Name:Vaishnavi Ingole

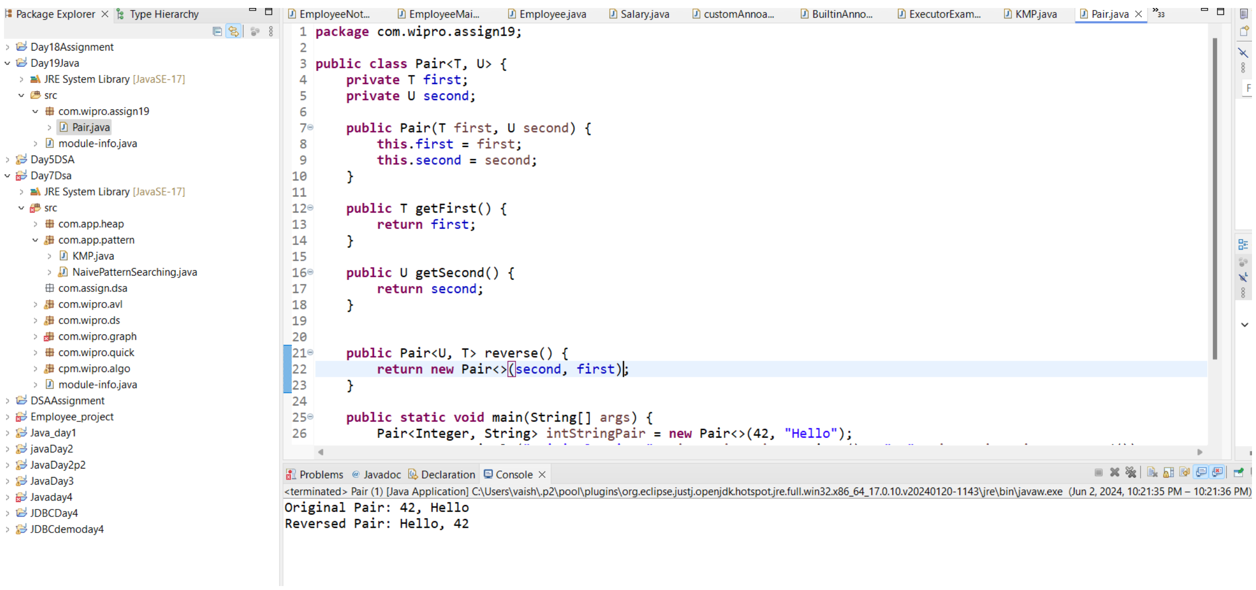
Mail:vaishnavingole54@mail.com

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.

Solution:

```
package com.wipro.assign19;

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);
    }

    public static void main(String[] args) {
        Pair<Integer, String> intStringPair = new Pair<>(42, "Hello");
        System.out.println("Original Pair: " +
intStringPair.getFirst() + ", " + intStringPair.getSecond());

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



```
package com.wipro.assign19;

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);
    }

    public static void main(String[] args) {
        Pair<Integer, String> intStringPair = new Pair<>(42, "Hello");
```

```
<terminated> Pair (1) [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin\javaw.exe  (Jun 2, 2024, 10:21:35 PM – 10:21:36 PM)
Original Pair: 42, Hello
Reversed Pair: Hello, 42
```

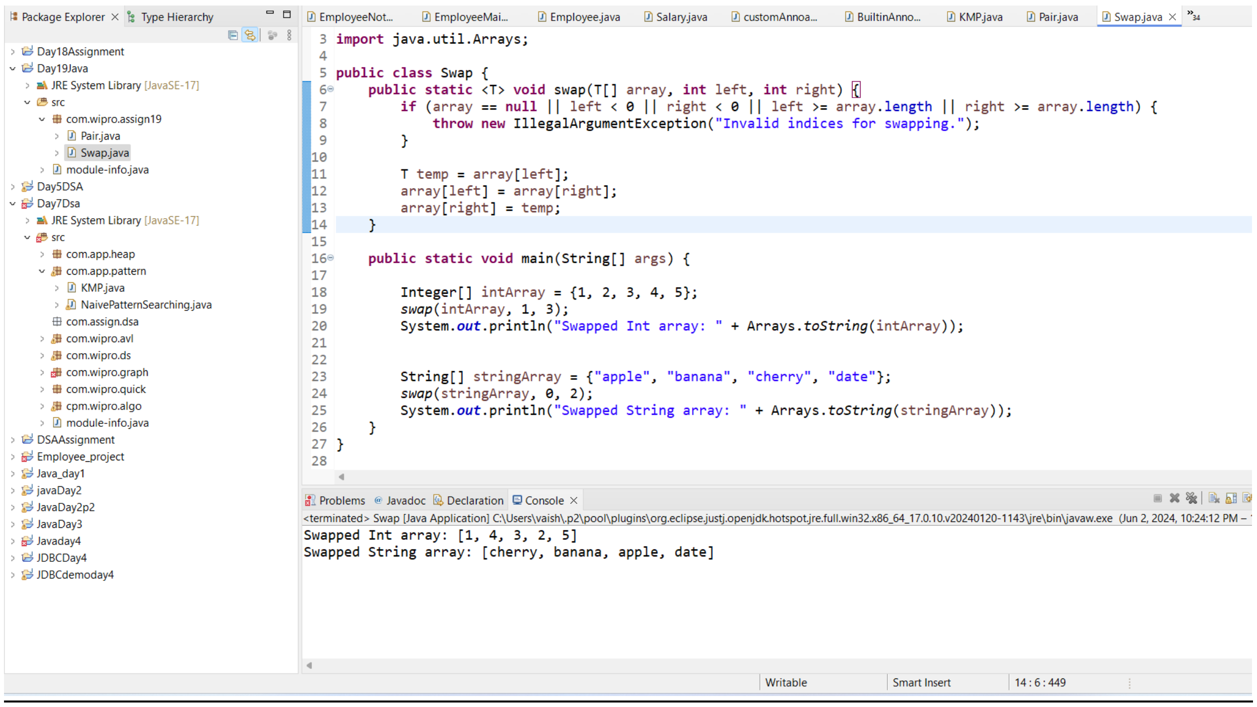
Task 2: Generic Classes and Methods

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.

Solution:

```
package com.wipro.assign19;

import java.util.Arrays;

public class Swap {
    public static <T> void swap(T[] array, int left, int right) {
        if (array == null || left < 0 || right < 0 || left >=
array.length || right >= array.length) {
            throw new IllegalArgumentException("Invalid indices for
swapping.");
        }

        T temp = array[left];
        array[left] = array[right];
        array[right] = temp;
    }

    public static void main(String[] args) {
```

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


        String[] stringArray = {"apple", "banana", "cherry", "date"};
        swap(stringArray, 0, 2);
        System.out.println("Swapped String array: " +
Arrays.toString(stringArray));
    }
}
```



```java
import java.util.Arrays;

public class Swap {
    public static <T> void swap(T[] array, int left, int right) {
        if (array == null || left < 0 || right < 0 || left >= array.length || right >= array.length) {
            throw new IllegalArgumentException("Invalid indices for swapping.");
        }

        T temp = array[left];
        array[left] = array[right];
        array[right] = temp;
    }

    public static void main(String[] args) {

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


        String[] stringArray = {"apple", "banana", "cherry", "date"};
        swap(stringArray, 0, 2);
        System.out.println("Swapped String array: " + Arrays.toString(stringArray));
    }
}
```

```
<terminated> Swap [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin\javaw.exe (Jun 2, 2024, 10:24:12 PM –
Swapped Int array: [1, 4, 3, 2, 5]
Swapped String array: [cherry, banana, apple, date]
```

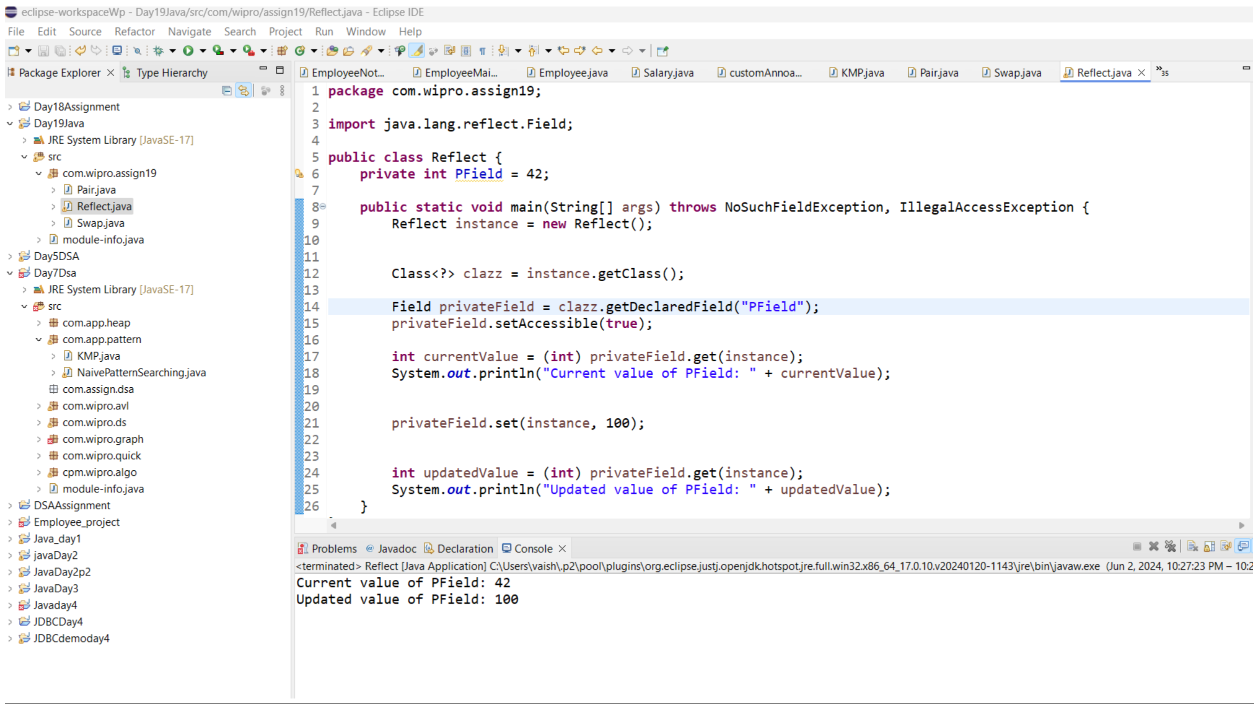
Task 3: Reflection API

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

<u>Solution:</u>

```java
package com.wipro.assign19;
```

```
import java.lang.reflect.Field;

public class Reflect {
    private int PField = 42;

    public static void main(String[] args) throws
NoSuchFieldException, IllegalAccessException {
        Reflect instance = new Reflect();


        Class<?> clazz = instance.getClass();

        Field privateField = clazz.getDeclaredField("PField");
        privateField.setAccessible(true);

        int currentValue = (int) privateField.get(instance);
        System.out.println("Current value of PField: " +
currentValue);


        privateField.set(instance, 100);


        int updatedValue = (int) privateField.get(instance);
        System.out.println("Updated value of PField: " +
updatedValue);
    }
}
```



```
package com.wipro.assign19;

import java.lang.reflect.Field;

public class Reflect {
    private int PField = 42;

    public static void main(String[] args) throws NoSuchFieldException, IllegalAccessException {
        Reflect instance = new Reflect();


        Class<?> clazz = instance.getClass();

        Field privateField = clazz.getDeclaredField("PField");
        privateField.setAccessible(true);

        int currentValue = (int) privateField.get(instance);
        System.out.println("Current value of PField: " + currentValue);


        privateField.set(instance, 100);


        int updatedValue = (int) privateField.get(instance);
        System.out.println("Updated value of PField: " + updatedValue);
    }
```

```
<terminated> Reflect [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin\javaw.exe  (Jun 2, 2024, 10:27:23 PM – 10:2
Current value of PField: 42
Updated value of PField: 100
```

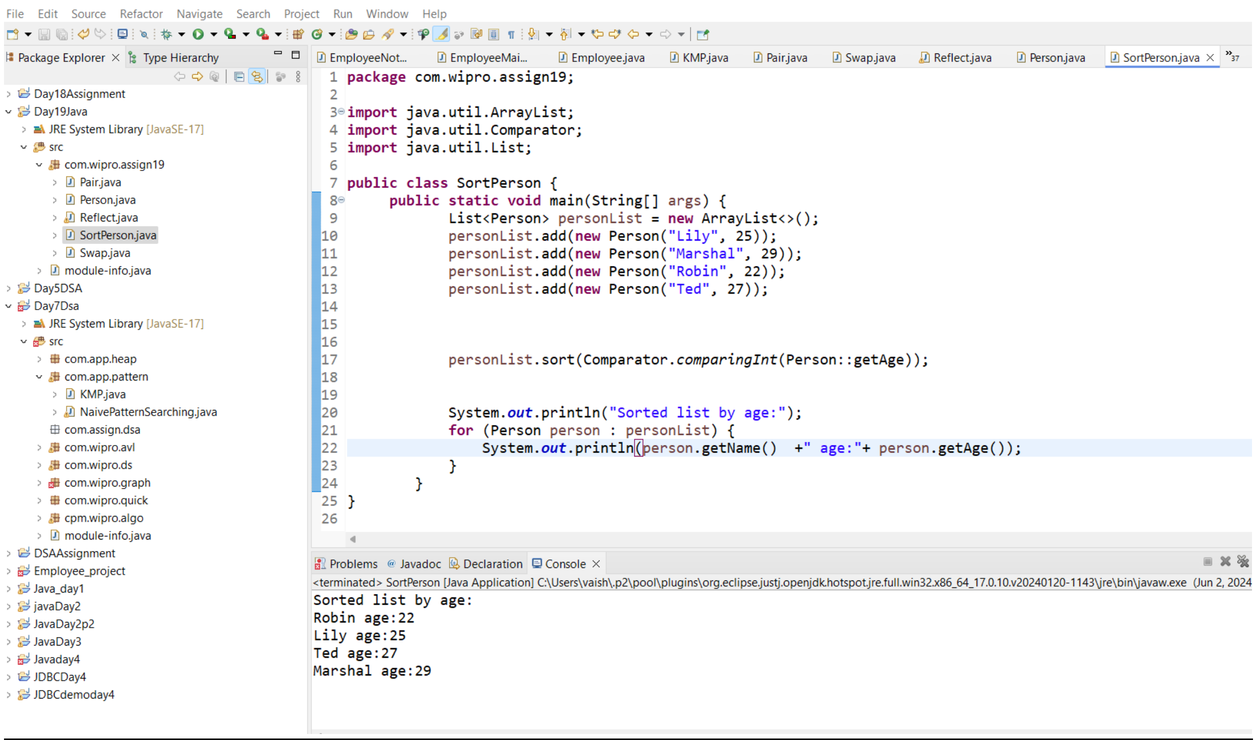
Task 4: Lambda Expressions

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

Solution:

```
package com.wipro.assign19;

import java.util.ArrayList;
import java.util.Comparator;
import java.util.List;

public class SortPerson {
	public static void main(String[] args) {
		List<Person> personList = new ArrayList<>();
		personList.add(new Person("Lily", 25));
		personList.add(new Person("Marshal", 29));
		personList.add(new Person("Robin", 22));
		personList.add(new Person("Ted", 27));



		personList.sort(Comparator.comparingInt(Person::getAge));
```

```
              System.out.println("Sorted list by age:");
              for (Person person : personList) {
                  System.out.println(person.getName()  +" age:"+
person.getAge());
              }
          }
}
```



```
package com.wipro.assign19;

import java.util.ArrayList;
import java.util.Comparator;
import java.util.List;

public class SortPerson {
    public static void main(String[] args) {
            List<Person> personList = new ArrayList<>();
            personList.add(new Person("Lily", 25));
            personList.add(new Person("Marshal", 29));
            personList.add(new Person("Robin", 22));
            personList.add(new Person("Ted", 27));



            personList.sort(Comparator.comparingInt(Person::getAge));


            System.out.println("Sorted list by age:");
            for (Person person : personList) {
                System.out.println(person.getName()  +" age:"+ person.getAge());
            }
        }
}
```

```
<terminated> SortPerson [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin\javaw.exe (Jun 2, 2024
Sorted list by age:
Robin age:22
Lily age:25
Ted age:27
Marshal age:29
```

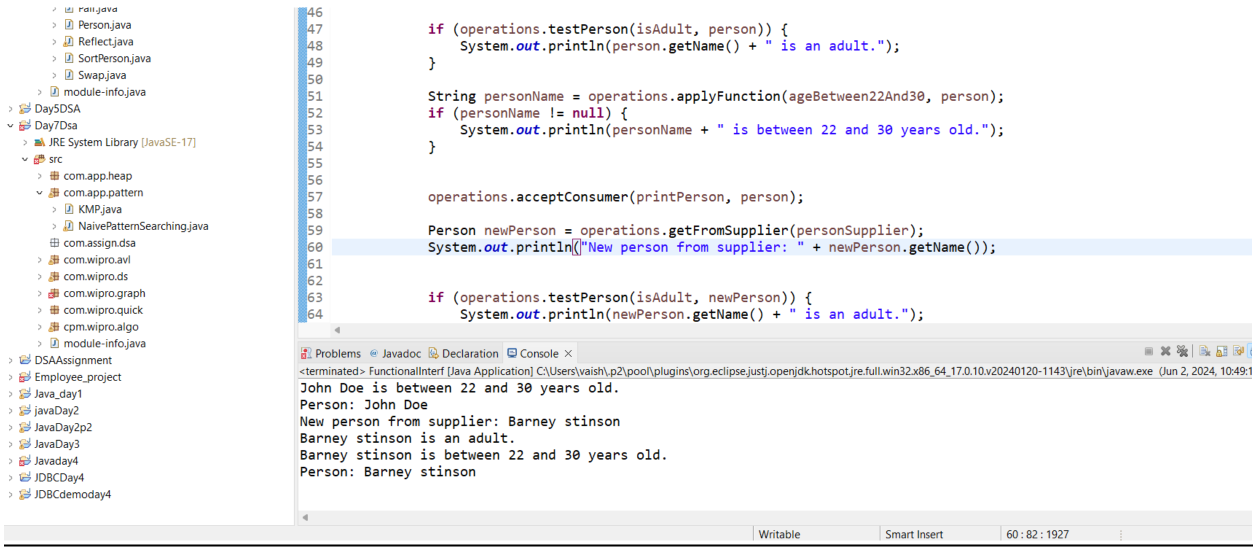
Task 5: Functional Interfaces

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

Solution:

```
package com.wipro.assign19;

import java.util.function.Consumer;
import java.util.function.Function;
import java.util.function.Predicate;
import java.util.function.Supplier;
```

```
public class FunctionalInterf {
      public boolean testPerson(Predicate<Person> predicate, Person
person) {
            return predicate.test(person);
         }


         public <R> R applyFunction(Function<Person, R> function,
Person person) {
            return function.apply(person);
         }

         public void acceptConsumer(Consumer<Person> consumer, Person
person) {
            consumer.accept(person);
         }


         public Person getFromSupplier(Supplier<Person> supplier) {
            return supplier.get();
         }

         public static void main(String[] args) {
          FunctionalInterf operations = new    FunctionalInterf();
            Person person = new Person("John Doe", 25);


            Predicate<Person> isAdult = p -> p.getAge() >= 18;

            Function<Person, String> ageBetween22And30 = p -> {
                if (p.getAge() > 22 && p.getAge() < 30) {
                    return p.getName();
                }
                return null;
            };

            Consumer<Person> printPerson = p ->
System.out.println("Person: " + p.getName());


            Supplier<Person> personSupplier = () -> new
Person("Barney stinson", 28);


            if (operations.testPerson(isAdult, person)) {
                System.out.println(person.getName() + " is an
adult.");
            }

            String personName =
operations.applyFunction(ageBetween22And30, person);
            if (personName != null) {
                System.out.println(personName + " is between 22 and
30 years old.");
            }


            operations.acceptConsumer(printPerson, person);

            Person newPerson =
operations.getFromSupplier(personSupplier);
            System.out.println("New person from supplier: " +
newPerson.getName());


            if (operations.testPerson(isAdult, newPerson)) {
                System.out.println(newPerson.getName() + " is an
adult.");
                personName =
operations.applyFunction(ageBetween22And30, newPerson);
                if (personName != null) {
                    System.out.println(personName + " is between 22
and 30 years old.");
                }
                operations.acceptConsumer(printPerson, newPerson);
            }
         }
}
```



```java

        if (operations.testPerson(isAdult, person)) {
            System.out.println(person.getName() + " is an adult.");
        }

        String personName = operations.applyFunction(ageBetween22And30, person);
        if (personName != null) {
            System.out.println(personName + " is between 22 and 30 years old.");
        }


        operations.acceptConsumer(printPerson, person);

        Person newPerson = operations.getFromSupplier(personSupplier);
        System.out.println("New person from supplier: " + newPerson.getName());


        if (operations.testPerson(isAdult, newPerson)) {
            System.out.println(newPerson.getName() + " is an adult.");
```

```
<terminated> FunctionalInterf [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.10.v20240120-1143\jre\bin\javaw.exe (Jun 2, 2024, 10:49:1
John Doe is between 22 and 30 years old.
Person: John Doe
New person from supplier: Barney stinson
Barney stinson is an adult.
Barney stinson is between 22 and 30 years old.
Person: Barney stinson
```