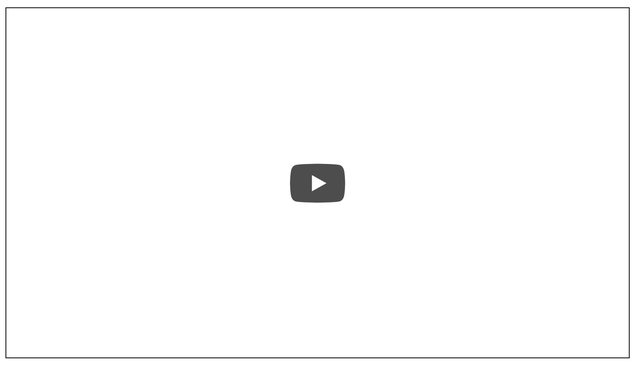
Notes About OOP



Set and Get methods

The last part of the video mentioned that accessing attributes in Python can be somewhat different than in other programming languages like Java and C++. This section goes into further detail.

The shirt class has a method to change the price of the shirt: `shirt_one.change_price(20)`. In Python, you can also change the values of an attribute with the following syntax:

```
shirt_one.price = 10
shirt_one.price = 20
shirt_one.color = 'red'
shirt_one.size = 'M'
shirt_one.style = 'long_sleeve'
```

This code accesses and changes the price, color, size and style attributes directly. Accessing attributes directly would be frowned upon in many other languages **but not in Python**. Instead, the general object-oriented programming convention is to use methods to access attributes or change attribute values. These methods are called set and get methods or setter and getter methods.

A get method is for obtaining an attribute value. A set method is for changing an attribute value. If you were writing a Shirt class, the code could look like this:

```
class Shirt:

    def __init__(self, shirt_color, shirt_size, shirt_style, shirt_price):
        self._price = shirt_price

    def get_price(self):
      return self._price

    def set_price(self, new_price):
      self._price = new_price
```

Instantiating and using an object might look like this:

```
shirt_one = Shirt('yellow', 'M', 'long-sleeve', 15)
print(shirt_one.get_price())
shirt_one.set_price(10)
```

In the class definition, the underscore in front of price is a somewhat controversial Python convention. In other languages like C++ or Java, price could be explicitly labeled as a private variable. This would prohibit an object from accessing the price attribute directly like `shirt_one._price = 15`. However, Python does not distinguish between private and public variables like other languages. Therefore, there is some controversy about using the underscore convention as well as get and set methods in Python. Why use get and set methods in Python when Python wasn't designed to use them?

At the same time, you'll find that some Python programmers develop object-oriented programs using get and set methods anyway. Following the Python convention, the underscore in front of price is to let a programmer know that price should only be accessed with get and set methods rather than accessing price directly with `shirt_one._price`. However, a programmer could still access _price directly because there is nothing in the Python language to prevent the direct access.

To reiterate, a programmer could technically still do something like `shirt_one._price = 10`, and the code would work. But accessing price directly, in this case, would not be following the intent of how the Shirt class was designed.

One of the benefits of set and get methods is that, as previously mentioned in the course, you can hide the implementation from your user. Maybe originally a variable was coded as a list and later became a dictionary. With set and get methods, you could easily change how that variable gets accessed. Without set and get methods, you'd have to go to every place in the code that accessed the variable directly and change the code.

You can read more about get and set methods in Python on this Python Tutorial site.

A Note about Attributes

There are some drawbacks to accessing attributes directly versus writing a method for accessing attributes.

In terms of object-oriented programming, the rules in Python are a bit looser than in other programming languages. As previously mentioned, in some languages, like C++, you can explicitly state whether or not an object should be allowed to change or access an attribute's values directly. Python does not have this option.

Why might it be better to change a value with a method instead of directly? Changing values via a method gives you more flexibility in the long-term. What if the units of measurement change, like the store was originally meant to work in US dollars and now has to handle Euros? Here's an example:

Example Dollars versus Euros

If you've changed attribute values directly, you'll have to go through your code and find all the places where US dollars were used, like:

```
shirt_one.price = 10 # US dollars
```

and then manually change to Euros

```
shirt_one.price = 8 # Euros
```

If you had used a method, then you would only have to change the method to convert from dollars to Euros.

```

def change_price(self, new_price):
    self.price = new_price * 0.81 # convert dollars to Euros

shirt_one.change_price(10)
```

For the purposes of this introduction to object-oriented programming, you will not need to worry about updating attributes directly versus with a method; however, if you decide to further your studies of object-oriented programming, especially in another language such as C++ or Java, you'll have to take this into consideration.

Modularized Code

Thus far in the lesson, all of the code has been in Jupyter Notebooks. For example, in the previous exercise, a code cell loaded the Shirt class, which gave you access to the Shirt class throughout the rest of the notebook; however, if you were developing a software program, you would want to modularize this code.

You would put the Shirt class into its own Python script called, say, shirt.py. And then in another Python script, you would import the Shirt class with a line like: `from shirt import Shirt`.

For now, as you get used to OOP syntax, you'll be completing exercises in Jupyter notebooks. But midway through the lesson, you'll modularize object-oriented code into separate files.

NEXT