Classes in Python

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Contents

1 Classes

One of the important reason why we are using Python today is because it is an Object Oriented Programming Language. And you might hear from time to time that everything in Python is an object. Lets see how i can make this mumbo jumbo a little bit more clear.

There is a transperant plastic object with a cap and a refil inside it is on my desk at the moment. Yes please note that I have mentioned an onject here. Most probably the object is identified by a name and in english we call it a pen. Our world is scatterd with objects around if we are to feed data about objects to our computers and make them do repetative tasks, complex calculations, life saving decisions we need the computers to understand the kind of object they are dealing with by providing them a basic definition. Simply put it like if you built a robot to chop wood, how would the robot ubnderstand what is wood further robot might not know what size to cut different types of wood. The example being really stupid.

We all heard about dinosaurs. According to wikipedia Dinosaurs are a diverse group of reptiles of the clade Dinosauria. They first appeared during the Triassic period, between 243 and 233.23 million years ago, although the exact origin and timing of the evolution of dinosaurs is the subject of active research. They became the dominant terrestrial vertebrates after the Triassic–Jurassic extinction event 201.3 million years ago; their dominance continued through the Jurassic and Cretaceous periods... Basicall they are scary big lizards, lived millions of years ago that are, thank God dead now because of a big meteor. For referen please see Ice age movie series. All of these dinosaurs have a name, some legs, eating habbits, living haitats, physical size, fight capablity or incapablity. I want to make a database of dinosaurs that are common in my area. So when I find a raptor go and tell computer here is a picture of a dinosaur please put it in your database. Well we all might know although it not impossible this is not exactly how our computers take instructions unless we programatically tell them to do so.

To do that, lets define the term Dinosaur to the computer. A dinosaur should have these properties

1. Some animal lived long ago
2. Has a name(type or species)
3. Bi-pedal, fins, wings, multi-pedal
4. Food habbits
5. Habitat
6. Size
7. Flight Capablity or incapablity

And the dinosaur definition should do these tasks.

1. Identity and return information about a Dinosaur
2. Check if the animal can be categorized as a Dinosaur in the first place.

A basic representation of dinosaur could be,

Dinosaur
-era(year) - Float -name - String -locomotion - String -food_habbits - List -habitat - List -size - Integer -flight-Boolean
+identifyDinosaur +checkIfDinosaur

In Python this representation can be written as,

```
class Dinosaurs:
''' The dinosaur is a pre historic animal '''
    era = 1                      # Default value 1
    name = ""                    # Empty String
    locomotion = ""              # Empty String
    food_habbits = []            # Empty List
    habitat = []                 # Empty List
    size = 0                     # Default Value 0
    flight = False               # Default False

    def identifyDinosaur(self, dino_name):
        return dino_name in self.name

    def checkIfDinosaur(self):
        if self.era<243 and self.era>233.23:
            return True
```

This is actually how a Class in python is defined. But wait lets use it.

```
dino_1 = Dinosaurs()
```

Or

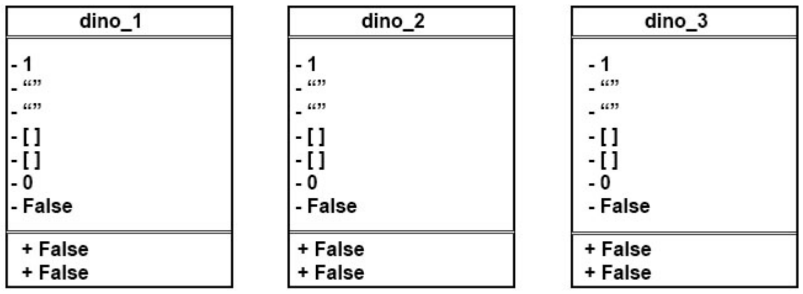
```
dino_2 = Dinosaurs()
```

So whats this business with "self". Well to understand self we need to look into the statement $dino_3 = Dinosaurs()$ This is a way of utilising the class Dinosaurs to define $dino_3$ as a dinosaur to the computer. So if we type,

```
print(dino_1.name)                 #Result: ""
print(dino_1.era)                  #Result: 1
print(dino_2.food_habbits)         #Result: []
print(dino_3.locomotion)           #Result: ""
# We can even use methods
print(dino_1.identifyDinosaur("Tyranosorus Rex"))           #Result: False
print(dino_2.checkIfDinosaur())                             #Result: False
```

$dino_1$, $dino_2$ and $dino_3$ are instances of the class Dinosaurs(). so $dino_1$ will have its own/unique set of era, name, locomotion, food habbits, etc. So will $dino_2$. And so will $dino_3$. If we had $dino_4$, $dino_5$ or $harry_{potter}$ or $desh_{bhaktaviik}$ these would all have the unique attribute values of era, name, locomotion, etc. "Self" parameter here represents the instance itself.

The naming convention suggests that we call the instance self rather than tom, harry, or some$_{\text{instance}}$ although that can be done. Some more naming conventions. Class names should start with a capital letter or Camel cased. Avoid underscores for class names. Generally class names are plurals. Good class names are Students(), ObsoleteAccounts(), ProgramErrors(). Variables inside classes are called attributes and functions are called methods. So now these instances of Dinosaurs() can be represented as,



Now look those values that has replaced the tributes. Looks like a big mess. So much so for Object Oriented Programming. This looks like a mockery and a waste of precious time. But its not what it looks like here the attribute values can be over-written for each individual instances.

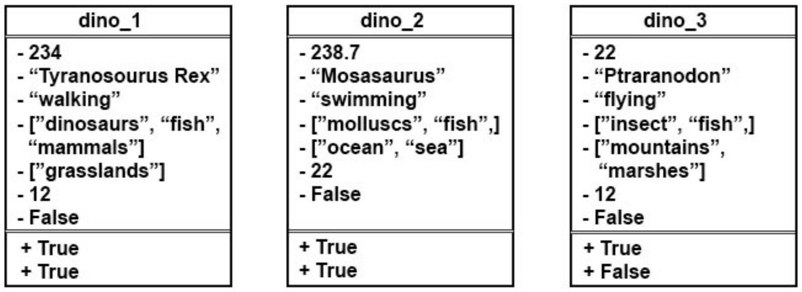
```
dino_1.era = 234
dino_1.name = "Tyranosorus rex"
dino_1.locomotion = "walking"
dino_1.food_habbits = ["dinosaurs", "insects", "fishes"]
dino_1.habitat = ["grasslands"]
dino_1.size = 12
dino_1.flight = False
# We can even use methods
print(dino_1.identifyDinosaur("Tyranosorus rex"))            #Result: True
print(dino_1.checkIfDinosaur())                              #Result: True
```

Similiarly we can do the same treatment to the instances dino$_2$ and dino$_3$.

```
dino_2.era = 238.7
dino_2.name = "Mosasaurus"
dino_2.locomotion = "swimming"
dino_2.food_habbits = ["molluscs", "fishes"]
dino_2.habitat = ["seas", "oceans"]
```

```
dino_2.size = 17
dino_2.flight = False
dino_3.era = 22
dino_3.name = "Pteranodon"
dino_3.locomotion = "flying"
dino_3.food_habbits = ["insects", "fishes"]
dino_3.habitat = ["mountains", "marshes"]
dino_3.size = 9
dino_3.flight = True
# We can even use methods
print(dino_2.identifyDinosaur("Mosasaurus"))            #Result: True
print(dino_2.checkIfDinosaur())                         #Result: True
print(dino_3.identifyDinosaur("Pteranodon"))            #Result: True
print(dino_3.checkIfDinosaur())                         #Result: False
```

Hence the representation of these tables have changed,



dino_1
- 234
- “Tyranosourus Rex”
- “walking”
- [”dinosaurs”, “fish”, “mammals”]
- [”grasslands”]
- 12
- False

+ True
+ True

dino_2
- 238.7
- “Mosasaurus”
- “swimming”
- [”molluscs”, “fish”,]
- [”ocean”, “sea”]
- 22
- False

+ True
+ True

dino_3
- 22
- “Ptraranodon”
- “flying”
- [”insect”, “fish”,]
- [”mountains”, “marshes”]
- 12
- False

+ True
+ False

The whole process can be given a GUI.

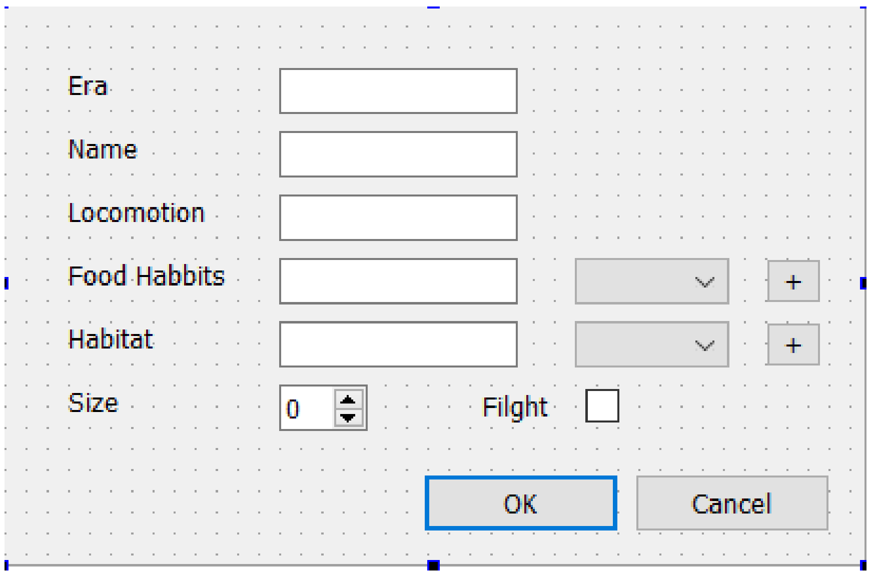


Figure 1: This is a gui to insert dinosaur information to the computer.