Object Oriented Programming Through Python (2.7.x)

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The OOP style

Objects interacting with each other through their methods.

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  - A class is a description of the structure and functionality of the desired object (abstract)
  - Objects are *instances* of classes (concrete)
- You can have multiple instances of the same class!

```
> z1 = complex(5,3)
> z2 = complex(1,2)
> print(z1 * z2.conjugate())
(11-7j)
```

Toy Example - Inheritance

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> tim, marty = Cat(), Bird()
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> tim.legs
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> marty.speak()
Chirp!
> tim.legs = 3
> #Tim the cat got injured :(
```

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    - Try to avoid!

Inheritance and Constructors

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> bob = Animal(age=4)
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> larry = Cat(4)
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> larry = Cat(4)
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class Cat(Animal):
    def __init__(self, *args, **kwargs):
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Key Ideas for OOP

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- Polymorphism (we can write code for base class)

Real Example: Predator–prey system

`predator.py`

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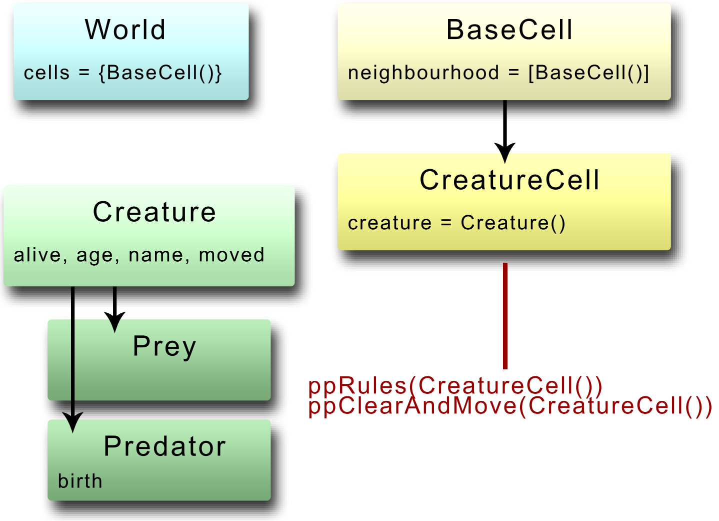

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- Static vs. dynamic typing

Exercises

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- Write classes and functions to represent our number system (integers, rational numbers).
- Can you think of a better ruleset for the predator–prey system?
- How would you keep track of the number of live predators and prey in each iteration?
- Export that data into a file and plot with your favourite plotting software. Do your results agree with the Lotka–Volterra equations?
- Write a new subclass for BaseCell to follow the rules of Conway's Game of Life.