

Assignment Day-12

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.

```
/*
    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.
*/

class Pair<T, G> {
    private T obj1;
    private G obj2;

    Pair(T obj1, G obj2) {
        this.obj1 = obj1;
        this.obj2 = obj2;
    }

    @Override
    public String toString() {
        return "(" +
            obj1.getClass().getName() +
            " : " +
            obj1.toString() +
            " , " +
            obj2.getClass().getName() +
            " : " +
            obj2.toString() +
            ")";
    }

    public Pair<G, T> reversedPair() {
        return new Pair(obj2, obj1);
    }
}

public class Assignment_1 {
    public static void main(String[] args) {
        System.out.println("Creating a type safe class called Pair");
        Pair<String, Integer> pair = new Pair<String, Integer>("Hello", 1234);
        System.out.println(pair);
    }
}
```

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```
        System.out.println("Reversed Pair");  
        Pair<Integer, String> revPair = pair.reversedPair();  
        System.out.println(revPair);  
  
    }  
}
```

```
package m5_core_java_programming.day_12;  
  
/*  
    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.  
*/  
  
import java.util.Scanner;  
  
class Arr {  
    private Object[] arr;  
    private final int size;  
    private int curr;  
  
    Arr(int size) {  
        this.arr = new Object[size];  
        this.size = size;  
        this.curr = 0;  
    }  
  
    public int size() {  
        return this.size;  
    }  
}
```

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```
public void add(Object obj) {  
    if (this.curr < this.size) {
```

Output

```
C:\Users\coolr\.jdk\openjdk-22.0.1\bin\java.exe "-javaagent:C:\Program Files\JetBrains  
Creating a type safe class called Pair  
(java.lang.String : Hello , java.lang.Integer : 1234)  
Reversed Pair  
(java.lang.Integer : 1234 , java.lang.String : Hello)  
  
Process finished with exit code 0
```

-
2. 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.

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```
        this.arr[this.curr] = obj;
        this.curr++;
    } else {
        System.out.println("Array is filled");
    }
}

public void replace(int a, int b) {
    if (a < 0 || a >= this.size || b < 0 || b >= this.size || a == b ||
this.curr < this.size) {
        System.out.println("Please fill the array first");
    } else {
        Object temp = this.arr[a];
        this.arr[a] = this.arr[b];
        this.arr[b] = temp;
    }
}

@Override
public String toString() {
    if (this.curr < this.size) {
        System.out.println("Please fill the array first");
        return "Please fill the array first.";
    } else {
        String string = "(";
        for (Object x : this.arr) {
            string += " " + x.toString();
        }
        string += " )";
        return string;
    }
}
}

public class Assignment_2 {
    public static void main(String[] args) {
        Scanner scan = new Scanner(System.in);
        System.out.println("Enter the size of the array : ");
        int n = scan.nextInt();
        System.out.println("Enter the Items");
        Arr arr = new Arr(n);
        for (int i = 0; i < n; i++) {
            System.out.println("Choose from any wrapper class type :");
        }
    }
}
```

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```
System.out.println("1. Integer");  
System.out.println("2. Long");  
System.out.println("3. Byte");  
System.out.println("4. Short");  
System.out.println("5. Double");  
System.out.println("6. Float");
```

```
System.out.println("7. String");  
int option = scan.nextInt();  
switch (option) {  
    case 1: {  
        System.out.println("Enter item : ");  
        arr.add(scan.nextInt());  
        break;  
    }  
    case 2: {  
        System.out.println("Enter item : ");  
        arr.add(scan.nextLong());  
        break;  
    }  
    case 3: {  
        System.out.println("Enter item : ");  
        arr.add(scan.nextByte());  
        break;  
    }  
    case 4: {  
        System.out.println("Enter item : ");  
        arr.add(scan.nextShort());  
        break;  
    }  
    case 5: {  
        System.out.println("Enter item : ");  
        arr.add(scan.nextDouble());  
        break;  
    }  
    case 6: {  
        System.out.println("Enter item : ");  
        arr.add(scan.nextFloat());  
        break;  
    }  
    case 7: {  
        System.out.println("Enter item : ");  
        arr.add(scan.next());  
        break;  
    }  
}
```

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```
        default: {
            System.out.println("Wrong choice");
            i--;
            break;
        }
    }
}

System.out.println(arr);

System.out.println("Enter indexes to swap item : ");
System.out.println("Enter first index : ");
int a = scan.nextInt();
System.out.println("Enter second index : ");
int b = scan.nextInt();
arr.replace(a, b);
System.out.println("After swapping :");
System.out.println(arr);
}
}
```

Output

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Enter the size of the array :

4

Enter the Items

Choose from any wrapper class type :

1. Integer
2. Long
3. Byte
4. Short
5. Double
6. Float
7. String

1

Enter item :

656

Choose from any wrapper class type :

1. Integer
2. Long
3. Byte
4. Short
5. Double
6. Float
7. String

7

Enter item :

Sayan

Choose from any wrapper class type :

1. Integer

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```
2. Long
3. Byte
4. Short
5. Double
6. Float
7. String
5
Enter item :
232.5
Choose from any wrapper class type :
1. Integer
2. Long
3. Byte
4. Short
5. Double
6. Float
7. String
4
Enter item :
12
( 656 Sayan 232.5 12 )
Enter indexes to swap item :
Enter first index :
1
Enter second index :
3
After swapping :
( 656 12 232.5 Sayan )
```

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

```
package m5_core_java_programming.day_12;

/*
    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
*/

import java.lang.reflect.*;

class RefExample {
    private int num1;
```


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```
protected int num2;  
public String name;
```

```
private RefExample() {  
    this.num1 = 0;  
    this.num2 = 0;  
    this.name = "Default Name.";  
}  
  
public RefExample(int num1, int num2) {  
    this.num1 = num1;  
    this.num2 = num2;  
    this.name = "Default Name.";  
}  
  
public RefExample(int num1, int num2, String name) {  
    this.num1 = num1;  
    this.num2 = num2;  
    this.name = name;  
}  
  
public void publicMethod() {  
    System.out.println("I am public.");  
}  
  
private void privateMethod(String str) {  
    System.out.println("I am private.");  
    System.out.println("But they have invoked me with this value " + str);  
}  
  
protected void protectedMethod() {  
    System.out.println("I am protected.");  
}  
  
public int getNum1() {  
    return num1;  
}  
  
public void setNum1(int num1) {
```

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```
        this.num1 = num1;
    }

    public int getNum2() {
        return num2;
    }

    public void setNum2(int num2) {
        this.num2 = num2;
    }

    public String getName() {
```

```
        return name;
    }

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

public class Assignment_3 {
    public static void main(String[] args) {
        try {
            Class c =
Class.forName("m5_core_java_programming.day_12.RefExample");
            System.out.println("All constructors of : " + c.getTypeName());
            Constructor[] constructor = c.getDeclaredConstructors();
            for (Constructor cons : constructor) {

System.out.println("-----
_")
+ "\n" +
                "Modifier : " + Modifier.toString(cons.getModifiers()) +
"\n" +
                "Constructor Name : " + cons.getName() + "\n" +
                "Parameter count : " + cons.getParameterCount()
            );
        }
    }

    System.out.println(".....
..
...");
}
```

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```
        System.out.println("All the methods of :" + c.getTypeName());
        Method[] method = c.getDeclaredMethods();
        for (Method meth : method) {

System.out.println("-----
-")
+ "\n" +
                "Modifier : " + Modifier.toString(meth.getModifiers()) +
"\n" +
                "Method Name : " + meth.getName() + "\n" +
                "Parameter count : " + meth.getParameterCount() + "\n" +
                "Return type : " + meth.getReturnType()

        );
    }

System.out.println(".....
..
...");

        System.out.println("All the Fields of :" + c.getTypeName());
        Field[] fields = c.getDeclaredFields();
        for (Field field : fields) {

System.out.println("-----
-")
+ "\n" +
                "Modifier : " + Modifier.toString(field.getModifiers())
+ "\n" +
                "Field Name : " + field.getName() + "\n" +
                "Field type : " + field.toGenericString()

        );
    }

System.out.println(".....
..
...");

        System.out.println("Setting private privateMethod method to
public");
        Method privToPublic = c.getDeclaredMethod("privateMethod",
String.class);
        privToPublic.setAccessible(true);
        RefExample ref = new RefExample(1, 10);
        privToPublic.invoke(ref, "Set to Public");

    } catch (ClassNotFoundException e) {
        throw new RuntimeException(e);
    }
}
```

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```
    } catch (NoSuchMethodException e) {  
        throw new RuntimeException(e);  
    } catch (InvocationTargetException e) {  
        throw new RuntimeException(e);  
    } catch (IllegalAccessException e) {  
        throw new RuntimeException(e);  
    }  
}  
}
```

Output

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```
C:\Users\c00tr\jaks\openjdk-22.0.1\bin\java.exe -javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2
All constructors of : m5_core_java_programming.day_12.RefExample
-----
Modifier : public
Constructor Name : m5_core_java_programming.day_12.RefExample
Parameter count : 3
-----
Modifier : public
Constructor Name : m5_core_java_programming.day_12.RefExample
Parameter count : 2
-----
Modifier : private
Constructor Name : m5_core_java_programming.day_12.RefExample
Parameter count : 0
.....
All the methods of :m5_core_java_programming.day_12.RefExample
-----
Modifier : public
Method Name : getName
Parameter count : 0
Return type : class java.lang.String
-----
Modifier : public
Method Name : setName
Parameter count : 1
Return type : void
-----
Modifier : public
Method Name : publicMethod
Parameter count : 0
Return type : void
-----
Modifier : private
Method Name : privateMethod
Parameter count : 1
Return type : void
-----
Modifier : protected
Method Name : protectedMethod
Parameter count : 0
Return type : void
-----
Modifier : public
Method Name : getNum2
Parameter count : 0
Return type : int
-----
Modifier : public
Method Name : getNum1
Parameter count : 0
Return type : int
-----
```

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```
Modifier : public
Method Name : setNum1
Parameter count : 1
Return type : void
-----
Modifier : public
Method Name : setNum2
Parameter count : 1
Return type : void
.....
All the Fields of :m5_core_java_programming.day_12.RefExample
-----
Modifier : private
Field Name : num1
Field type : private int m5_core_java_programming.day_12.RefExample.num1
-----
Modifier : protected
Field Name : num2
Field type : protected int m5_core_java_programming.day_12.RefExample.num2
-----
Modifier : public
Field Name : name
Field type : public java.lang.String m5_core_java_programming.day_12.RefExample.name
.....
Setting private privateMethod method to public
I am private.
But they have invoked me with this value Set to Public
```

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

```
package m5_core_java_programming.day_12;

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

import java.util.LinkedList;
import java.util.Scanner;

class Person {
    private String name;
    private int age;

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

    public int getAge() {
        return age;
    }
}
```

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```
}

    public String getName() {
        return name;
    }

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

    public void setAge(int age) {
        this.age = age;
    }

    @Override
    public String toString() {
        return "Person{" +
            "name='" + name + '\'' +
            ", age=" + age +
            '}';
    }
}

public class Assignment_4 {
    public static void main(String[] args) {
        Scanner scan = new Scanner(System.in);
        LinkedList<Person> ls = new LinkedList<Person>();
        System.out.println("Number of people to add : ");
        int n = scan.nextInt();
        for (int i = 0; i < n; i++) {
            System.out.println("Add name :");
            String name = scan.next();
            System.out.println("Add age :");
            int age = scan.nextInt();
            Person person = new Person(name, age);
            ls.add(person);
        }

        System.out.println("Before Sorting :");
        System.out.println(ls);
        System.out.println("After sorting :");
        ls.sort((a, b) -> a.getAge() - b.getAge());
        System.out.println(ls);
    }
}
```

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```
}  
}
```

Output

```
Number of people to add :  
4  
Add name :  
Sayan  
Add age :  
25  
Add name :  
Ashlesha  
Add age :  
22  
Add name :  
Sumit  
Add age :  
24  
Add name :  
Prantika  
Add age :  
27  
Before Sorting :  
[Person{name='Sayan', age=25}, Person{name='Ashlesha', age=22}, Person{name='Sumit', age=24}, Person{name='Prantika', age=27}]  
After sorting :  
[Person{name='Ashlesha', age=22}, Person{name='Sumit', age=24}, Person{name='Sayan', age=25}, Person{name='Prantika', age=27}]  
  
Process finished with exit code 0
```

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

```
package m5_core_java_programming.day_12;  
  
/*  
    Create a method that accepts functions as parameters using Predicate,  
    Function, Consumer, and Supplier interfaces to operate on a Person object.  
*/  
  
import java.util.Scanner;  
import java.util.function.Consumer;  
import java.util.function.Function;  
import java.util.function.Predicate;  
import java.util.function.Supplier;  
  
class SpecialFunction {  
    public static boolean predicate(Predicate<Person> p, Person person) {  
        return p.test(person);  
    }  
}
```


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```
public static Person supplier(Supplier<Person> s, String name, int age) {  
    return s.get();  
}  
  
public static int function(Function<Person, Integer> f, Person person) {  
    return f.apply(person);  
}
```

```
public static void consumer(Consumer<Person> c, Person person) {  
    c.accept(person);  
}  
}  
  
public class Assignment_5 {  
  
    public static void main(String[] args) {  
        Scanner scan = new Scanner(System.in);  
        System.out.println("Creating a person object :");  
        System.out.println("Enter name :");  
        String name = scan.next();  
        System.out.println("Enter age :");  
        int age = scan.nextInt();  
        Person person = new Person(name, age);  
  
        System.out.println("_____  
        ");  
        System.out.println("Calling predicate functional interface :");  
        Predicate<Person> p = (Person per) -> per.getAge() > 18;  
        System.out.println("This Predicate if the person is adult " +  
        SpecialFunction.predicate(p, person));  
  
        System.out.println("_____  
        ");  
        System.out.println("Calling supplier functional interface :");  
        System.out.println("Enter name :");  
        name = scan.next();  
        System.out.println("Enter age :");  
        age = scan.nextInt();  
        String finalName = name;  
        int finalAge = age;  
        Supplier<Person> s = () -> new Person(finalName, finalAge);  
        person = SpecialFunction.supplier(s, finalName, finalAge);  
        System.out.println("This Supplier will create a new Person object " +
```

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```
        System.out.println("Enter new age :");
        age = scan.nextInt();
        int finalAge1 = age;
        Consumer<Person> c = (Person per) -> per.setAge(finalAge1);
        SpecialFunction.consumer(c, person);
        System.out.println("This Consumer will set new age in the person
        object
" + person);
    }
}
person);

System.out.println("
");
        System.out.println("Calling function functional interface :");
        Function<Person, Integer> f = (Person per) -> per.getAge();
        System.out.println("This Function will return the age of the person " +
SpecialFunction.function(f, person));

System.out.println("
");
        System.out.println("Calling consumer functional interface :");
        System.out.println("Current Age of person " + person.getAge());
```

Output

```
C:\Users\coolr\.jdk\openjdk-22.0.1\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2024.1\lib\idea
Creating a person object :
Enter name :
Sayan
Enter age :
25

-----
Calling predicate functional interface :
This Predicate if the person is adult true
-----

Calling supplier functional interface :
Enter name :
Ashlesha
Enter age :
22
This Supplier will create a new Person object Person{name='Ashlesha', age=22}
-----

Calling function functional interface :
This Function will return the age of the person 22
-----

Calling consumer functional interface :
Current Age of person 22
Enter new age :
23
This Consumer will set new age in the person object Person{name='Ashlesha', age=23}

Process finished with exit code 0
```

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Tools Used :

IntelliJ IDE java version

"1.8.0_411"

Java(TM) SE Runtime Environment (build 1.8.0_411-b09)

Java HotSpot(TM) Client VM (build 25.411-b09, mixed mode, sharing)