Algorithms and Computational Thinking
# Autumn 2017

Tuesday, 12 December 2017

Exercise 11 : Abstract Classes and Types

The goal of this exercise is to improve your comprehension of object-oriented programming by leveraging inheritance and abstract classes. To make it easier to understand all the class names are in **bold**, method names in *italics* and attributes are underlined.

In this exercise you will implement five classes that will represent people. The class **Human** will be an abstract class on which **GoodPeople** and **BadPeople** classes will be based. Further, **GoodPeople** will have two child classes : **NormalPeople** and **Hero** as shown in the figure below.
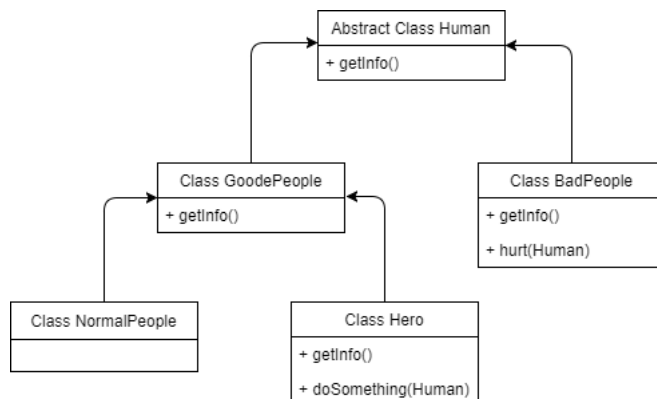
Task 1

First create a **Human** class with attributes common to all other classes : firstname, lastname and affiliation. An affiliation can be one of the three : criminal, citizen or justice league. Next, define a method called *getInfo* that

will be implemented in the other classes.

Task 2

Now, create a class **BadPeople**. This class should implement the method *getInfo* from the abstract class **Human**. Here, you need to print "I will not tell you my name. I'm a <u>affiliation</u>.

Next, define a method called *hurt* (with one parameter) that will print a message "I will hurt <u>firstname</u> <u>lastname</u> ". Lastly, the affiliation of **BadPeople** should be set to "Criminal".

Task 3

Next, create the superclass **GoodPeople**, with **Human** as the abstract class. As you did before, implement the *getInfo* method, which should print "Hi my name is <u>firstname</u> <u>lastname</u>. I'm a <u>affiliation</u>"

Task 4

Next, create two subclasses, inheriting from **GoodPeople** : **NormalPeople** and **Hero**. **NormalPeople** should initialize the <u>firstname</u>, <u>lastname</u> and set the <u>affiliation</u> to "Normal People".

Hero needs to do the same (but for <u>affiliation</u> use "Justice League"), in addition define a new method *doSomething* that will take as parameter another human object and print a message depending on its input parameter. If the human object is an instance of **BadPeople** print "I will stop you" and if it's an instance of **NormalPeople** print "I will save you".

Results

After correctly creating the classes, instantiating the objects and using methods as described above, should should see outputs as shown below (Python version). You can choose any of the three languages (or all three : recommended) to implement this exercise :

```
theJocker=BadPeople("The", "Jocker")
theJocker.getInfo()
james=NormalPeople("James", "Gordon")
james.getInfo()
batman=Hero("Bruce","Wayne","Batman")
batman.getInfo()
print("="*150)
theJocker.hurt(james)
batman.doSomething(james)
batman.doSomething(theJocker)
```

```
I will not tell you my name. I'm a Criminal
Hi my name is James Gordon. I'm a Simple citizen
Hi my name is Bruce Wayne, but you know me as Batman. I'm in the Justice League. I will protect the world!
======================================================================================================
I will hurt James Gordon
I will save you James Gordon
I will stop you The Jocker
```