Python's Syntax For Classes

What Is A Class?

A **class** is a way to collect data, and functions designed to operate on that data.

Such functions have a special name: **methods**.

The class itself is like a template. You create **instances** of the class, to use in your code.

Each instance has its own data, separate from other instances. You call a method on an instance, to operate on that instance's data.

3 and 7 are instances of the built-in `int` class. When you write a class, you are creating a new, custom data type.

A Simple Class

Here's a class called `Dog`, with data `name`, and methods called `__init__` and `describe`:

```
class Dog:
    def __init__(self, name):
        self.name = name
    def describe(self):
        return self.name + " says: Woof!"
```

- `self` is always the first argument of every method. It lets you refer to the instance inside your code.
- Inside the `__init__()` method, `self.name` is a **member variable**. It is different from `name`, the variable passed in.
- `__init__` is special. It is called once, automatically, when you create the instance.

Creating An Instance

You can create many **instances** of a class. Just like 3 and 7 are instances of `int`.

You create an instance by calling the class name like a function:

```
>>> fido = Dog("Fido")
>>> fido.name
'Fido'
```

Refer to the *attributes* of an instance (methods or member variables) with the dot operator, like this: `fido.name`

describe()

Look at the second method, `describe()`:

```
class Dog:
    def __init__(self, name):
        self.name = name
    def describe(self):
        return self.name + " says: Woof!"
```

Calling `describe()`

Call `describe()` with the dot operator:

```
>>> fido = Dog("Fido")
>>> fido.describe()
'Fido says: Woof!'
```

Why Do We Have Classes?

Why do we have classes at all:

Many reasons...

It lets you **organize** your code better...

It lets you **reason** about your code more easily...

It lets you **manage complex code** more easily...

And many other benefits.

Let's learn what some of those are.