Web Application Development using Python

Introduction to Object Oriented Programming - Part 2

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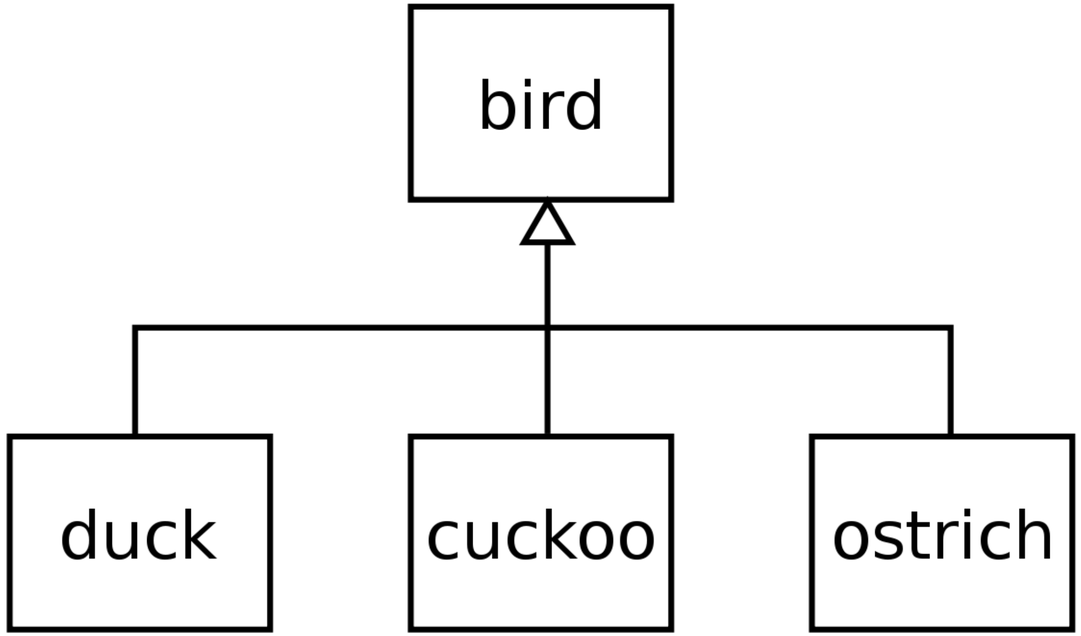
Outline

- Inheritance
- Polymorphism
- Method overriding
- Other important functions
  - `super()`
  - `instanceof()`
  - `issubclass()`

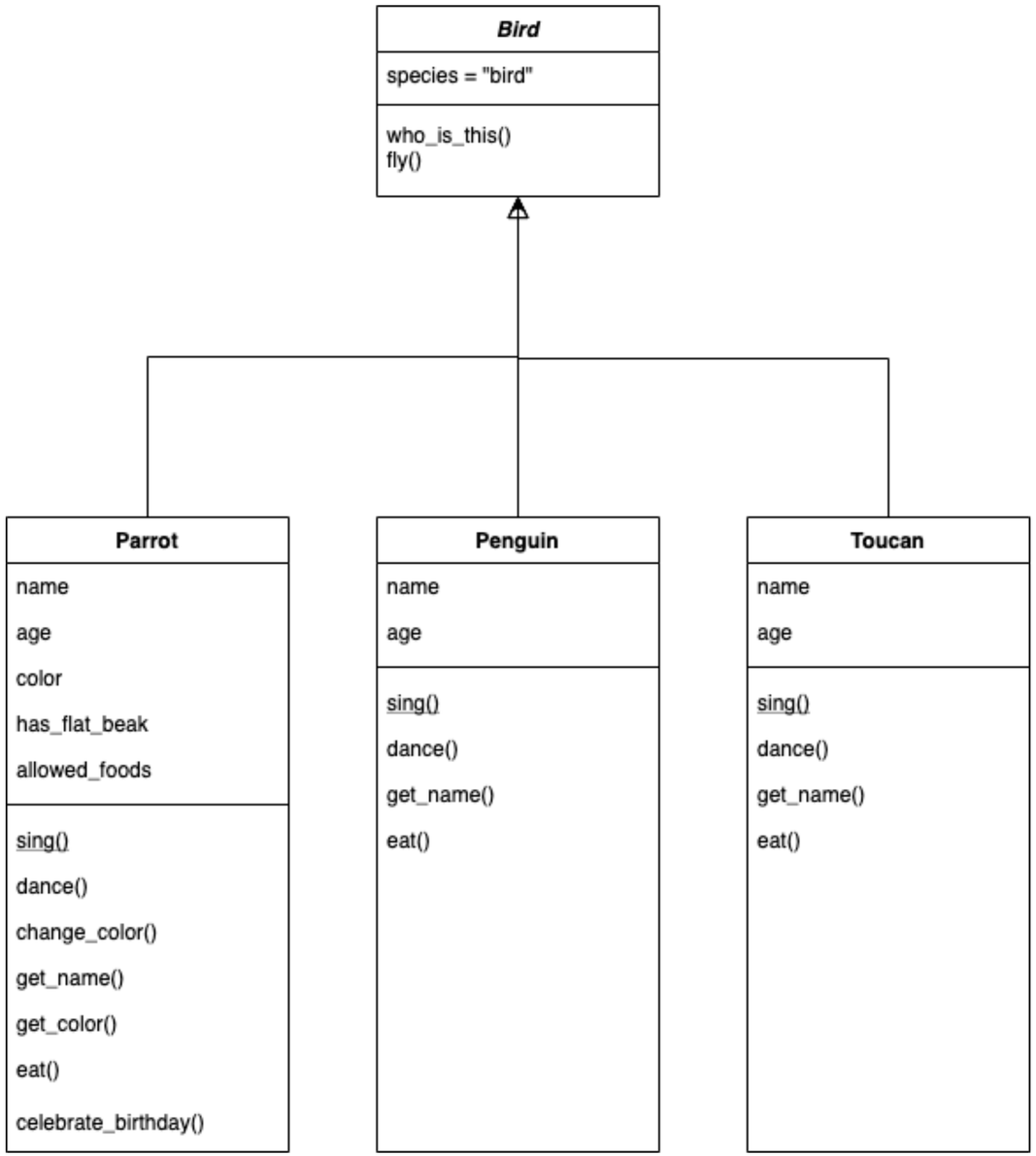
Inheritance



Inheritance model

W3/S3/Birds/

- What is the base (or parent) class?
- Which attributes are inherited from the parent to each of the other child classes?
- Which methods are inherited from the parent to each of the other child classes?
- How can we use inheritance to enhance this class diagram?

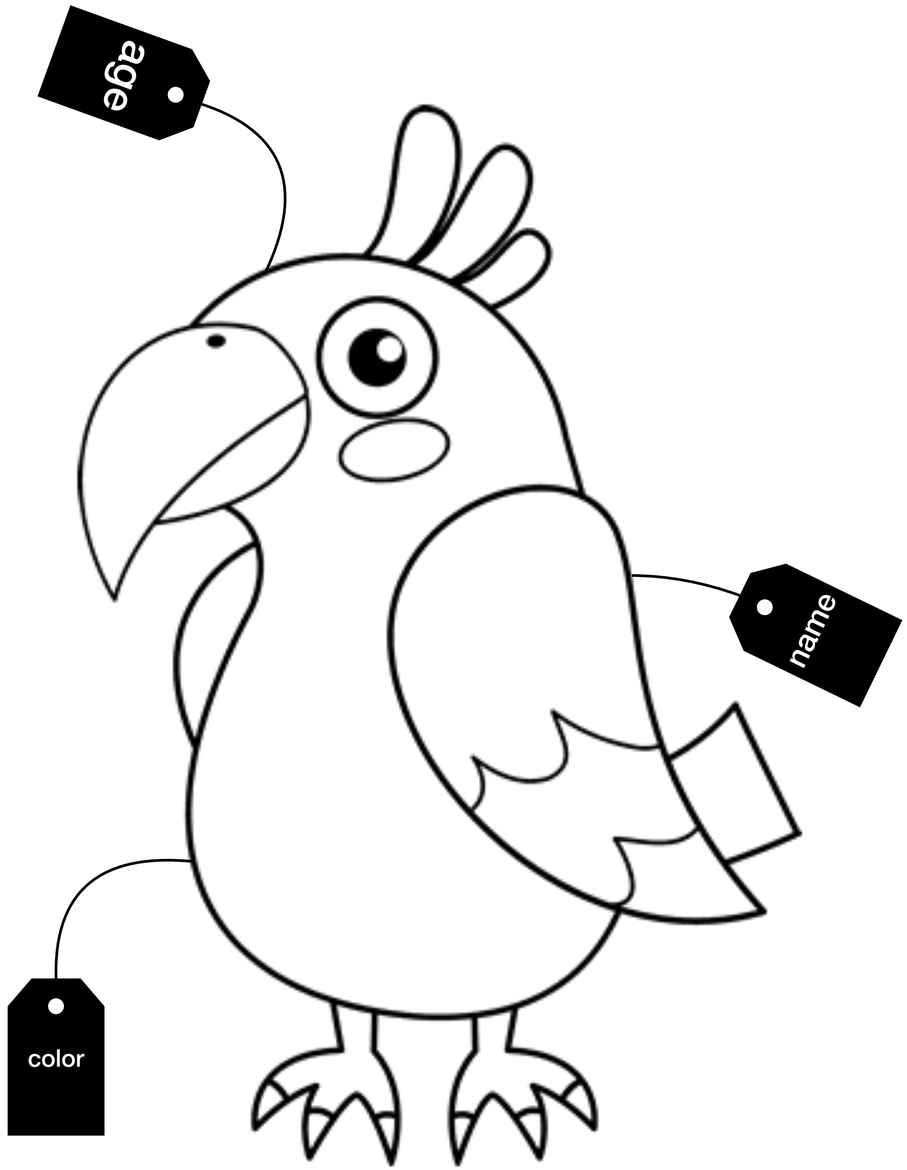


Inheriting from a class

Inheriting from a class

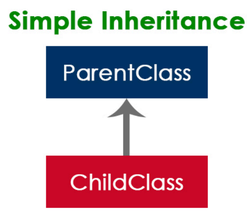
W3/S3/Birds/

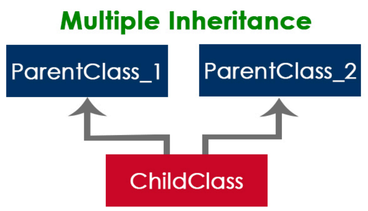
- A class can specify a parent class (or more) in parenthesis next to the class declaration.
- We must remember to initialise the parent class by calling the super init method.
  - We can use `super().__init__()`
  - We may need to pass parameters to the parent class.
- We may need to import our class from a different files.

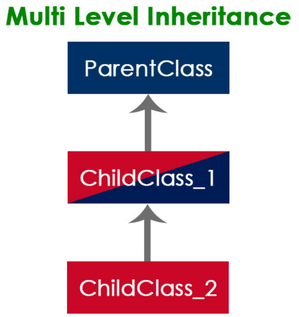


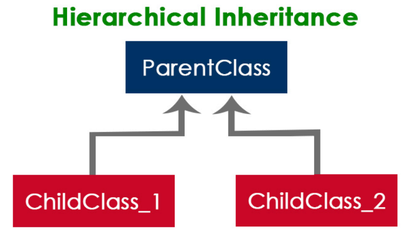
Types of Inheritance

- Simple inheritance
- Multi-level inheritance
- Multiple inheritance
- Hierarchal inheritance

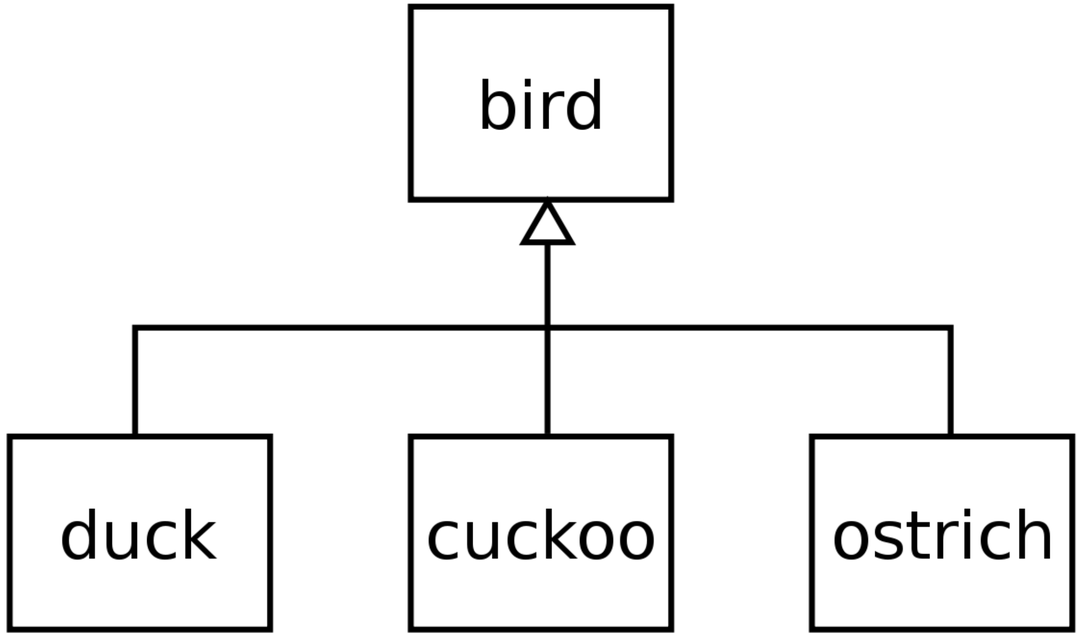






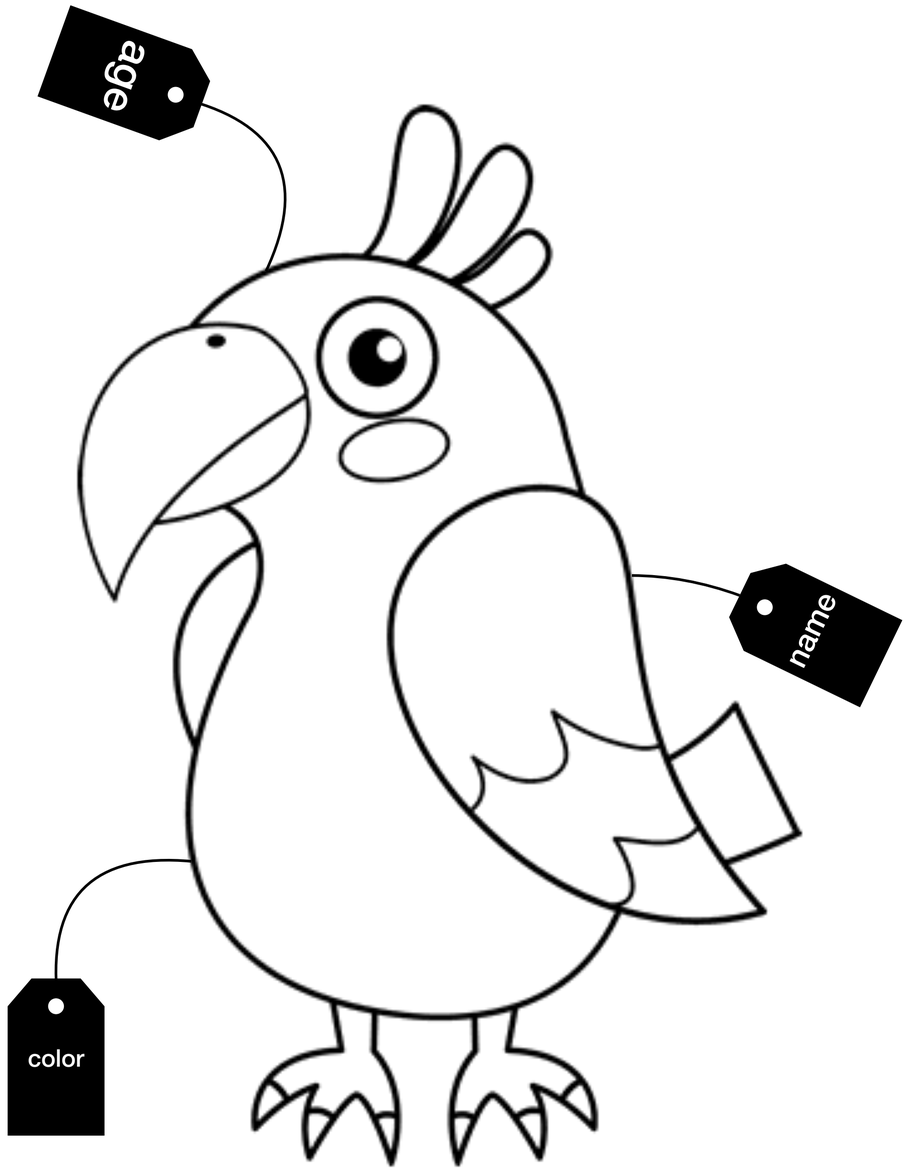


Polymorphism



Polymorphism
W3/S3/Birds/

- What is polymorphism?
  - The word polymorphism means having many forms.
- In programming, polymorphism means we can have the same function or method name but with different signatures.
- Built-in examples:
  - `len()`



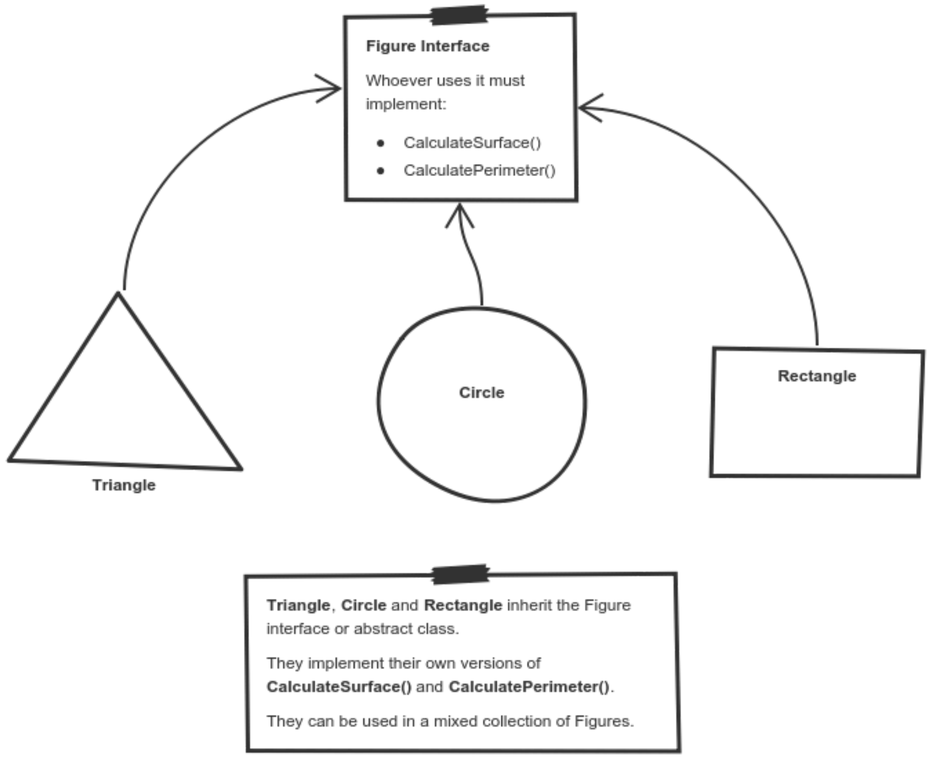
Polymorphism

W3/S3/polymorphism.py

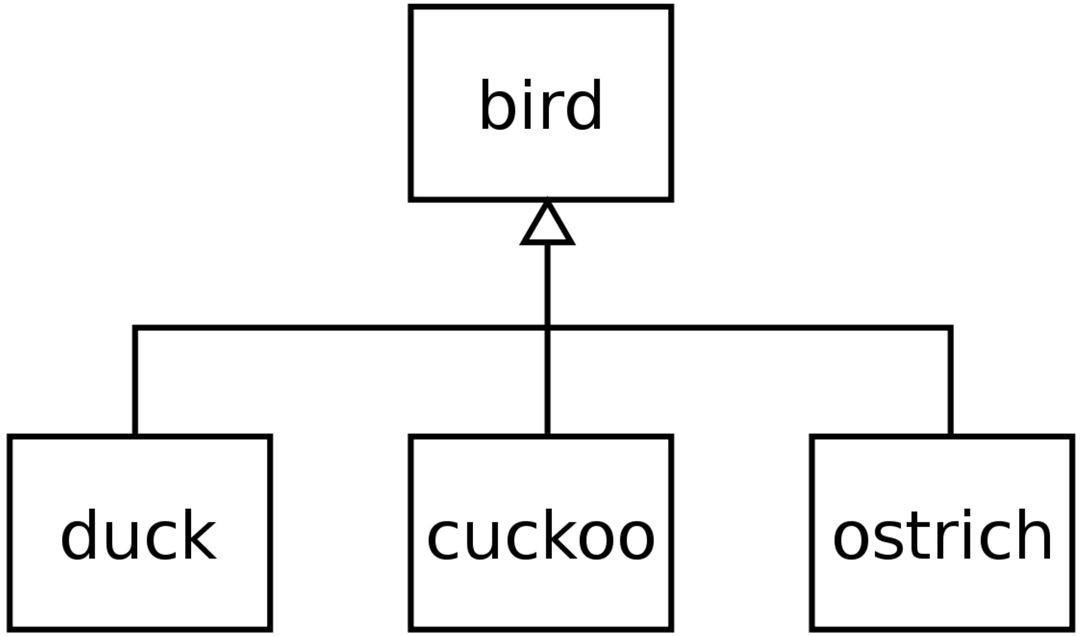
```python
# A simple Python function to explain polymorphism


def poly_add(a, b, c=0):
    return a + b + c


# call the method
print(poly_add(2, 3))
print(poly_add(2, 3, 4))
```



Method overriding



Method overriding

W3/S3/Birds/

- Method overriding is a concept of object oriented programming that allows us to change the implementation of a method in the **child class** that is defined in the **parent class**.
- To override a method we need,
  - Inheritance as we override the functionality of the parent class in the child class.
  - The overridden method to have the have the **same** method signature as in the parent class.
- Which methods can we override?
  - who_is_this()
  - fly()

Resources

- https://docs.python.org/3/library/abc.html
- https://www.python-course.eu/object_oriented_programming.php
- https://www.programiz.com/python-programming/multiple-inheritance
- https://www.w3schools.com/python/ref_func_isinstance.asp
- https://www.w3schools.com/python/ref_func_issubclass.asp