# Python Cheat Sheet: Classes

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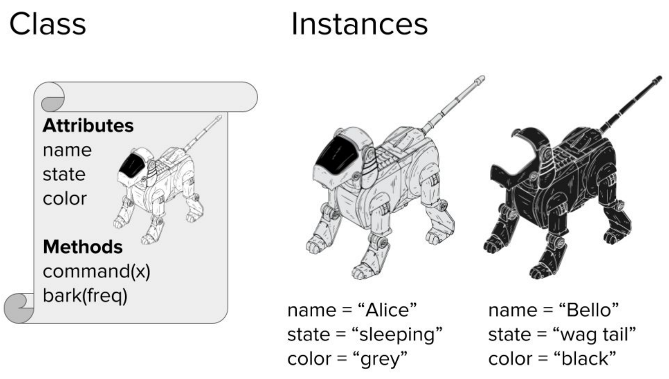
| | Description |
|---|---|
| lasses | A class encapsulates data and functionality: data as attributes, and functionality as methods. It is a blueprint for creating concrete instances in memory. |



| | Description |
|---|---|
| stance | You are an instance of the class human. An instance is a concrete implementation of a class: all attributes of an instance have a fixed value. Your hair is blond, brown, or black--but never unspecified.<br><br>Each instance has its own attributes independent of other instances. Yet, class variables are different. These are data values associated with the class, not the instances. Hence, all instance share the same class variable `species` in the example. |
| elf | The first argument when defining any method is always the `self` argument. This argument specifies the instance on which you call the method.<br><br>`self` gives the Python interpreter the information about the concrete instance. To *define* a method, you use `self` to modify the instance attributes. But to *call* an instance method, you do not need to specify `self`. |
| reation | You can create classes “on the fly” and use them as logical units to store complex data types. |

```
class Employee():
       pass
employee = Employee()
employee.salary = 122000
employee.firstname = "alice"
employee.lastname = "wonderland"

print(employee.firstname + " "
       + employee.lastname + " "
       + str(employee.salary) + "$")
# alice wonderland 122000$
```

**Example**

```
class Dog:
       """ Blueprint of a dog """

       # class variable shared by all instances
       species = ["canis lupus"]

       def __init__(self, name, color):
              self.name = name
              self.state = "sleeping"
              self.color = color

       def command(self, x):
              if x == self.name:
                     self.bark(2)
              elif x == "sit":
                     self.state = "sit"
              else:
                     self.state = "wag tail"

       def bark(self, freq):
              for i in range(freq):
                     print("[" + self.name
                            + "]: Woof!")


bello = Dog("bello", "black")
alice = Dog("alice", "white")

print(bello.color) # black
print(alice.color) # white

bello.bark(1) # [bello]: Woof!

alice.command("sit")
print("[alice]: " + alice.state)
# [alice]: sit

bello.command("no")
print("[bello]: " + bello.state)
# [bello]: wag tail

alice.command("alice")
# [alice]: Woof!
# [alice]: Woof!

bello.species += ["wulf"]
print(len(bello.species)
       == len(alice.species)) # True (!)
```

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