Introduction to Python

NLP: Jordan Boyd-Graber

University of Maryland

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Using Python

- Command line
- Notebooks
- VM

Start Python, Variables

```
hk:~ jbg$ python3
Python 3.5.2 (v3.5.2:4def2a2901a5, Jun 26 2016, 10:47:25)
[GCC 4.2.1 (Apple Inc. build 5666) (dot 3)] on darwin
Type ``help'', ``copyright'', ``credits'' or ``license'' for
>>> 3 + 2
5
>>> a = 5
>>> a * 5
25
```

Define Function

```
>>> def logistic(x):
...     return 1.0 / (1 + exp(-x))
...
>>>
```

Errors!

```
>>> logistic(3.0)
Traceback (most recent call last):
  File ``<stdin>'', line 1, in <module>
  File ``<stdin>'', line 2, in logistic
NameError: name 'exp' is not defined
>>> from math import exp
```

Importing Functions

```
>>> logistic(-100)
3.7200759760208356e-44
>>> logistic(100)
1.0
>>> logistic(0)
0.5
```

Python: Datatypes

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Datatypes

Programming is about manipulating data. Different types of informations are stored differently.

- integers
- floats
- strings
- lists
- dictionaries.

Datatypes

```
>>> 22//7
3
>>> s = 22/7
>>> s
3.1428571428571428
>>> 22 % 7
1
```

Strings

```
>>> s = " I am the very model of a modern Major-General "
>>> s.strip()
'I am the very model of a modern Major-General'
>>> s.find("am")
3
>>> s.replace("modern Major-General", "Gilbert caricature")
' I am the very model of a Gilbert caricature '
```

Lists

A list is an ordered collection of data (of any type). Both lists and strings can access using the accessor [].

```
>>> l = range(10)
>>> l
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
>>> l[4]
4
>>> list(s)
[' ', 'I', ' ', 'a', 'm', ' ', 't', 'h', 'e', ' ', 'v', 'e',
>>> s.split(" ")
['', 'I', 'am', 'the', 'very', 'model', 'of', 'a', 'modern'
>>> "am" in s.split()
True
>>> "Mikado" in s.split()
False
>>> filter(lambda x: x != "", s.split(" "))
['I', 'am', 'the', 'very', 'model', 'of', 'a', 'modern', 'M
```

Dictionaries

```
>>> d = {}
>>> d[3] = 4
>>> d[3]
4
>>> d[2]
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
KeyError: 2
>>> d[3] = 2
>>> d[3]
2
```

Putting it Together

- Functions, classes

Python: Control Flow

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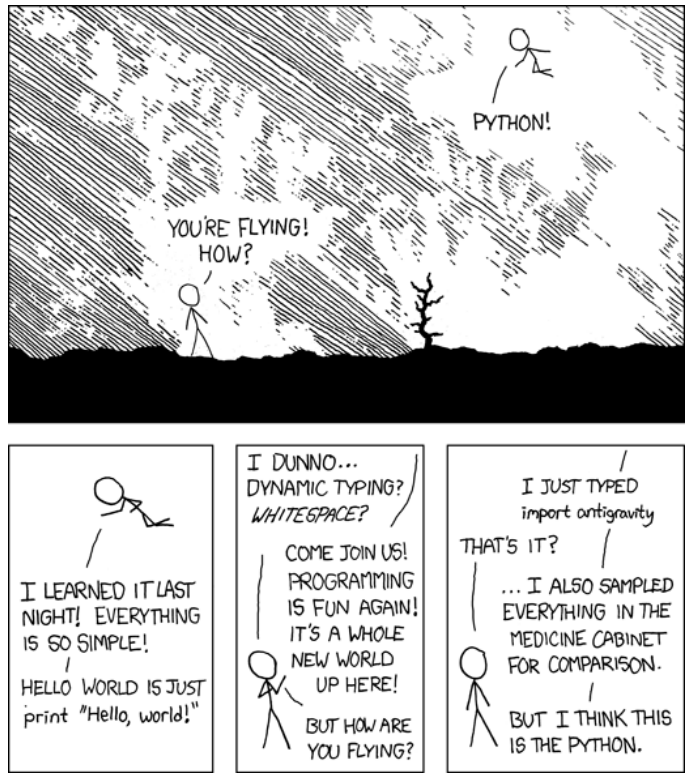
What Makes Python Odd



- Some languages use brackets / parens
- Python uses whitespace
- Loops / if statements

Is this the right language to start with?

- Python-inspired syntax
- `where` clause has unit tests for function
- Concise, recursive (but optional) data declarations

If statements

```
>>> sheeps_clothing = "wool"
>>> if "wolf" in sheeps_clothing:
...     print("RUN")
... elif len(sheeps_clothing) > 4:
...     print("Haircut time")
... else:
...     print("All is well")
...
All is well
```

For loops

Need to take a list as input

```
>>> sum = 0
>>> for i in range(100):
...     sum += i
...
>>> print(sum)
4950
```

List comprehensions

```
>>> sum(x for x in range(10))
45
>>> sum(x for x in range(10) if x % 2 == 0)
20
```

String formatting

```
>>> "%s foo %i %0.3f" % ("blah", 8, 0.5)
'blah foo 8 0.500'
```