

CSC148 fall 2013

Introduction to computer science week 1

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Outline

Introduction

object-oriented design

What's CSC148 about?

6 hrs.

- ▶ well first, CSC108 was about if statements, loops, function definitions and calls, lists, dictionaries, searching, sorting, classes, documentation style. So you've got all that down...
- ▶ ... otherwise, sign up for the CSC148 ramp-up session
September 14th or 21st, 10-4
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python infested by objects



← evel
virus?!
does it mutate-?

Here are some built-in objects to fool around with:

```
>>> w1 = "words"  
>>> w2 = "swords"[1:]  
>>> w1 is w2  
False  
>>> import turtle  
>>> t = turtle.Turtle()  
>>> t.pos()  
(0.00,0.00)  
>>> t.forward(100)
```

] some value,
different
objects.

] each
turtle
has its own
info.

vandalizing existing classes

this is **deeply wrong**, except for teaching purposes...

Don't do this in assignment

```
>>> from turtle import Turtle
```

```
>>> t1 = Turtle()
```

```
>>> t1.pos()
```

```
(0.00,0.00)
```

```
>>> t1.forward(100)
```

```
>>> t1.pos()
```

```
(100.00,0.00)
```

```
>>> t1.neck
```

```
Traceback (most recent call last):
```

```
File "<stdin>", line 1, in <module>
```

```
AttributeError: 'Turtle' object has no attribute 'neck'
```

```
>>> Turtle.neck = "very reptilian"
```

```
>>> t2 = Turtle()
```

```
>>> t2.neck
```

```
'very reptilian'
```



] t1.neck would also work



Design a new class

Somewhere in the real world there is a description of points in two-dimensional space:

In two dimensions, a point is two numbers (coordinates) that are treated collectively as a single object. Points are often written in parentheses with a comma separating the coordinates. For example, (0, 0) represents the origin, and (x, y) represents the point x units to the right and y units up from the origin. Some of the typical operations that one associates with points might be calculating the distance of a point from the origin, or from another point, or finding a midpoint of two points, or asking if a point falls within a given rectangle or circle.

mit?

Find the most important noun (good candidate for a class...), its most important attributes, and operations that sort of noun should support.

build class Point...

in that **deeply wrong**, but informative, way

don't do this ever

```
>>> from math import sqrt
>>> class Point(object):
...     pass
...
>>> def initialize(point, x, y):
...     point.x = x
...     point.y = y
...
>>> def distance(point):
...     return sqrt(point.x**2 + point.y**2)
...
>>> Point.__init__ = initialize
>>> Point.distance = distance
>>> p2 = Point(12, 5)
>>> p2.distance()
13.0
>>>
```

] very generic class

] attach methods to class

] → first parameter (self, point) is implicit



build class Point...

...properly!...

```
from math import sqrt
```

```
class Point(object):
```

```
    """Two dimensional point  
    """
```

```
    def __init__(self: "Point",  
                 x: "horizontal coordinate",  
                 y: "vertical coordinate") -> "None":  
        """Initialize this point  
>>> p = Point(3, 4)  
        """  
  
        self.x = x  
        self.y = y
```

float

__init__

changes existing instance

None

float

```
# and so on
```