return "Person [name=" + name + ", age=" + age + "]";

}

public static void main(String[] args) {

List<Person> people = new ArrayList<>();

people.add(new Person("Alice", 30));

people.add(new Person("Bob", 25));

people.add(new Person("Charlie", 38));

System.out.println("Original list: " + people);

// Sort by age using lambda expression

people.sort((p1, p2) -> p1.getAge() - p2.getAge());

System.out.println("Sorted by age: " + people);

}

}
```

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.

```
package day19;

import java.util.function.Consumer;

import java.util.function.Function;

import java.util.function.Predicate;

import java.util.function.Supplier;

public class Person1 {

private String name;

private int age;

public Person1(String name, int age) {

this.name = name;

this.age = age;

}

public String getName() {

return name;

}

public int getAge() {

return age;

}

@Override

public String toString() {

return "Person [name=" + name + ", age=" + age + "]";

}

//public class FunctionalPersonOperations {
```

```
static Predicate<Person> isAdult = person -> person.getAge() >= 18;

static Function<Person, String> getFullName = person ->

(isAdult.test(person) ? "Mr./Ms. " : "") + person.getName();

static Consumer<Person> printDetails = person ->

System.out.println("Name: " + person.getName() + ", Age: " +
person.getAge());

static Supplier<Person> createPerson = () -> new Person("John Doe", 30);

public static void main(String[] args) {

// Create a Person object

Person person = createPerson.get();

// Check if adult

if (isAdult.test(person)) {

System.out.println("Adult");

} else {

System.out.println("Not an adult");

}

// Get full name

String fullName = getFullName.apply(person);

System.out.println("Full Name: " + fullName);

// Print details

printDetails.accept(person);

}

}
```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PQDemo.java
ThreadSafeCo...
Pair.java
ArraySwappe...
ReflectionT...
Person.java
*Person1.java
public class Person1 {
private String name;
private int age;
public Person1(String name, int age) {
this.name = name;
this.age = age;
}
public String getName() {
return name;
}
public int getAge() {
return age;
}
@Override
public String toString() {
return "Person [name=" + name + ", age=" + age + "]";
Console
<terminated> Person1 [Java Application] C:\Users\DELL\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.6.v20230204-1729\jre\bin\javaw.exe
Adult
Full Name: Mr./Ms. John Doe
Name: John Doe, Age: 30