Python Programming

Class and Object

Mostafa S. Ibrahim
Teaching, Training and Coaching since more than a decade!

Artificial Intelligence & Computer Vision Researcher
PhD from Simon Fraser University - Canada
Bachelor / Msc from Cairo University - Egypt
Ex-(Software Engineer / ICPC World Finalist)

Modeling real systems

- Imagine we are creating a system for a company
  - It has many departments
  - Each department has employees
  - Each employee has information: name, age, address, salary, etc
  - And much more information and relationships
- Structuring your code needs several things to learn
  - 1 Fundamental steps **classes**
- In this section, we focus on some basics for classes
  - This concept is part of a very important topic **OOP**
  - We won’t introduce OOP now
  - But it is very educational to know little bit in this stage!

Related Information

- Each employee has information: name, age, address, salary, etc
- Each student has name, birth date, email, GPA, courses, grades, etc
- We can use what we learned and write a lot of variables expressing our needs
  - But imagine we have 2 employees info? 100? A lot of variables
- Python offers a class syntax
  - We group several information together in one NEW data type
  - We create variables, each one of them is called
  - 1 **class** …. Create (instantiate) many **objects**

Define a class … Create an Object

- Take a minute to read and guess
- Line 3: Class Employee
  - It gathers together the related variables of the class
  - We call them **attributes**
  - Class = **blueprints to create objects**
- Line 9
  - Employee()
  - Creates a variable of type Employee
    - We call it **object**
- Line 10+: Using (.) operator: we can access the internal variables

```
2   # This is a bit improper...wait with me
3   class Employee:
4       name = None
5       salary = None
6       address = None
7
8
9   mostafa = Employee()
10  mostafa.name = 'mostafa saad'
11  mostafa.salary = 1000
12  mostafa.address = 'Lovely Canada'
13
14  print(mostafa.address)  # Lovely Canada
```

Creating multiple objects

- 1 Class
- Many objects
- Each object has its data
- Everything in Python is an object
  - Int, float, str, ...
- Observe:
  - Employee class
  - Name start with Capital Letter
  - Use CamerCase
  - **M**y**S**erviceM**M**anager

```
5   class Employee:...
9
10  mostafa = Employee()
11  mostafa.name = 'mostafa saad'
12  mostafa.salary = 1000
13  mostafa.address = 'Lovely Canada'
14
15  print(mostafa.address)  # Lovely Canada
16
17  emp2 = Employee()
18  emp2.name = 'belal mostafa saad'
19  emp2.salary = 0
20  emp2.address = 'Same as his dad'
21
22  print(emp2.address)  # Same as his dad
23  emp2.address = 'BC'
24  print(emp2.address)  # BC
25
26  emp3 = Employee()
27  emp4 = Employee()
28
```

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."