Jobsheet 02

Class andObject

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1. Competence

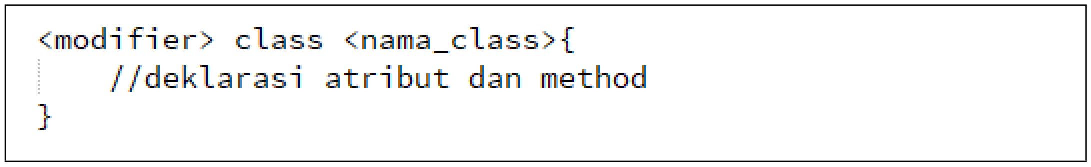
- Students can understand the descriptions of classes and objects
- Students understand the implementation of the class
- Students can understand the implementation of the attribute
- Students can understand the implementation of the method
- Students can understand the implementation of the intansiasi process

2. Introduction

2.1 Classes and Objects

In a nutshell, a class is an abstraction of an object (real or unreal) (Roger S Pressman). If we want to create a **student** class, then we need to identify the student object regarding the characteristics/attributes and behaviors/actions that represent the object. One example of an attribute from a student is **NIM** (Student Identification Number) and the behavior/action that can be done by students is **to follow final Exam**.

After we understand the meaning of classes and objects, the next step is to implement classes through the Object Oriented Programming approach (in this course using the java programming language). Here is the syntax of the class declaration in java programming:



```
<modifier> class <nama_class>{
    //deklarasi atribut dan method
}
```

The rules for writing a class are as follows:

1. In the form of nouns,
2. Starting with **a capital letter,**
3. If it consists of more than 1 word, then each word is concatenated, and the initial letter of each word uses **a capital letter**.

The Access Modifier is not covered in this jobsheet, but will be discussed in the next jobsheet.

Example class declaration:

```
public class Mahasiswa {

}
```

2.2 Attribute

To declare *attributes*, you can do it with the following syntax:

```
<modifier> <tipe_data> <nama_atribut>;
```

The rules for writing attributes are as follows:

1. In the form of nouns or adjectives,
2. Starting with **a lowercase letter**,
3. If it consists of more than 1 word, then each word is concatenated, and the initial letter of each word uses **a capital letter**

Example attribute declaration:

```
public String nim;
public String nama;
public String alamat;
```

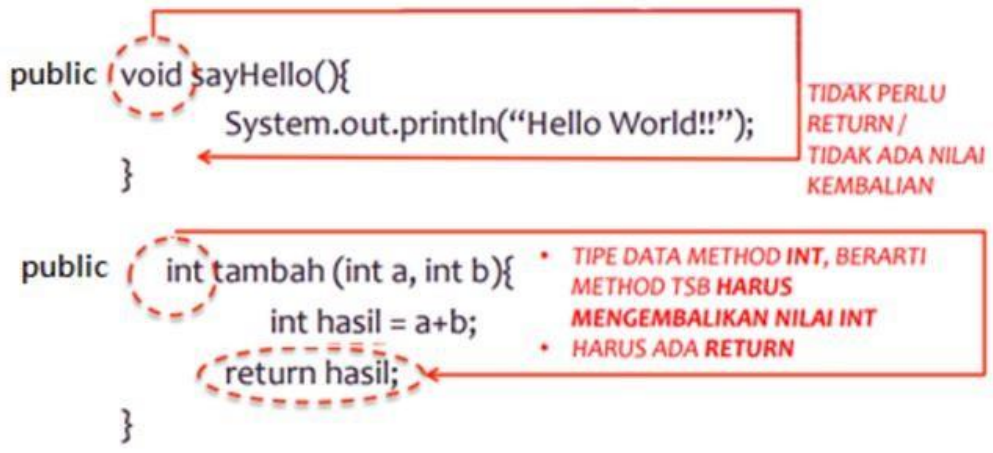
2.3 Method

The method on an object represents the behavior of the object or the action/function/procedure/process that can be performed. A method is implemented as a block that contains a statement or line of program code.

The method is declared with the following syntax:

```
<modifier> <return_type> <nama method>(param1, param2, …)
{
    //statements
}
```

A method with *a return type* **void** means it does not have a *return value*, so it does not require a *return* keyword in it. While methods with *a return type* **other than void** mean that they require a *return value*, so there must be a value returned with the *return* keyword in it.



```
public void sayHello(){
        System.out.println("Hello World!!");
    }
public  int tambah (int a, int b){
            int hasil = a+b;
        return hasil;
    }
```

TIDAK PERLU RETURN / TIDAK ADA NILAI KEMBALIAN
• TIPE DATA METHOD INT, BERARTI METHOD TSB HARUS MENGEMBALIKAN NILAI INT
• HARUS ADA RETURN

The rules for writing methods are as follows:

1. In the form of verbs,
2. Starting with **a lowercase letter**,
3. If it consists of more than 1 word, then each word **is concatenated**, and the initial letter of each word uses **a capital letter.**

2.4 Object

Once the class is created, the next step is to create the object. The process of creating an Object from a Class is called **instantiation** using *the keyword new*. The basic syntax of the agency is as follows:

```
NamaClass namaObject = new NamaClass();
```

Example:

```
Mahasiswa mhs = new Mahasiswa();
Mahasiswa ani = new Mahasiswa();
Mahasiswa mahasiswa = new Mahasiswa();
Random r = new Random();
Pegawai pegawai1 = new Pegawai();
```

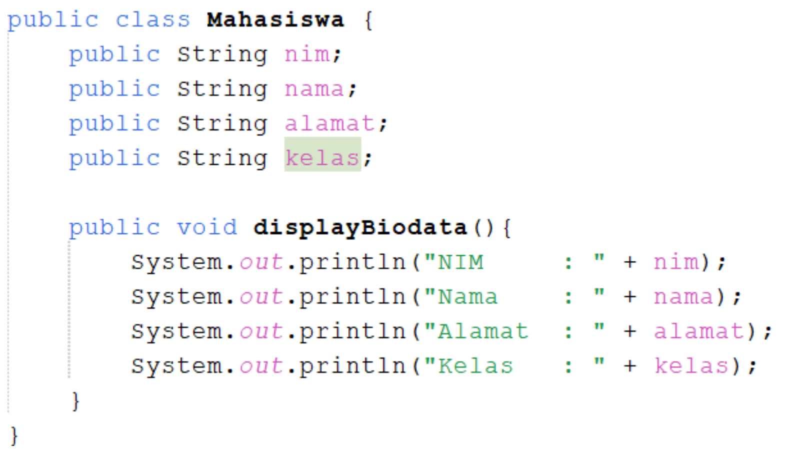
In the first line of the example above, a new object is created with the name *Mhs* which is of type *Student*.

3. Experiment

3.1 Experiment 1: Object instantiation, accessing attributes, calling methods

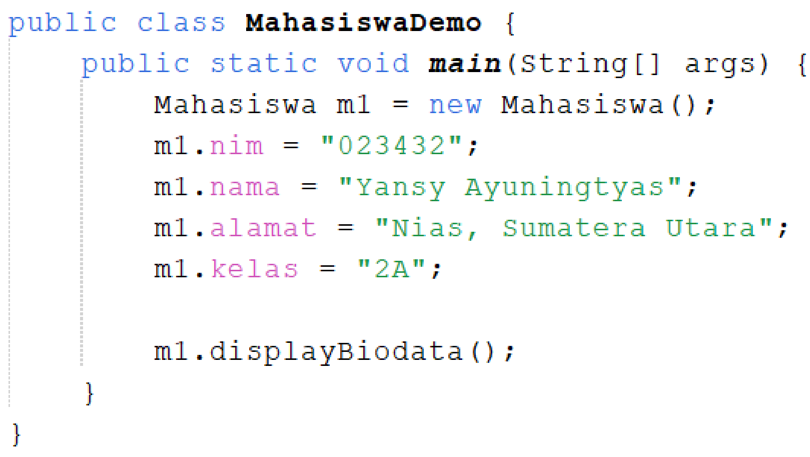
Working steps:

1. Open development tools, e.g. Netbeans, Visual Code, etc.
2. Type the following program code:



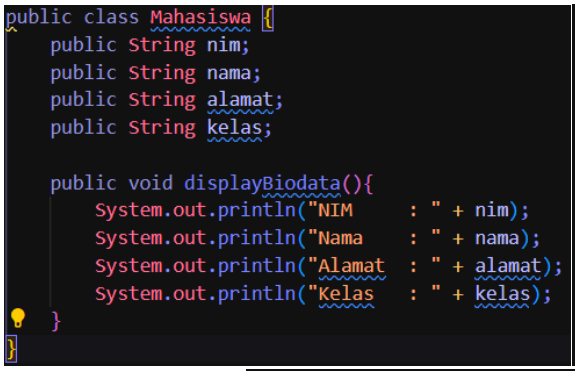
```
public class Mahasiswa {
    public String nim;
    public String nama;
    public String alamat;
    public String kelas;

    public void displayBiodata(){
        System.out.println("NIM      : " + nim);
        System.out.println("Nama     : " + nama);
        System.out.println("Alamat   : " + alamat);
        System.out.println("Kelas    : " + kelas);
    }
}
```

3. Save with the file name Mahasiswa.java.
4. To create a new object with a student type, a student class institution is carried out as in the following example:

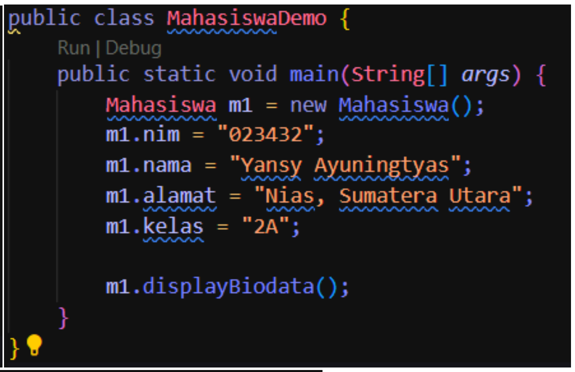


```
public class MahasiswaDemo {
    public static void main(String[] args) {
        Mahasiswa m1 = new Mahasiswa();
        m1.nim = "023432";
        m1.nama = "Yansy Ayuningtyas";
        m1.alamat = "Nias, Sumatera Utara";
        m1.kelas = "2A";

        m1.displayBiodata();
    }
}
```

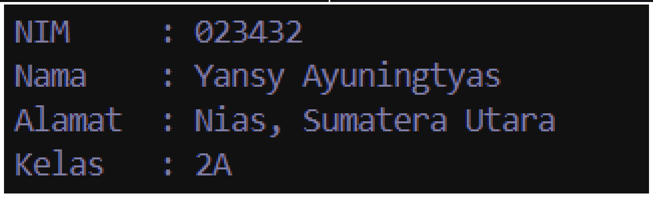
5. Save files with MahasiswaDemo.java
6. Run class MahasiswaDemo.java



```
public class Mahasiswa {
    public String nim;
    public String nama;
    public String alamat;
    public String kelas;

    public void displayBiodata(){
        System.out.println("NIM     : " + nim);
        System.out.println("Nama    : " + nama);
        System.out.println("Alamat  : " + alamat);
        System.out.println("Kelas   : " + kelas);
    }
}
```



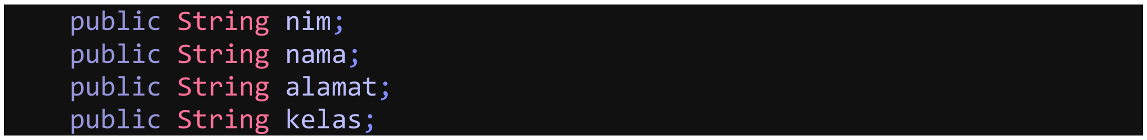
```
public class MahasiswaDemo {
    Run | Debug
    public static void main(String[] args) {
        Mahasiswa m1 = new Mahasiswa();
        m1.nim = "023432";
        m1.nama = "Yansy Ayuningtyas";
        m1.alamat = "Nias, Sumatera Utara";
        m1.kelas = "2A";

        m1.displayBiodata();
    }
}
```



```
NIM     : 023432
Nama    : Yansy Ayuningtyas
Alamat  : Nias, Sumatera Utara
Kelas   : 2A
```

7. At what point is the attribute declaration process in the above program?

   Attributes are declared in the Student class in this section:

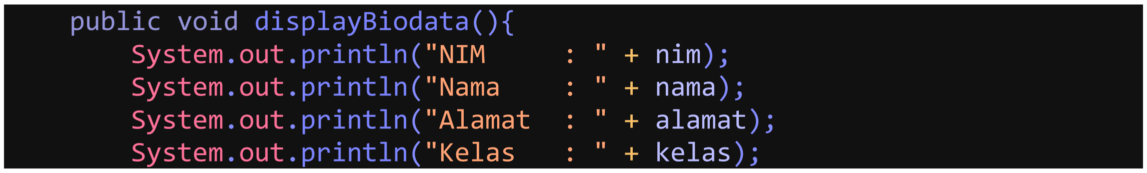


```
    public String nim;
    public String nama;
    public String alamat;
    public String kelas;
```

   The code declares the variable by specifying its data type and name.

8. In what part of the method declaration process in the program above?

   Method is declared in the Student class in this section:

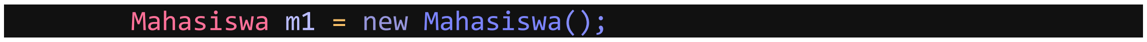


```
    public void displayBiodata(){
        System.out.println("NIM     : " + nim);
        System.out.println("Nama    : " + nama);
        System.out.println("Alamat  : " + alamat);
        System.out.println("Kelas   : " + kelas);
```

   Method is a block of code that will be executed when called.

9. How many objects are instantiated in the above program?

   The program only instantiates one object.



```
        Mahasiswa m1 = new Mahasiswa();
```

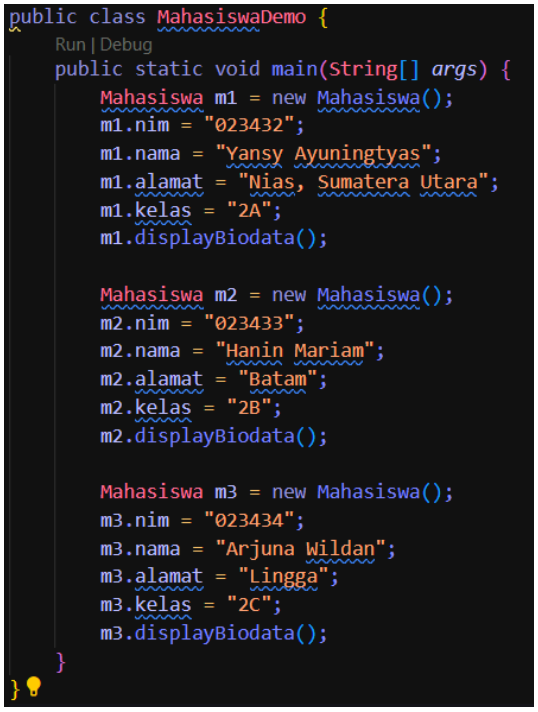
10. What does the "m1.nim=101" program syntax actually do?

    Fills the value of the nim attribute of object m1 with the value 101 (probably means 023432).

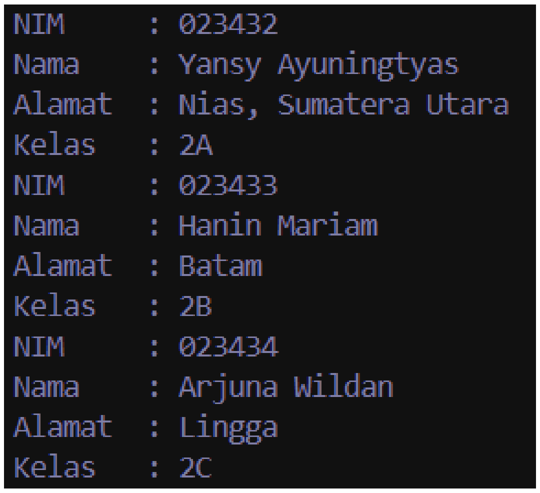
11. What does the "m1.displayBiodata()" program syntax actually do?

    m1.displayBiodata(); is used to call the displayBiodata() method of object m1. This method serves to display information on the object's attributes, such as NIM, name, address, and class that have been entered.

12. Institution of 2 new student objects in the StudentDemo class



```java
public class MahasiswaDemo {
    Run | Debug
    public static void main(String[] args) {
        Mahasiswa m1 = new Mahasiswa();
        m1.nim = "023432";
        m1.nama = "Yansy Ayuningtyas";
        m1.alamat = "Nias, Sumatera Utara";
        m1.kelas = "2A";
        m1.displayBiodata();

        Mahasiswa m2 = new Mahasiswa();
        m2.nim = "023433";
        m2.nama = "Hanin Mariam";
        m2.alamat = "Batam";
        m2.kelas = "2B";
        m2.displayBiodata();

        Mahasiswa m3 = new Mahasiswa();
        m3.nim = "023434";
        m3.nama = "Arjuna Wildan";
        m3.alamat = "Lingga";
        m3.kelas = "2C";
        m3.displayBiodata();
    }
}
```



```
NIM     : 023432
Nama    : Yansy Ayuningtyas
Alamat  : Nias, Sumatera Utara
Kelas   : 2A
NIM     : 023433
Nama    : Hanin Mariam
Alamat  : Batam
Kelas   : 2B
NIM     : 023434
Nama    : Arjuna Wildan
Alamat  : Lingga
Kelas   : 2C
```

4.2 Experiment 3: Method with return value

Working steps:

1. Open a text editor or IDE, e.g. Notepad++/netbeans.
2. Type the following program code:

```java
public class Barang {
    public String kode;
    public String nama;
    public double hargaKotor;
    public double diskon;
}
```

3. Save with file name Barang.java
4. Create a method that calculates and returns the net price value based on the discount and gross price attributes

```java
public double getHargaBersih(){
    return hargaKotor - diskon * hargaKotor;
}
```

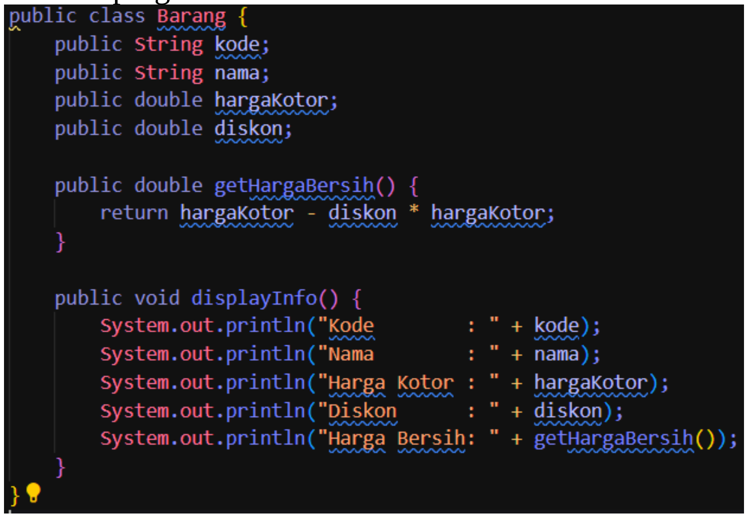
5. Create a method to print info from an item. The net price value is obtained by calling the getHargaNet() method.

```java
public void displayInfo(){
    System.out.println("Kode        : " + kode);
    System.out.println("Nama        : " + nama);
    System.out.println("Harga Kotor : " + hargaKotor);
    System.out.println("Diskon      : " + diskon);
    System.out.println("Harga Bersih: " + getHargaBersih());
}
```

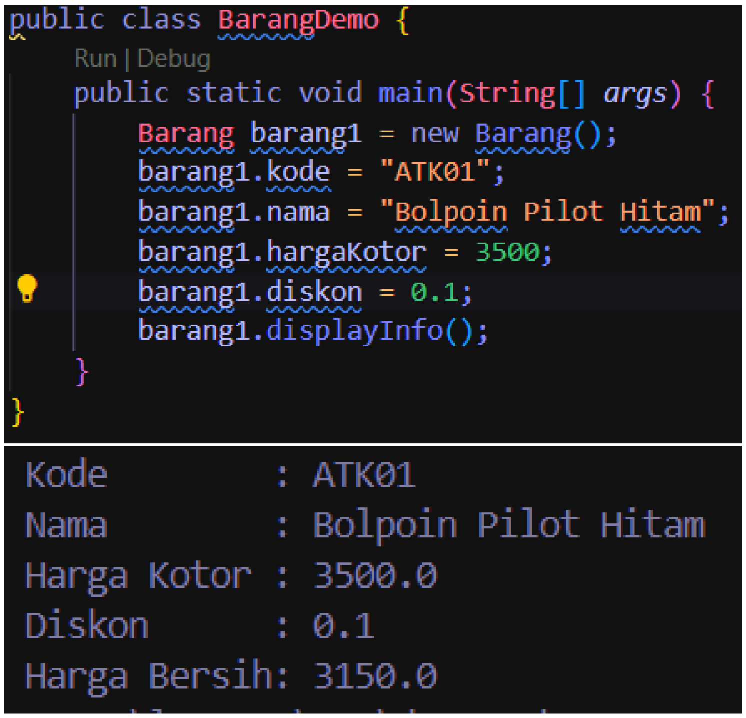
6. Create a new file BarangDemo.java then instantiate the new item object

```java
public class BarangDemo {
    public static void main(String[] args) {
        Barang barang1 = new Barang();
        barang1.kode = "ATK01";
        barang1.nama = "Bolpoin Pilot Hitam";
        barang1.hargaKotor = 3500;
        barang1.diskon = 0.1;

        barang1.displayInfo();
    }
}
```

7. Run the program!



```java
public class Barang {
    public String kode;
    public String nama;
    public double hargaKotor;
    public double diskon;

    public double getHargaBersih() {
        return hargaKotor - diskon * hargaKotor;
    }

    public void displayInfo() {
        System.out.println("Kode        : " + kode);
        System.out.println("Nama        : " + nama);
        System.out.println("Harga Kotor : " + hargaKotor);
        System.out.println("Diskon      : " + diskon);
        System.out.println("Harga Bersih: " + getHargaBersih());
    }
}
```



```
public class BarangDemo {
    Run | Debug
    public static void main(String[] args) {
        Barang barang1 = new Barang();
        barang1.kode = "ATK01";
        barang1.nama = "Bolpoin Pilot Hitam";
        barang1.hargaKotor = 3500;
        barang1.diskon = 0.1;
        barang1.displayInfo();
    }
}
```

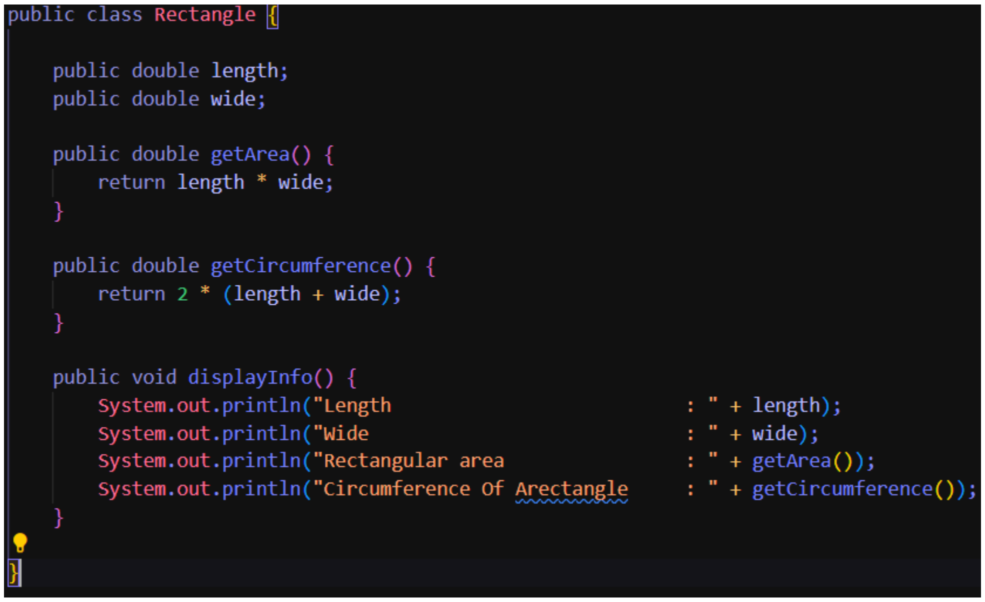
```
Kode        : ATK01
Nama        : Bolpoin Pilot Hitam
Harga Kotor : 3500.0
Diskon      : 0.1
Harga Bersih: 3150.0
```

8. In Java programming, the return statement is used to return a value when the execution of a block is complete.
   The return keyword is used in methods if the result of the method needs to be returned to the calling program, such as the result of a calculation or data. But if the method just does its work with no return value, return is not used in the method.

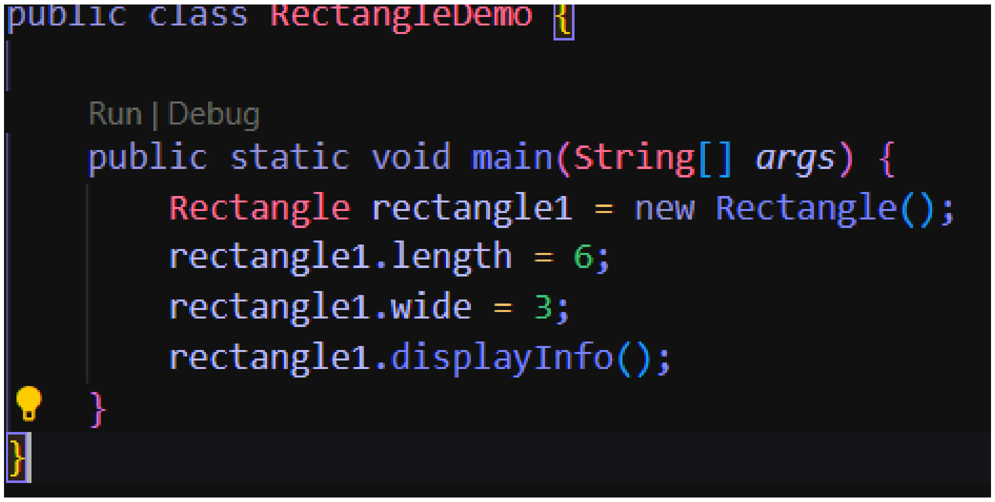
4.3 Assignment

1. Implement the following case study with the PBO paradigm.
   The Rectangle **class** has **long and wide** attributes with the integer data type The class also has three methods:
   - method displayInfo() to display long and wide data
   - Method getArea() to calculate the area of
   - Method getCircumference() to calculate circumference

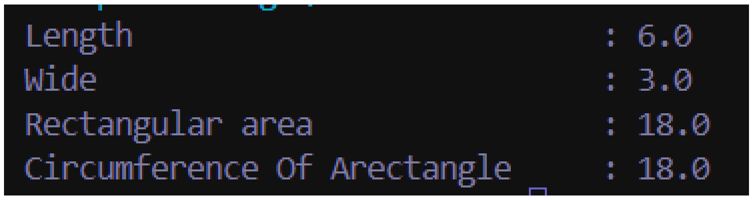
   Display the square data, square area values and square circumference in the **DemoSquare class**.



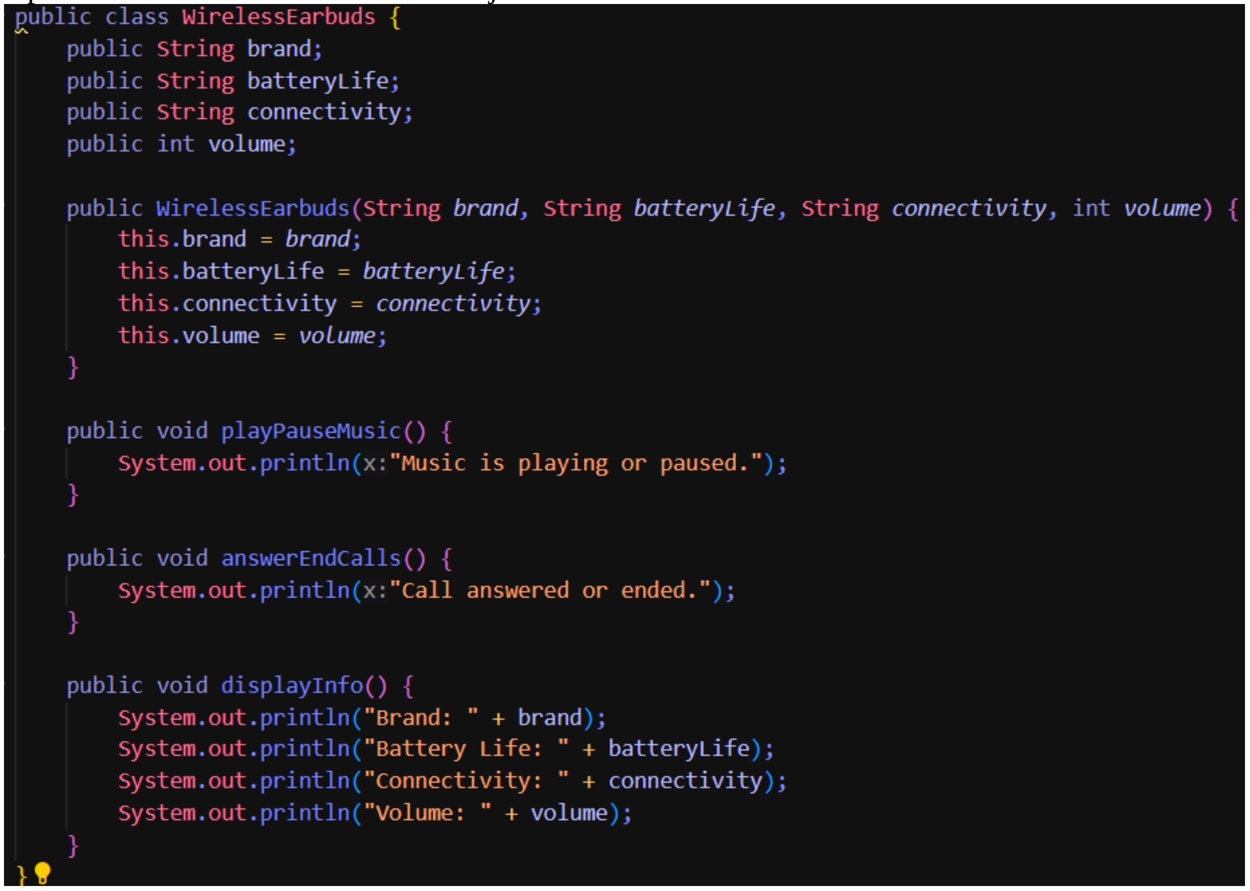
```
public class Rectangle {

    public double length;
    public double wide;

    public double getArea() {
        return length * wide;
    }

    public double getCircumference() {
        return 2 * (length + wide);
    }

    public void displayInfo() {
        System.out.println("Length                              : " + length);
        System.out.println("Wide                                : " + wide);
        System.out.println("Rectangular area                    : " + getArea());
        System.out.println("Circumference Of Arectangle         : " + getCircumference());
    }

}
```

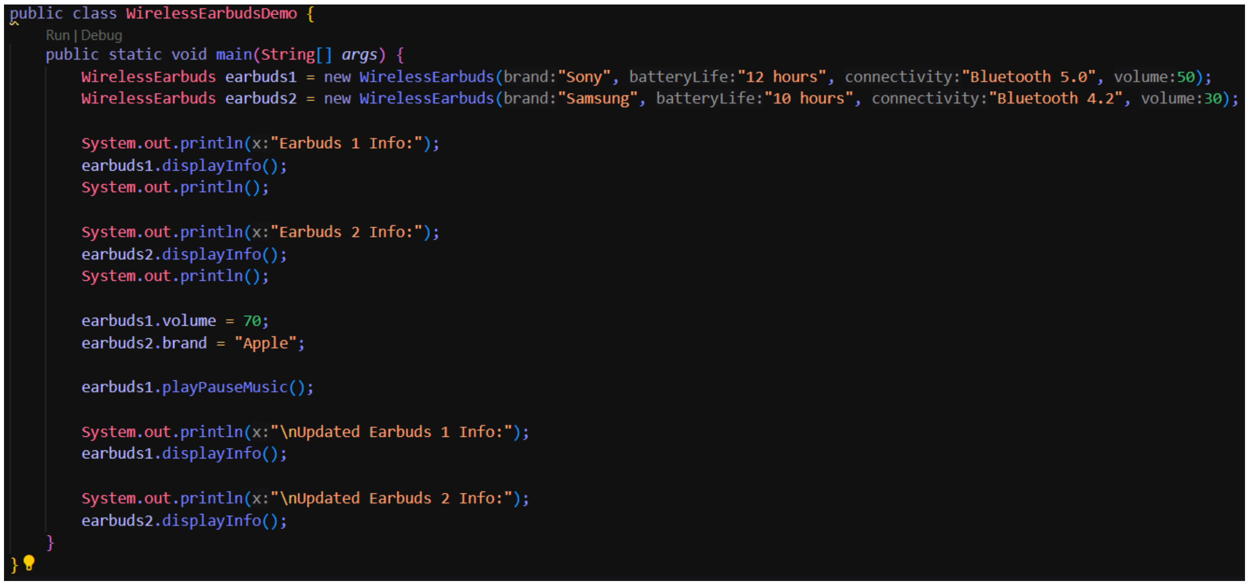


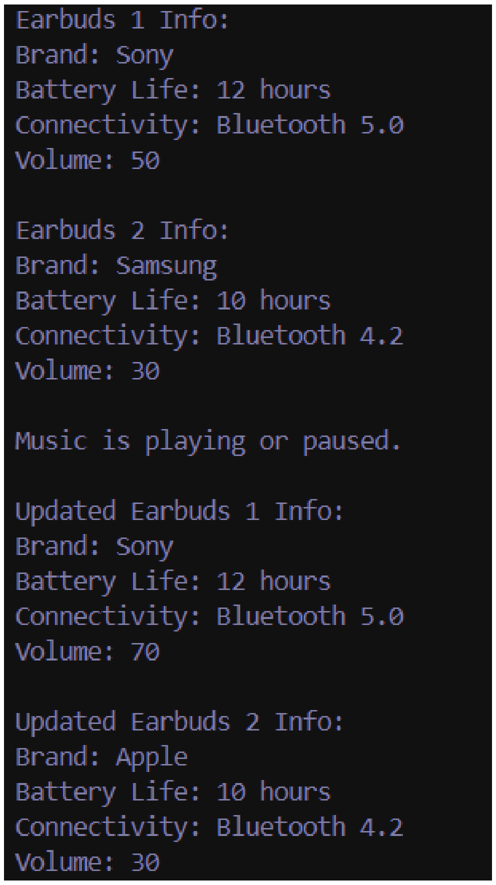
```
public class RectangleDemo {

    Run | Debug
    public static void main(String[] args) {
        Rectangle rectangle1 = new Rectangle();
        rectangle1.length = 6;
        rectangle1.wide = 3;
        rectangle1.displayInfo();
    }
}
```


```
Length                             : 6.0
Wide                               : 3.0
Rectangular area                   : 18.0
Circumference Of Arectangle        : 18.0
```

2. Implement **one of** the classes that has been created in the PBO Theory 02 task into java with the PBO paradigm. Instantiate 2 objects from that class on another class. Update the attribute values of each object and execute the methods it has.


```java
public class WirelessEarbuds {
    public String brand;
    public String batteryLife;
    public String connectivity;
    public int volume;

    public WirelessEarbuds(String brand, String batteryLife, String connectivity, int volume) {
        this.brand = brand;
        this.batteryLife = batteryLife;
        this.connectivity = connectivity;
        this.volume = volume;
    }

    public void playPauseMusic() {
        System.out.println(x:"Music is playing or paused.");
    }

    public void answerEndCalls() {
        System.out.println(x:"Call answered or ended.");
    }

    public void displayInfo() {
        System.out.println("Brand: " + brand);
        System.out.println("Battery Life: " + batteryLife);
        System.out.println("Connectivity: " + connectivity);
        System.out.println("Volume: " + volume);
    }
}
```


```java
public class WirelessEarbudsDemo {
    Run | Debug
    public static void main(String[] args) {
        WirelessEarbuds earbuds1 = new WirelessEarbuds(brand:"Sony", batteryLife:"12 hours", connectivity:"Bluetooth 5.0", volume:50);
        WirelessEarbuds earbuds2 = new WirelessEarbuds(brand:"Samsung", batteryLife:"10 hours", connectivity:"Bluetooth 4.2", volume:30);

        System.out.println(x:"Earbuds 1 Info:");
        earbuds1.displayInfo();
        System.out.println();

        System.out.println(x:"Earbuds 2 Info:");
        earbuds2.displayInfo();
        System.out.println();

        earbuds1.volume = 70;
        earbuds2.brand = "Apple";

        earbuds1.playPauseMusic();

        System.out.println(x:"\nUpdated Earbuds 1 Info:");
        earbuds1.displayInfo();

        System.out.println(x:"\nUpdated Earbuds 2 Info:");
        earbuds2.displayInfo();
    }
}
```



```
Earbuds 1 Info:
Brand: Sony
Battery Life: 12 hours
Connectivity: Bluetooth 5.0
Volume: 50

Earbuds 2 Info:
Brand: Samsung
Battery Life: 10 hours
Connectivity: Bluetooth 4.2
Volume: 30

Music is playing or paused.

Updated Earbuds 1 Info:
Brand: Sony
Battery Life: 12 hours
Connectivity: Bluetooth 5.0
Volume: 70

Updated Earbuds 2 Info:
Brand: Apple
Battery Life: 10 hours
Connectivity: Bluetooth 4.2
Volume: 30
```

This program has two classes:

- In the WirelessEarbuds class, there are attributes such as brand, batteryLife, connectivity, and volume. There are also methods to play/pause music, answer calls, and display earbuds info.

- The WirelessEarbudsDemo class is for running the program. We create two earbuds objects, update their attributes, then call methods to adjust the volume and view the changed info.

In summary, this program shows how to create objects, change values, and use methods in a PBO (Object Oriented Programming) style.

----- Good Luck-----