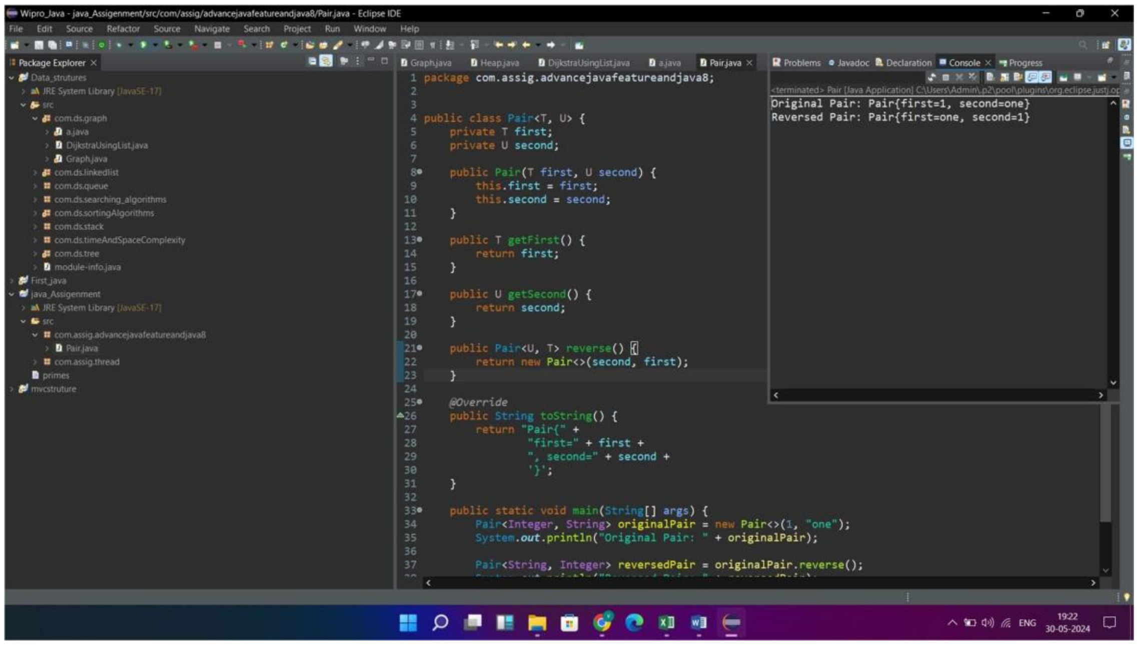
Task 1: Generics and Type Safety

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 com.assig.advancejavafeatureandjava8;


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;

    }


    // Method to reverse the pair

    public Pair<U, T> reverse() {

        return new Pair<>(second, first);

    }


    @Override

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

    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);
    }
}
```



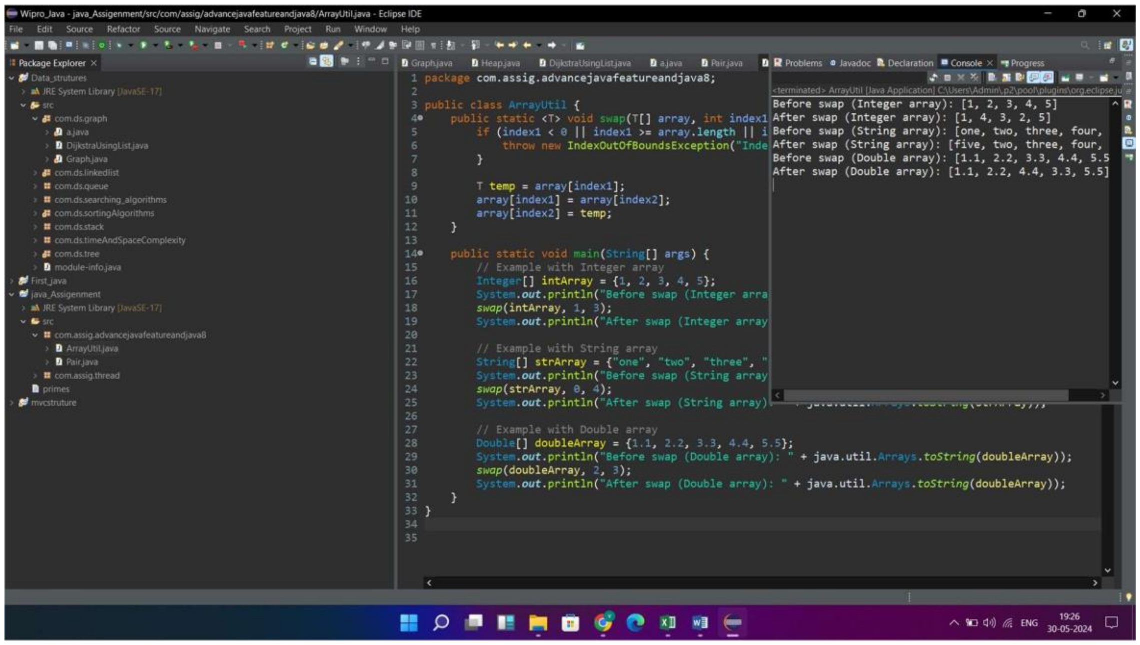
```java
package com.assig.advancejavafeatureandjava8;


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 +
                '}';
    }

    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();
```

```
<terminated> Pair [Java Application] C:\Users\Admin\.p2\pool\plugins\org.eclipse.justj.op
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

```java
package com.assig.advancejavafeatureandjava8;

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;
    }
}
```



```java
package com.assig.advancejavafeatureandjava8;

public class ArrayUtil {
    public static <T> void swap(T[] array, int index1
        if (index1 < 0 || index1 >= array.length || i
            throw new IndexOutOfBoundsException("Inde
        }

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

    public static void main(String[] args) {
        // Example with Integer array
        Integer[] intArray = {1, 2, 3, 4, 5};
        System.out.println("Before swap (Integer arra
        swap(intArray, 1, 3);
        System.out.println("After swap (Integer array

        // Example with String array
        String[] strArray = {"one", "two", "three", "
        System.out.println("Before swap (String array
        swap(strArray, 0, 4);
        System.out.println("After swap (String array)

        // Example with Double array
        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));
    }
}
```

```
<terminated> ArrayUtil [Java Application] C:\Users\Admin\.p2\pool\plugins\org.eclipse.ju
Before swap (Integer array): [1, 2, 3, 4, 5]
After swap (Integer array): [1, 4, 3, 2, 5]
Before swap (String array): [one, two, three, four,
After swap (String array): [five, two, three, four,
Before swap (Double array): [1.1, 2.2, 3.3, 4.4, 5.5
After swap (Double array): [1.1, 2.2, 4.4, 3.3, 5.5]
```

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

package com.assig.advancejavafeatureandjava8;
import java.lang.reflect.Field;

import java.lang.reflect.Modifier;

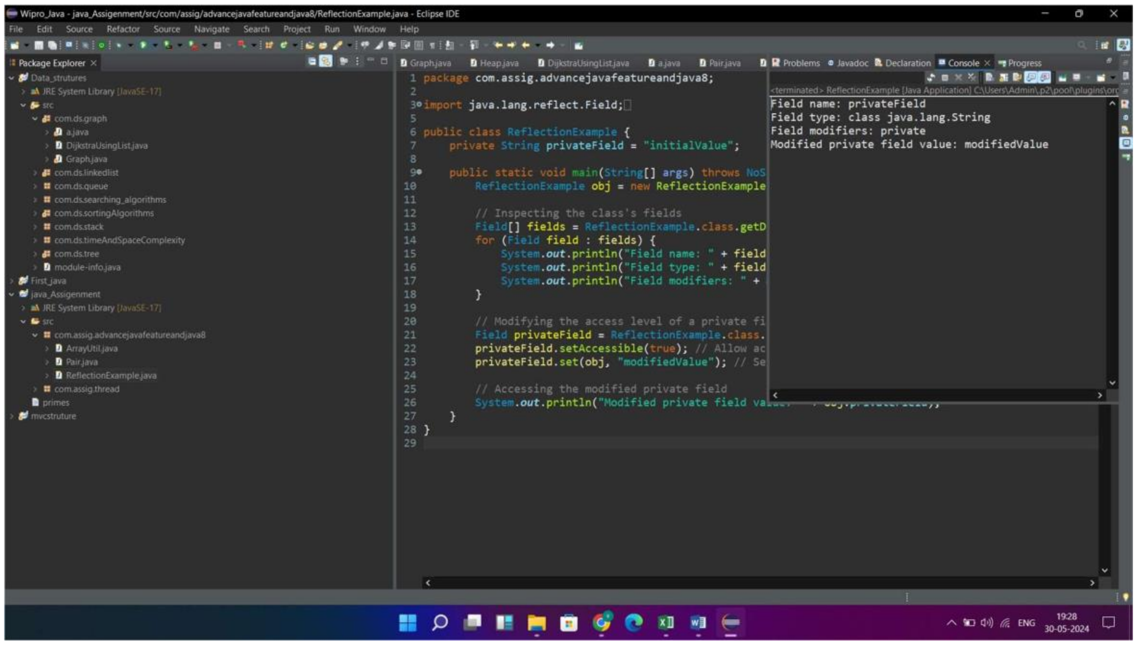
public class ReflectionExample {

    private String privateField = "initialValue";

    public static void main(String[] args) throws NoSuchFieldException,
IllegalAccessException {

        ReflectionExample obj = new ReflectionExample();

```
        Field[] fields = ReflectionExample.class.getDeclaredFields(); for (Field
        field : fields) {
            System.out.println("Field name: " + field.getName());

            System.out.println("Field type: " + field.getType());

            System.out.println("Field modifiers: " +
  Modifier.toString(field.getModifiers()));

        }



        Field privateField =
  ReflectionExample.class.getDeclaredField("privateField");

        privateField.setAccessible(true); // Allow access to private field

        privateField.set(obj, "modifiedValue"); // Set new value


private field System.out.println("Modified private field value: " +
  obj.privateField);

    }

  }
```



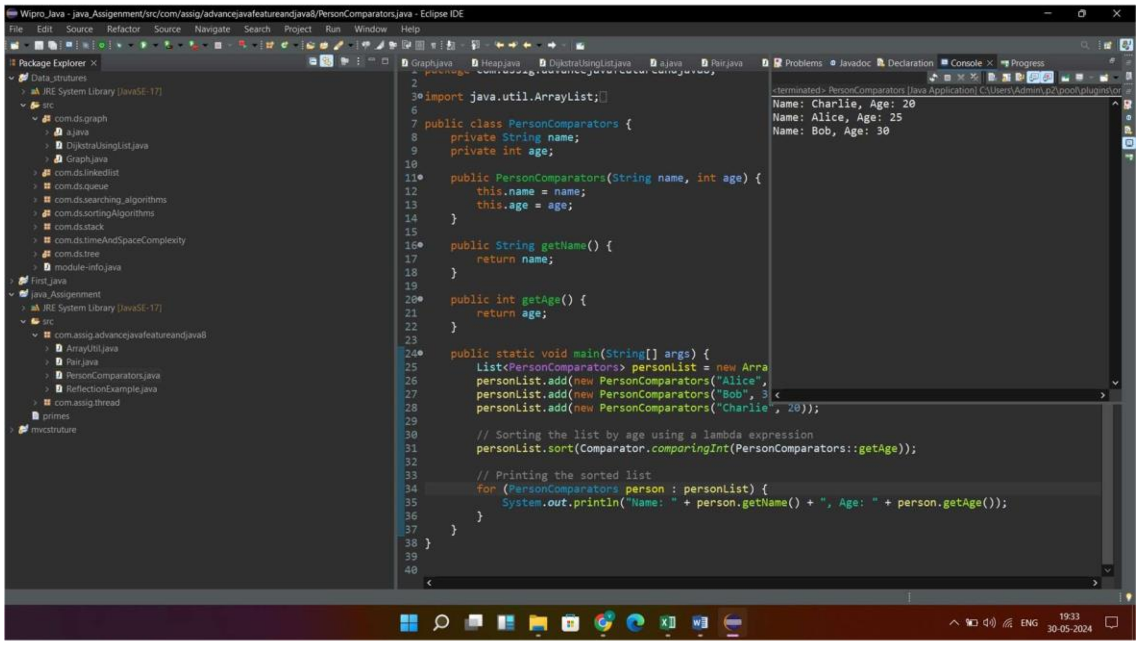
```java
package com.assig.advancejavafeatureandjava8;

import java.lang.reflect.Field;

public class ReflectionExample {
    private String privateField = "initialValue";

    public static void main(String[] args) throws NoS
        ReflectionExample obj = new ReflectionExample

        // Inspecting the class's fields
        Field[] fields = ReflectionExample.class.getD
        for (Field field : fields) {
            System.out.println("Field name: " + field
            System.out.println("Field type: " + field
            System.out.println("Field modifiers: " +
        }

        // Modifying the access level of a private fi
        Field privateField = ReflectionExample.class.
        privateField.setAccessible(true); // Allow ac
        privateField.set(obj, "modifiedValue"); // Se

        // Accessing the modified private field
        System.out.println("Modified private field value: " + obj.privateField);
    }
}
```

```
<terminated> ReflectionExample [Java Application] C:\Users\Admin\.p2\pool\plugins\or
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..

```
package com.assig.advancejavafeatureandjava8;


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("Alice", 25));
        personList.add(new PersonComparators("Bob", 30));
        personList.add(new PersonComparators("Charlie", 20));

        // Sorting the list by age using a lambda expression

personList.sort(Comparator.comparingInt(PersonComparators::getA ge));

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


```
import java.util.ArrayList;

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 Arra
        personList.add(new PersonComparators("Alice",
        personList.add(new PersonComparators("Bob", 3
        personList.add(new PersonComparators("Charlie", 20));

        // 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());
        }
    }
}
```

```
<terminated> PersonComparators [Java Application] C:\Users\Admin\.p2\pool\plugins\or
Name: Charlie, Age: 20
Name: Alice, Age: 25
Name: Bob, Age: 30
```

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 com.assig.advancejavafeatureandjava8;

import java.util.function.Consumer; import

java.util.function.Function; import

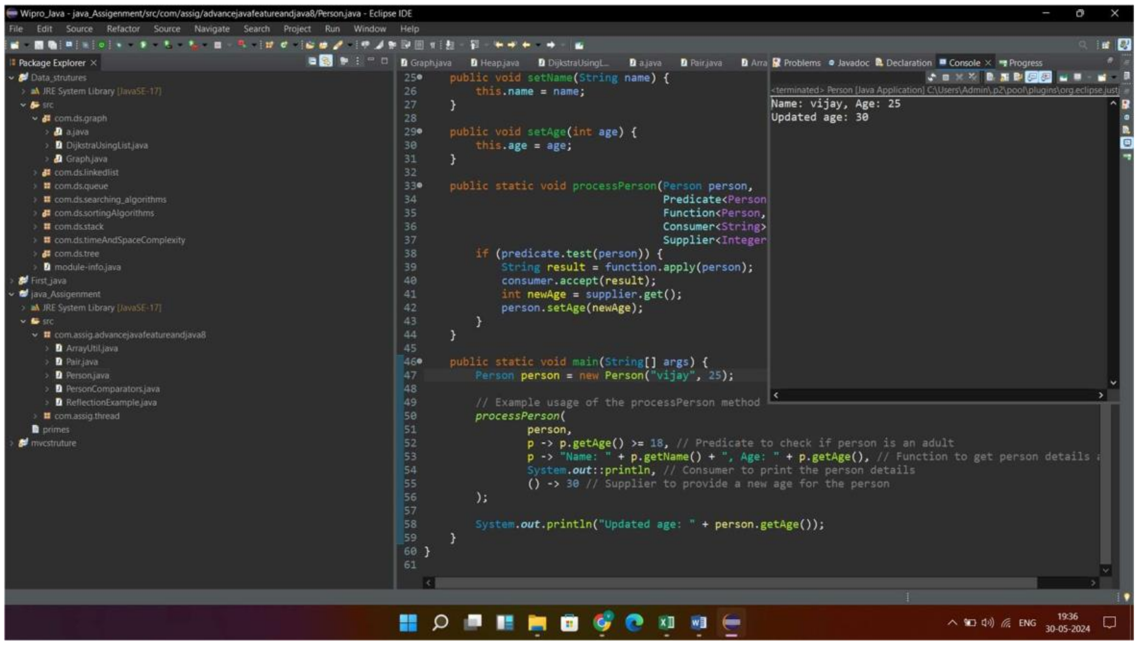
java.util.function.Predicate; import

java.util.function.Supplier;

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;
}

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

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

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("vijay", 25);


        // 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());
    }
}
```



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

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

    public static void processPerson(Person person,
                                     Predicate<Person
                                     Function<Person,
                                     Consumer<String>
                                     Supplier<Integer
        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("vijay", 25);

        // 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
                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());
    }
}
```

```
<terminated> Person [Java Application] C:\Users\Admin\.p2\pool\plugins\org.eclipse.just
Name: vijay, Age: 25
Updated age: 30
```