Python

Gang Chen
chengang@bgitechsolutions.com

November 1, 2014

华大科技 BGI·tech
香港中文大學 The Chinese University of Hong Kong

Outline

1. Overview
2. Quick Get Started
3. Syntax
4. iPython

Next

1 Overview
- History

2 Quick Get Started

3 Syntax

4 iPython

Like is short, use Python
人生苦短
我用python
INTERN
parc
ZEUUX Project
zeuux.org
free software, free society

Life is short

You need Python!

Bruce Eckel
Author of Thinking in Java and Thinking in C++

人生苦短，我用Python

Next

1. Overview
   - History
2. Quick Get Started
   - Download and Installation
   - Hello Python
   - Python Shell
3. Syntax
4. iPython

Brief History

- December 1989, Guido wants a better ABC programming language
- October, 2000, Python 2.0 was released
- December, 2008, Python 3.0, a backwards-incompatible release, was released.

Differences between Python 2 and 3

- print is a function
- Views and iterators instead of lists
- 1/2 = 0.5; 1//2 = 0
- All text is unicode
- ……

Reference: https://docs.python.org/3/whatsnew/3.0.html

Reference

Tutorials

- Google Python Class: https://developers.google.com/edu/python/?csw=1
- Official Documents: https://www.python.org/doc/

Books

- Lovely Python, 可爱的Python
- Think Python: How to think like a computer scientist
  http://www.greenteapress.com/thinkpython/thinkpython.html
  see thinkpython.pdf file

Next

1 Overview

2 Quick Get Started
- Download and Installation
- Hello Python
- Python Shell

3 Syntax

4 iPython

Next

1. Overview
   - History
2. Quick Get Started
   - Download and Installation
   - Hello Python
   - Python Shell
3. Syntax
4. iPython

Required Softwares

Required softwares will be listed on GitHub before the coming lecture.
https://github.com/gangchen/CUHK-I2P

Interpreters

Various Python Interpreters

- CPython: Official interpreter
- JPython: for Java Virtual Machine
- Ironpython: for .Net platform
- PyPy: just-in-time compiler
- Python for S60: Nokia

Download and installation

- Download: www.python.org
- Version: Please install CPython 2.
- For most Linux distributions and Mac OS, Python 2.7 is preinstalled.

Package Management

- easy_install
- pip

Next

1. Overview
   - History
2. Quick Get Started
   - Download and Installation
   - Hello Python
   - Python Shell
3. Syntax
4. iPython

```
#!/usr/bin/python

print "Hello, Python!";
```

see HelloPython.py

```
python HelloPython.py
```

Next

1. Overview
   - History
2. Quick Get Started
   - Download and Installation
   - Hello Python
   - Python Shell
3. Syntax
4. iPython

Interactive Shell

```
$ python
Python 2.7.6 (default, Sep  9 2014, 15:04:36)
[GCC 4.2.1 Compatible Apple LLVM 6.0 (clang-600.0.39)] on dar
Type "help", "copyright", "credits" or "license" for more inf
>>> print "Hello Python!"
Hello Python!
>>>
```

Next

1 Overview

2 Quick Get Started

3 Syntax

4 iPython

Types and Variables

```
print(type(2))
print(type(1.3))
print(type("Hello"))

print(type(type(1.3)))

message = "Hello"
```

Operators

```
1.3 - 0.6 == 0.7?
import math
math.sqrt(2)
math.sin(2)
```

Package

```
sin(2)
from math import sin
sin(2)
```

Conditional and loop

- if-else
- for

Next

- Iteration
- String
- Lists
- Dict
- Tuples
- Files
- Object Oriented Programming
- Think Python is highly recommended.

Next

1 Overview
2 Quick Get Started
3 Syntax
4 iPython

IPython provides a rich architecture for interactive computing with:

- Powerful interactive shells (terminal and Qt-based).
- A browser-based notebook with support for code, text, mathematical expressions, inline plots and other rich media.
- Support for interactive data visualization and use of GUI toolkits.
- Flexible, embeddable interpreters to load into your own projects.
- Easy to use, high performance tools for parallel computing.

matplotlib

matplotlib

- matplotlib is a library for making 2D plots of arrays in Python.
- matplotlib is designed with the philosophy that you should be able to create simple plots with just a few commands, or just one!
- Plots should look great - publication quality. One important requirement for me is that the text looks good (antialiased, etc.)
- Postscript output for inclusion with TeX documents
- Embeddable in a graphical user interface for application development
- Code should be easy enough that I can understand it

ipython + matplotlib

ipython + matplotlib

ased Interactive data analysis and visu

Example: see animate_decay.py

Tutorial

http://www.labri.fr/perso/nrougier/teaching/matplotlib/

Next

- scipy: a Python-based ecosystem of open-source software for scientific computing
- Biopython and other python-based bioinformatics projects
- Bioinformatics in the cloud: Python SDK of SBGenomics and DNAnexus