INTRODUCTION TO PYTHON

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GENERAL ASSEMBLY

Introduction

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INTRODUCTIONS

Agenda

- Why programming?
- Why Python?
- Python Overview and Setup
- Python Basics
- Build programs to analyze data

WHY PROGRAMMING

Why Programming?

- Solve Problems
  - Recommended Products
  - Optimal Road Trip
- Essential Skill of the 21st Century
  - Everyone from health professionals to basketball players can learn to code.

WHY PYTHON?

Why Python?

- Batteries Included
- Simple, clean, easy-to-learn
- Many uses
    - the data science language
    - web applications (Django, Flask)
- Free and open source

```
def sum(a, b):
    return a + b

print sum(1, 2)
```

PYTHON OVERVIEW

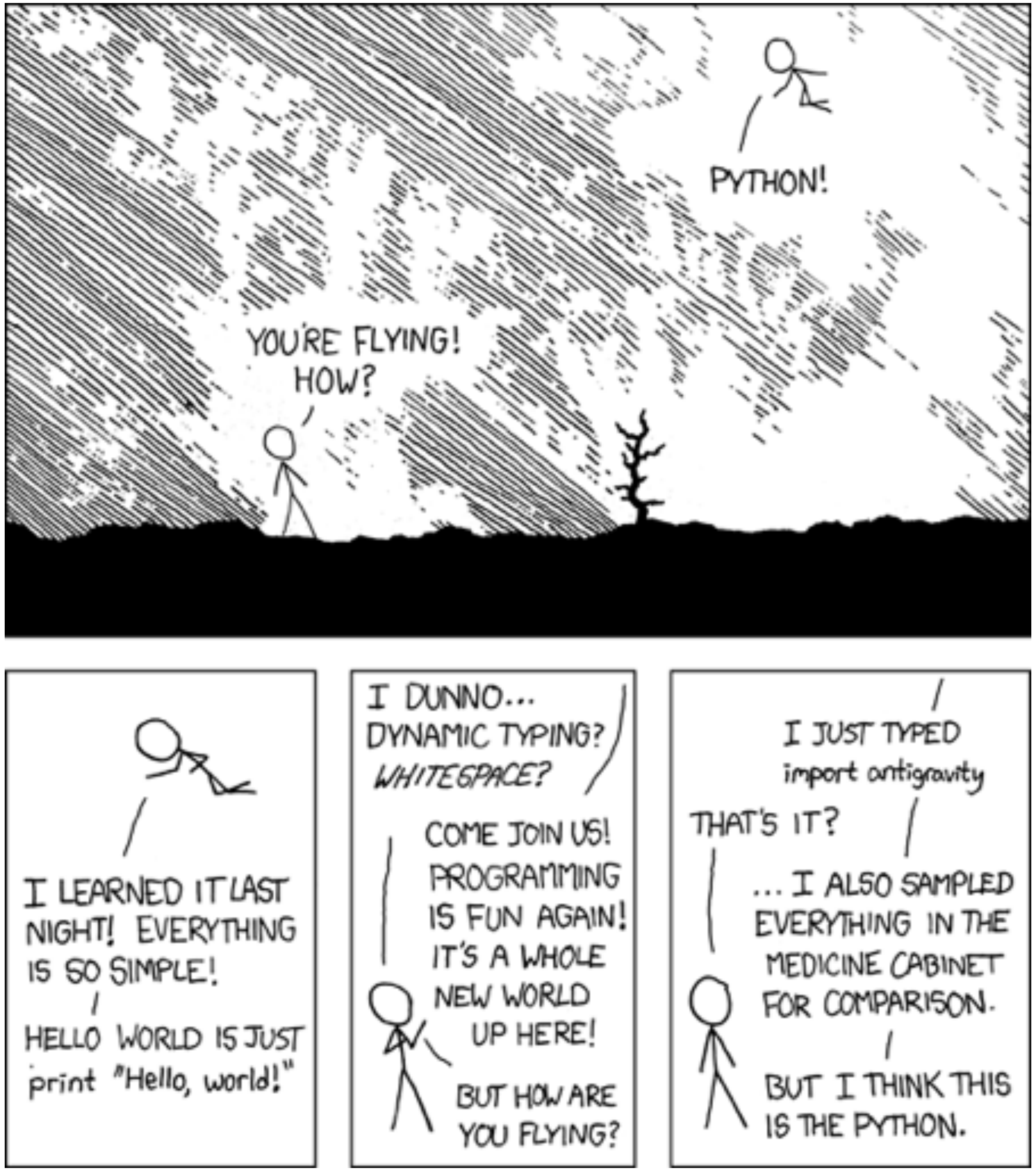
History

- Guido van Rossum
  - Benevolent Dictator for Life

Image source: Wikipedia

What is it like?

- High level
  - Interpreted, not compiled
- Whitespace dependent
  - Gotta indent!
- Dynamic
  - Change types on the fly


YOU'RE FLYING! HOW?
PYTHON!
I LEARNED IT LAST NIGHT! EVERYTHING IS SO SIMPLE!
HELLO WORLD IS JUST print "Hello, world!"
I DUNNO... DYNAMIC TYPING? WHITESPACE?
COME JOIN US! PROGRAMMING IS FUN AGAIN! IT'S A WHOLE NEW WORLD UP HERE!
BUT HOW ARE YOU FLYING?
I JUST TYPED import antigravity
THAT'S IT?
...I ALSO SAMPLED EVERYTHING IN THE MEDICINE CABINET FOR COMPARISON.
BUT I THINK THIS IS THE PYTHON.

Who Uses It?

Pinterest
Google
NASA
YAHOO!
reddit
Dropbox
Insta

…a lot of companies

PYTHON SETUP

Install Python and Sublime Text

- We’ll be using Python 2.7.10
    - Install from Python.org
- Run Python
    - Type `python` in the command line. `exit()` to exit the prompt.
- Install Sublime (text editor)
    - Others include Atom, Visual Studio Code

Your First Program

- Traditionally, the first program in a new language is Hello World

```
print “Hello, world!”
```

- Interactive Mode: type and execute immediately
- Run a file: Save code with the `.py` extension
  - `python hello_world.py`

FIRST PROGRAM = ✓

Installing Packages

- Use pip

```
pip install requests
```

```
pip install pattern
```

- Packages give us more functionality without having to write it ourselves.

Basics

‣ Variables

```
a = 4

b = ‘something’

my_variable = True

does_exist = None
```

Basics

- Basic Types (strings, integers, floats, booleans, None)

```
a_string = ‘I am a single-quoted string’

another_string = “I am a double-quoted string”

an_integer = 4

a_float = 5.2

a_none_value = None
```

Convert Types

```
str(4)              >>> ‘4’

str(5.0)            >>> ‘5.0’

int(‘7’)            >>> 7
```

- **Operators** (+, -, *, /, **, %)

```
5 + 5                    >>> 10

‘something’ + ‘neat’     >>> ‘somethingneat’

4 ** 2                   >>> 16

4.0 - 2.7                >>> 1.3

5 % 2                    >>> 1
```

Basics

- Comparisons (<, >, <=, >=, ==, !=)

```
5 > 4                      >>> True

5 == 2                     >>> False

6 >= 6                     >>> True

5 != 5                     >>> False
```

- Boolean Operators (and, or, not)

```
5 > 3 and 7 == 7          >>> True

not 5 == 5                >>> False

5 == 5                    >>> True

5 > 6 or 5 > 1            >>> True
```

Exercise

Create a file called hello_name.py and do the following:

1. Print your name.
2. Print your age.
3. Print how many days old you are.
4. Print if your age is divisible by 4.

Comments

```
# this is a Python comment
```

```
# this is a group of multiple

# Python comments
```

- **IO (input and output)**

```
my_name = raw_input(‘What is your name: ‘)

print my_name
```

```
>>> What is your name: Brian

>>> Brian
```

- format

```
a_string = ‘{} is interesting’.format(‘Programming’)

print a_string



>>> Programming is interesting
```

Basics

- Conditional statements (if, else, elsif)

```
is_running = True

if is_running:

  print “It’s running!”

else:

  print “It’s not running!”
```

Basics

- **Loops (while, for)**

```
counter = 0

while counter < 5:

  print “Loop has run”

  counter = counter + 1
```

```
stuff = [‘jar’, ‘dirt’]

for item in stuff:

   print item
```

Exercise

Create a program called letters.py that prints the number of letters in a word.

1. Ask the user to input a word.
2. Print out the length of the word.
3. Repeat until the user types “EXIT”

Data Structures and Organization

- Lists

```
my_list = [‘apple’, 4, True, 3.0, ‘nice’]
```

- Dictionaries

```
my_dictionary = {

   ‘guitar’: ‘A music instrument’

   ‘age’: 100 }
```

Exercise

Create a program that prints the frequency of letters in a sentence.

1. Ask the user to input a sentence.
2. Print out each letter and the number of times each letter occurs.
3. Repeat until the user types “EXIT”

DATA ANALYSIS

Data Analysis

- Collect Data (manually or by finding a dataset)
- Clean Data
- Analyze Data
- Reflect
- Report

Collect Data

- Surveys
- APIs (talk to a program)
- Data Scraping

Clean Data

- Are there gaps in the data?
- Is each data point valid?
- Are there outliers that skew the results?

Analyze Data

- You have the data, now what do you want from it?
  - Sums, totals, averages, median, ranges
- How do you get those results?
  - Python! Or some other language
  - Third party libraries (numpy)
  - API calls (outside algorithms and functions)

Reflect and Report

- Reflect
  - How are these results accurate? Inaccurate?
  - Can we tweak our methods, explore alternatives?
- Report
  - Present results and conclusions.

Exercise

- What are the most common words in articles about politics?
  - Collect data
  - Clean
  - Analyze
  - Reflect
  - Report

Exercise

- How do people feel about the city of Seattle?
  - Collect data
  - Clean
  - Analyze
  - Reflect
  - Report

HISTORICAL ANALYSIS

Word Counts

- Analyze Titanic passengers
  - Collect (import data using `csv`)
  - Clean (run counts, filter out any anomalies)
  - Analyze (get averages, modes, other data)
  - Reflect (may not be necessary for this)
  - Report (display results)

SENTIMENT ANALYSIS

Word Counts

- What’s sentiment?
  - Attitude, feeling, emotion
- How do we measure it?
  - Natural language processing (NLP)
  - Machine learning

Word Counts

- Analyze tweets about pizza and the Seahawks
    - Collect (import data using `csv`)
    - Clean
    - Analyze
    - Reflect
    - Report

RESOURCES

Python

- http://learnpythonthehardway.org/book/
- https://docs.python.org/2/
- https://docs.python.org/3/
- http://teamtreehouse.com/

Data Science and Analytics

- http://www.clips.ua.ac.be/pattern
- http://www.numpy.org/
- http://www.data.gov/
- https://www.udacity.com
- General Assembly

Q&A

THANK YOU!

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