

# Theory: Decorators in OOP

🕒 20 minutes    0 / 5 problems solved

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Start practicing

397 users solved this topic. Latest completion was 1 day ago.

As you already know, decorators can help change the behavior of a function without modifying its code. In this topic, we will discuss three main built-in decorators that can help us working with classes: `staticmethod`, `classmethod`, and `property`.

## §1. @staticmethod

The `@staticmethod` decorator can be used to bind a function to a class as its method. In the following example, we have the `CharType` class and the method to get the type of character:

```
1 class CharType(object):
2
3     @staticmethod
4     def get_type(char):
5         if char.isalpha():
6             return 'letter'
7         elif char.isdigit():
8             return 'digit'
9         else:
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11             return 'other'
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```

```

1  class User(object):
2
3      def __init__(self, name, surname):
4          self.name = name
5          self.surname = surname
6
7      def get_info(self):
8          return self.name + ' (' + self.surname + ')'
9
10
11  @classmethod
12
13  def from_string(cls, data):
14
15      name, surname = data.split(' ')
16
17
18  return cls(name, surname) # passing the string values to the initialization
on call
1
4
1
5
1
6
user = User.from_string('Santa Claus') # using the class name to call the method
1
7  print(user.get_info()) # Santa (Claus)

```

As you can see, class methods are used when we do not need attributes of specific instances but want to use the class information for some purpose. The most common example is alternative constructors. For one, if the required information comes from some outer source, a file, for example, in this case, we cannot pass the data directly as class instances. We may carry out some kind of preprocessing before actually creating a new object, you have seen this case in the example above. With the help of the decorator, we call a class method using the class itself rather than a class instance.

However, we can also call the `from_string` method on the `User` instance, even though it makes less sense.

```

1  user2 = user.from_string('Father Christmas')
2  user2.get_info() # Father (Christmas)

```

### §3. @classmethod vs @staticmethod

To make it clearer, let's outline the main differences between static and class methods:

1. Static methods have neither `cls` nor `self` as their parameters, so we cannot operate on the class or particular instances within the method. In general, they act similarly to functions outside the class and are often used as utility methods.
2. Class methods always take the class as the first argument, usually called `cls`. They are frequently used as alternative constructors that create class objects for various use cases.

### §4. @property

Finally, let's create a basic example of the `@property` decorator usage. This one is designed to access a method as if it was an attribute of a class. Once again, we have an instance of the `User` class:

```

1  class User:
2      def __init__(self, name, surname):
3          self.name = name
4          self.surname = surname
5          self.full_name = self.name + ' ' + self.surname
6
7
8  user = User('Santa', 'Claus')
9  print(user.full_name) # Santa Claus

```

When we change the name of the user to `'Father'`, we notice that the `full_name` attribute of our object remains the same. It happens because we have only set it during the initialization.

```
1 user.name = 'Father'
2
3 print(user.name) # Father
4 print(user.full_name) # Santa Claus
```

It is a perfect case to use the `@property` decorator! If we define `full_name` using the decorator, we will evaluate the method every time it is accessed as an attribute.

```
1 class User:
2     def __init__(self, name, surname):
3         self.name = name
4         self.surname = surname
5
6     @property
7     def full_name(self):
8         return self.name + ' ' + self.surname
9
10
11
12 user = User('Santa', 'Claus')
13
14 print(user.full_name) # Santa Claus
15
16
17 user.name = 'Father'
18
19 print(user.name) # Father
20
21 print(user.full_name) # Father Claus
```


## \$5. Conclusion

In this topic, we have learned that:

- the `@staticmethod` decorator allows us to use a function without access to class instances as a class method;
- the `@classmethod` decorator can be used to call a method of a class instead of a class instance;
- the `@property` decorator is helpful when we want to access a method as an attribute.

Now let's practice!

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