Python Classes/Objects

Python is an object oriented programming language.

Almost everything in Python is an object, with its properties and methods.

A Class is like an object constructor, or a "blueprint" for creating objects.

Create a Class

To create a class, use the keyword `class`:

Example

Create a class named MyClass, with a property named x:

```
class MyClass:
  x = 5
```

Create Object

Now we can use the class named MyClass to create objects:

Example

Create an object named p1, and print the value of x:

```
p1 = MyClass()
print(p1.x)
```

The __init__() Function

The examples above are classes and objects in their simplest form, and are not really useful in real life applications.

To understand the meaning of classes we have to understand the built-in __init__() function.

All classes have a function called __init__(), which is always executed when the class is being initiated.

Use the __init__() function to assign values to object properties, or other operations that are necessary to do when the object is being created:

Example

Create a class named Person, use the __init__() function to assign values for name and age:

Save file name as Person.py

```
class Person:
  def __init__(self, name, age):
    self.name = name
    self.age = age

p1 = Person("John", 36)

print(p1.name)
print(p1.age)
```

Run it by using command

```
py person.py
```

Output:-

```
John
36
```

Note: The `__init__()` function is called automatically every time the class is being used to create a new object.

Object Methods

Objects can also contain methods. Methods in objects are functions that belong to the object.

Let us create a method in the Person class:

Example

Insert a function that prints a greeting, and execute it on the p1 object:

```
class Person:
  def __init__(self, name, age):
    self.name = name
    self.age = age

  def myfunc(self):
    print("Hello my name is " + self.name)


p1 = Person("John", 36)
p1.myfunc()
```

output:-

```
Hello my name is John
```

Note: The `self` parameter is a reference to the current instance of the class, and is used to access variables that belong to the class

Another Example with explanation:-

Following is the example of a simple Python class −

```
class Employee:
   'Common base class for all employees'
   empCount = 0
```

```
  def __init__(self, name, salary):
    self.name = name
    self.salary = salary
    Employee.empCount += 1

  def displayCount(self):
   print "Total Employee %d" % Employee.empCount

  def displayEmployee(self):
    print "Name : ", self.name,  ", Salary: ", self.salary
```

- The variable *empCount* is a class variable whose value is shared among all instances of a this class. This can be accessed as *Employee.empCount* from inside the class or outside the class.
- The first method *__init__()* is a special method, which is called class constructor or initialization method that Python calls when you create a new instance of this class.
- You declare other class methods like normal functions with the exception that the first argument to each method is *self*. Python adds the *self* argument to the list for you; you do not need to include it when you call the methods.

Creating Instance Objects

To create instances of a class, you call the class using class name and pass in whatever arguments its *__init__* method accepts.

```
"This would create first object of Employee class"
emp1 = Employee("Zara", 2000)
"This would create second object of Employee class"
emp2 = Employee("Manni", 5000)
```

Accessing Attributes

You access the object's attributes using the dot operator with object. Class variable would be accessed using class name as follows −

```
emp1.displayEmployee()
emp2.displayEmployee()
print "Total Employee %d" % Employee.empCount
```

Now, putting all the concepts together −

```
class Employee:
  'Common base class for all employees'
  empCount = 0
```

```
   def __init__(self, name, salary):
      self.name = name
      self.salary = salary
      Employee.empCount += 1

   def displayCount(self):
     print "Total Employee %d" % Employee.empCount

   def displayEmployee(self):
      print "Name : ", self.name,  ", Salary: ", self.salary

"This would create first object of Employee class"
emp1 = Employee("Zara", 2000)
"This would create second object of Employee class"
emp2 = Employee("Manni", 5000)
emp1.displayEmployee()
emp2.displayEmployee()
print "Total Employee %d" % Employee.empCount
```

When the above code is executed, it produces the following result −

```
Name :  Zara ,Salary:  2000
Name :  Manni ,Salary:  5000
Total Employee 2
```

Python Inheritance

Inheritance allows us to define a class that inherits all the methods and properties from another class.

Parent class is the class being inherited from, also called base class.

Child class is the class that inherits from another class, also called derived class.

Create a Parent Class

Any class can be a parent class, so the syntax is the same as creating any other class:

Example

Create a class named `Person`, with `firstname` and `lastname` properties, and a `printname` method:

```
class Person:
  def __init__(self, fname, lname):
    self.firstname = fname
    self.lastname = lname

  def printname(self):
    print(self.firstname, self.lastname)

class Student(Person):
  pass

x = Student("Mike", "Olsen")
x.printname()
```

Output:-

```
Mike Olsen
```

Another Example of inheritance :-

```
class Parent:        # define parent class
   parentAttr = 100
   def __init__(self):
      print "Calling parent constructor"

   def parentMethod(self):
      print 'Calling parent method'

   def setAttr(self, attr):
      Parent.parentAttr = attr

   def getAttr(self):
      print "Parent attribute :", Parent.parentAttr

class Child(Parent): # define child class
   def __init__(self):
      print "Calling child constructor"

   def childMethod(self):
      print 'Calling child method'

c = Child()          # instance of child
c.childMethod()      # child calls its method
c.parentMethod()     # calls parent's method
c.setAttr(200)       # again call parent's method
c.getAttr()          # again call parent's method
```

When the above code is executed, it produces the following result −

```
Calling child constructor
Calling child method
Calling parent method
Parent attribute : 200
```

Similar way, you can drive a class from multiple parent classes as follows −

```
class A:        # define your class A
.....

class B:         # define your class B
.....

class C(A, B):   # subclass of A and B
.....
```

Overriding Methods

You can always override your parent class methods. One reason for overriding parent's methods is because you may want special or different functionality in your subclass.

Example

```
class Parent:        # define parent class
   def myMethod(self):
      print 'Calling parent method'

class Child(Parent): # define child class
   def myMethod(self):
      print 'Calling child method'

c = Child()          # instance of child
c.myMethod()         # child calls overridden method
```

When the above code is executed, it produces the following result −

```
Calling child method
```