Lecture 20: Programming with Subclasses

CS 1110
Introduction to Computing Using Python

http://www.cs.cornell.edu/courses/cs1110/2019sp

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Put Me in the Zoo

• Classes: Animal, Bird, Fish, Penguin, Parrot
• Instances can swim, fly, and speak based on class membership
• Track:
  - # of animals created (Q1)
  - name, tag #, weight for each animal (w/default weights)
• Methods:
  - speak(words): print words if animal speaks (Q2)
  - eat(): print eating sounds & gain 1 pound (Q3)
Questions to ask

• What does the class hierarchy look like?
• What are class attributes? What are instance attributes? What are constants?
• What does the __init__ function look like?
• How do we support default weights?
• How do we implement the class methods?
• What does a "stringified" Animal look like? `str(a)`
Q1: What is the best way to keep track of the number of Animals that have been created?

A: a global variable that you increment each time you call the Animal constructor

B: a class attribute inside the Animal Class that is incremented by the Animal's __init__ method

C: an instance attribute inside each Animal that is incremented by the Animal's __init__ method

D: A & B both work, but B is better

E: A & B & C all work, but C is best
If `speak` is defined by the Animal Class like this:

```python
def speak(self, words):
    if self.CAN_SPEAK:
        print(words)
```

Q2: Which subclasses need to provide their own version of this method?

A: Bird, Fish, Penguin, and Parrot  
B: Bird and Parrot  
C: just Parrot  
D: none  
E: I don’t know
If `eat` is defined by the `Animal` Class like this:

```python
def eat(self):
    print("NOM NOM NOM NOM")
    self.weight += 1
```

Q3: We want Fish to say nothing and Birds to make a pecking sound. Which subclasses need to provide their own version of this method?

A: Bird, Fish, Penguin, and Parrot
B: Bird and Fish
C: just Bird
D: just Fish
E: I don’t know