02324 Advanced Programming, exercises Week 2

Task 1. Implement Application for calculating BMI based on the 3 layer architecture

A person's BMI (Body Mass Index) can be calculated according to the formula:

$$BMI = w / h^2$$

Where w is the person's weight in kg and h is the person's height in meters.

BMI can be used as a guide when you want to examine whether you weigh too much, too little or normal according to the following table:

BMI < 18,5	You weigh too little
to 18.5 <= BMI < 25	Your weight is appropriate
25 <= BMI <= 30	You are overweight,
30 < BMI	You are obese

The task is to write a program, which is designed according to the principles of the 3-layer model, which can calculate BMI.

The data layer contains a certain number of people with information about cpr-nr, name, height, weight, and stored in an ArrayList. The class is shown below:

```java
public class Data implements IData
{

  private class Person {

    String cpr;

    String name;

    double height;

    double weight;


    public Person(String cpr, String name, double height, double weight)
{

      this.cpr = cpr;

      this.name = name;

      this.height = height;

      this.weight = weight;

    }

  }
```

```java
    private ArrayList<Person> persons;

    public Data(){
        persons = new ArrayList<Person>();
        // Add people
        persons.add(new Person("234567-8901", "Ib Olsen", 1.80, 75.0));
        persons.add(new Person("456789-0123", "Ole Jensen", 1.75, 95.0));
        persons.add(new Person("123456-7890", "Eva Hansen", 1.65, 65.0));


    }
    //Return the name of the person
    public String getName(String cpr){
        for (int in= 0; in< persons.size(); in++)
            if (persons.get(in).cpr.equals(cpr))
                return persons.get(in).name;
        return null;
    }
    //Return the person's weight
    public double getWeight (String cpr){
        for (int in= 0; in< persons.size(); in++)
            if (persons.get(in).cpr.equals(cpr))
                return persons.get(in).weight;
        return -1.0;
    }
    //Return the person's height
    public double getHeight (String cpr){
        for (int in= 0; in< persons.size(); in++)
            if (persons.get(in).cpr.equals(cpr))
                return persons.get(in).height;
        return -1.0;
    }
}
```

You should do the following:

1. Create a project with the name **bmi**
2. Define the `IData` which is the interface to the data layer
3. Create the above data class
4. The interface to the functionality layer, `IFunctionality`, is defined as:

```java
public interface IFunctionality {
 // calculate BMI based on the person's cpr-no
 double getBMI(String cpr);
 // return a text that describes the BMI range
 String getTextualBMI(String cpr);
 // return the person name based on the cpr-no
 String getName(String cpr);
}
```

5. Write a functionality class that implements the above interface
6. Define a TUI (text-user interface) class that reads a person's cpr number and on the basis of this calculates the BMI and prints out person's name and calculated BMI.

When you finish, find another group and swap (exchange) your functionality classes. If you have implemented functionality interface correctly the program should work just by replacing your .class file with the other group's .class file