Lecture 21: Programming with Subclasses

CS 1110
Introduction to Computing Using Python

Put Me in the Zoo

- Develop 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:
  - print words if animal speaks
  - animal eats: print eating sounds and gain 1 pound
- Read the skeleton zoology.py

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 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")
    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

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 methods?
• What does a "stringified" Animal look like?

After lecture

• Implement class Penguin
  ▪ Penguins cannot fly but can swim
  ▪ Let’s say the default weight is 25 units
  ▪ You decide what it sound it makes when it eats
• Experiment! It’s the best way to learn
• In lieu of pre-lecture reading for Thurs, read, run, and experiment with module zoo, which sets up a Zoo and lets you interact with the animals. Check out how the module uses Animal and its subclasses