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## First Class Functions In Python

If you have been using Python for some time, you certainly would have come across the phrase “Functions are First class citizens in Python”. If you are wondering what that means and wondering what about other citizens, then this article is for you.



Functions as first class citizens means that, you can pass functions around just like other objects. That means, you can assign functions to variables, you can pass them along as arguments, you can store them in bigger data structures, define them inside another function and also return them from another function, just like any other objects.

This is achieved in Python because functions are nothing but objects. It has so many parameters/methods in it which you can inspect using the `dir()` method.

```
def hello_func():
    print("hello")

print(dir(hello_func))
```

And the output is:

```
['__annotations__', '__call__', '__class__', '__closure__',
 '__code__', '__defaults__', '__delattr__', '__dict__', '__dir__',
 '__doc__', '__eq__', '__format__', '__ge__', '__get__',
 '__getattr__', '__globals__', '__gt__', '__hash__', '__init__',
 '__init_subclass__', '__kwdefaults__', '__le__', '__lt__',
 '__module__', '__name__', '__ne__', '__new__', '__qualname__',
 '__reduce__', '__reduce_ex__', '__repr__', '__setattr__',
 '__sizeof__', '__str__', '__subclasshook__']
```

So, Functions are objects of type `function`.

Let's see the advantages of functions being objects.

### Assigning Functions To Variables

Let's say I define a method `greet` like this:

```
def greet(name):
    print("Hello " + name)

greet("World")          ## => "Hello World"
greet("Universe")      ## => "Hello Universe"
```

But Since `greet` is a function object, I can assign it to a variable which I call `say_hello`

```
say_hello = greet
```

Now `say_hello` is also a functions object which means, I can call it just like `greet`.

```
say_hello("Earth")      ## => "Hello Earth"
say_hello("Mars")       ## => "Hello Mars"
```

You can do this because functions are first class citizens.

### Passing Functions As Arguments

You can pass functions as arguments to other functions as well.

Let's say you have a `call_func` which is defined like this:

```
def call_func(x, func):
    print(func(x))
```

The `func` is a function and you're just printing the value of the `func(x)`.

Now, Let' say I've two functions `double` and `triple` that are defined like this:

```
def double(n): return 2*n

def triple(n): return 3*n
```

Now you can pass these functions to `call_func` that we have defined earlier.

```
call_func(4, double)    ## => 8
call_func(5, triple)    ## => 15
```

*Note: You are passing `double` and `triple` to the function and not `double()` and `triple()`*

### Storing Functions In Other Data Structures

You can also store functions in other data structures like Lists, Dictionaries and more. Depending on how you implement them these can be extremely useful.

I can define an list called `operations` that stores the previously defined `double` and `triple` methods.

```
operations = [double, triple]
```

And after that I can call these functions with their indices.

```
operations[0](2)         ## => 4
operations[1](10)        ## => 30
```

So this way, functions are much more useful in python than in some other languages where this is not the case. These also have some good uses like generators. We'll cover those in future articles.

That is all for this article.

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Thanks for reading. See you again in the next article.