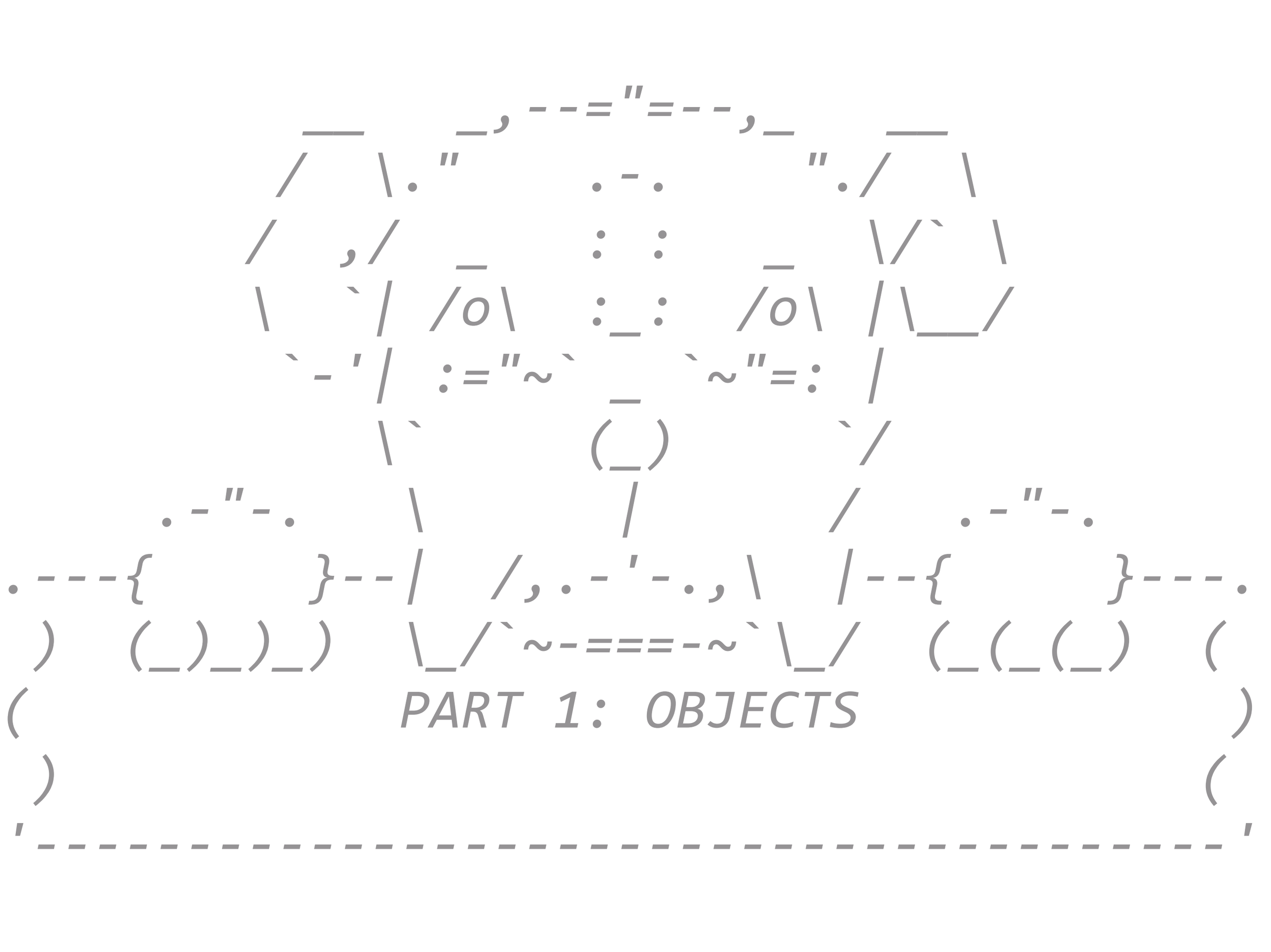
objects

objectify Python, not people


PART 1: OBJECTS

important primer

https://www.youtube.com/watch?v=jaIHcE7gZn8#t=17

objects

- used to model real-world things
- have attributes (think nouns)
- have methods (think verbs)

how to

1. make a class
2. make an instance of the class
3. use the object

attributes

- create/access them through special **`self`** argument

- only create them within **`__init__`** method (best practice)

attributes

```
class Sloth(object):

    def __init__(self, name, stuffie):
        self.name = name
        self.stuffie = stuffie

s = Sloth('Punkin', 'Giraffe')

# Get attributes
print s.stuffie

# Change attributes
s.stuffie = 'Manatee'
print s.stuffie
```

methods

```
class Sloth(object):
    # initializer, etc.

    def hug(self):
        return '{0} hugs {1}'.format(self.name,
                                     self.stuffie)

s = Sloth('Josh', 'Sloth')

# a kid can dream
print s.hug()
```

more methods

```
class Sloth(object):
    # initialiazer, etc.

    def change_stuffie(self, new_stuffie):
        if new_stuffie is None:
            raise ValueError('Give that sloth a stuffie')

        self.stuffie = new_stuffie


s = Sloth('Punkin', 'Giraffe')

s.change_stuffie(None)  # Raises an error
s.change_stuffie('Manatee')
```

full sloth class

```
class Sloth(object):
    def __init__(self, name, stuffie):
        self.name = name
        self.stuffie = stuffie

    def hug(self):
        return '{0} hugs {1}'.format(self.name,
                                     self.stuffie)

    def change_stuffie(self, new_stuffie):
        if new_stuffie is None:
            raise ValueError('Give that sloth a stuffie')

        self.stuffie = new_stuffie
```

class attributes

- single attribute available to entire class
- access two ways:
  - `Class.attr`
  - `instance.attr`

class attribute example

```
class Person(object):
    all = []

    def __init__(self, name):
        self.name = name
        self.all.append(self)

p = Person("Josh Palay")
print p
# <__main__.Person object at 0x10e112250>

Person.all
# [<__main__.Person object at 0x10e112250>]

p.all
# [<__main__.Person object at 0x10e112250>]
```

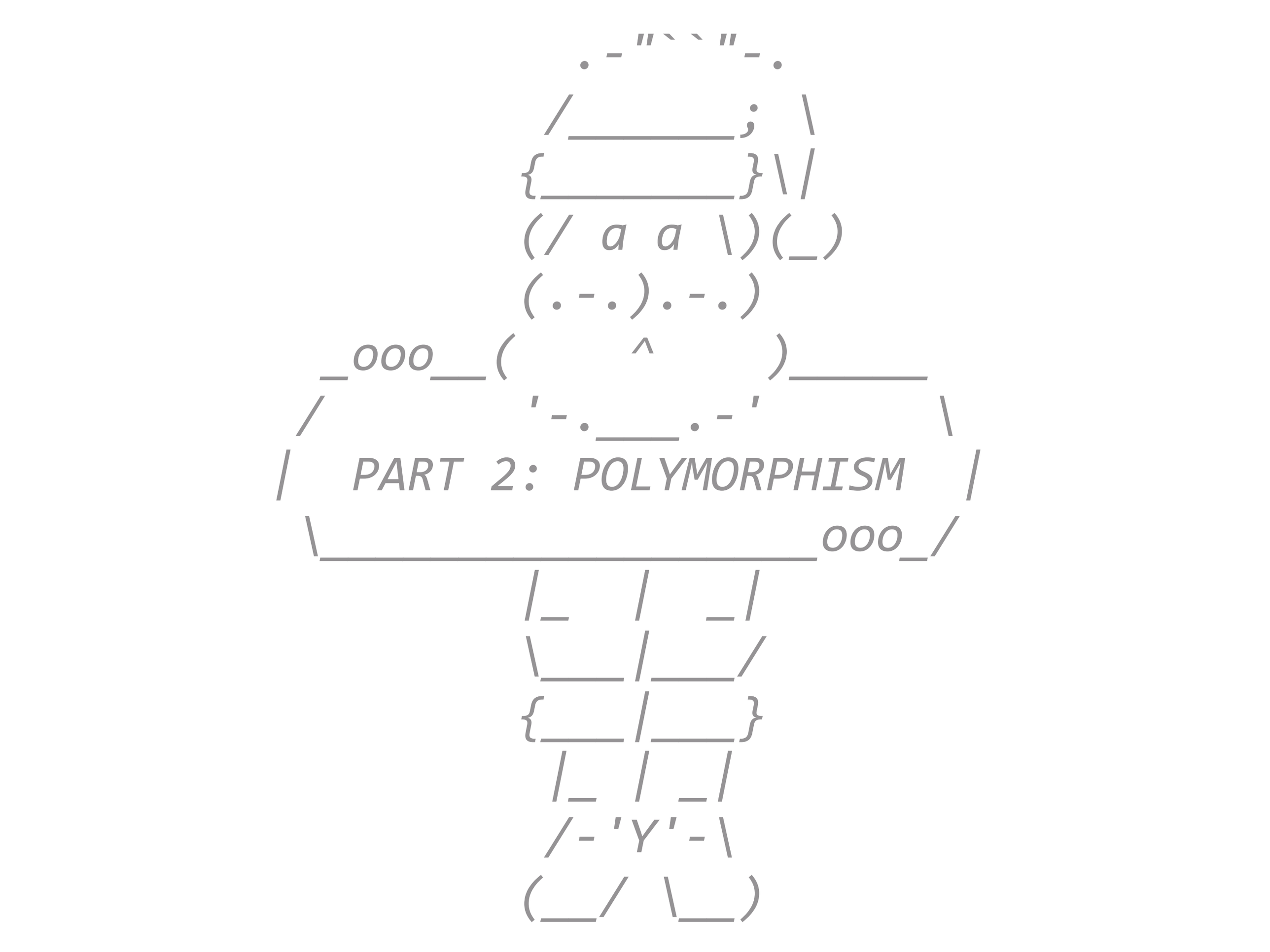
```
class Node(object):
    def __init__(self, val, tail):
        self.val = val
        self.tail = tail

    def has_cycle(self):
        nodes = set()
        curr = self

        while curr is not None:
            if curr in nodes:
                return True

            nodes.add(curr)
            curr = curr.tail

        return False
```


PART 2: POLYMORPHISM

classic example

- Let's model...
    - People!
    - Employees!
    - Students!
- Students/Employees have everything People have

without polymorphism

```
class Person(object):
    # person attributes + methods

class Employee(object):
    # person attributes + methods
    # employee attributes + methods


class Student(object):
    # person attributes + methods
    # student attributes + methods
```

with polymorphism

```
class People(object):
    # people attrs/methods


class Employee(People):
    # employee attrs/methods


class Student(People):
    # student attrs/methods
```

side-by-side

without polymorphism:

```
class Person(object):
    # person attrs/methods

class Employee(object):
    # person attrs/methods
    # employee attrs/methods

class Student(object):
    # person attrs/methods
    # student attrs/methods
```

with polymorphism:

```
class People(object):
    # people attrs/methods

class Employee(People):
    # employee attrs/methods

class Student(People):
    # student attrs/methods
```

classic examples are boring

```
class Storm(object):

    def __init__(self, windspeed):
        self.wind = windspeed

    def get_wind(self):
        return self.wind

    def get_report(self):
        return 'Winds are blowing at {0}mph!'.format(
            self.wind)
```

other types of storms

- Consider the Sharknado
- Employee : Person :: Sharknado : Storm
- Sharknado should extend Storm

initializer

```
class Sharknado(Storm):

    def __init__(self, windspeed, shark_level):
        # calls Storm's initializer
        super(Sharknado, self).__init__(windspeed)

        self.shark_level = shark_level
```

get_report

```
class Sharknado(Storm):

    def get_report(self):
        # Calls Storm's get_report
        r = super(Sharknado, self).get_report()

        r += 'Also {0} sharks bit me :('.format(
            self.shark_level)
        return r
```

get_wind


Part 3 (bonus! :o):
Other things

range is a thing

- built in function

- makes lists of numbers

range is a thing

```
# creates list [0, end)
range(end)
```

```
# creates list [start, end)
range(start, end)

# if step = n, creates list with every nth number
range(start, end, step)
```

range is a thing

```
# creates list [0...9]
range(10)

# creates list [1...10]
range(1, 11)

# creates list [0, 3, 6, 9]
range(0, 10, 3)
```

xrange is better

- Returns "generator", not a list
- Uses less memory
- Usually does what you want

list comprehensions

- easy way to transform list
- returns new list, never modifies old one
- `[<statement> for elt in lst]`

list comprehensions

```
nums = xrange(5)
squared_nums = [x ** 2 for x in nums]

print squared_nums
# [0, 1, 4, 9, 16]
```

you can also filter

```
nums = xrange(10)
odds = [x for x in nums if x % 2 == 1]

print odds
# [1, 3, 5, 7, 9]
```

do both!

```
nums = xrange(10)
odds_sq = [x ** 2 for x in nums if x % 2 == 1]

print odds_sq
# [1, 9, 25, 49, 81]
```