Python 0

Some material adapted from Upenn cmpe391 slides and other sources
Overview

- History
- Significance
- Installing & Running Python
- Simple script examples
Brief History of Python

• Invented in the Netherlands, early 90s by Guido van Rossum
• Named after Monty Python
• Open sourced from the beginning, managed by Python Software Foundation
• Considered a scripting language, but is much more
• Scalable, object oriented and functional from the beginning
• Used by Google from the beginning
“Python is an experiment in how much freedom programmers need. Too much freedom and nobody can read another's code; too little and expressiveness is endangered.”

- Guido van Rossum
TIOBE has been collecting data on programming language “popularity” for many years. It counts results for a query like "<language> programming" on popular search engines.

Python’s place in the Market

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Python Programming Language – Official Website

Python is a programming language that lets you work more quickly and integrate your systems more effectively. You can learn to use Python and see almost immediate gains in productivity and lower maintenance costs.

Python runs on Windows, Linux/Unix, Mac OS X, and has been ported to the Java and .NET virtual machines.

Python is free to use, even for commercial products, because of its OSI-approved open source license.

New to Python or choosing between Python 2 and Python 3? Read Python 2 or Python 3.

The Python Software Foundation holds the intellectual property rights behind Python, underwrites the PyCon conference, and funds other projects in the Python community.

Read more, or download Python now

> Python 3.2 alpha 3 released
The third and final alpha release of Python 3.2 has been released for testing.
PUBLISHED: Tue, 12 Oct 2010, 8:30 +0200
The Python Tutorial

Release: 2.7
Date: November 02, 2010

Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms.

The Python interpreter and the extensive standard library are freely available in source or binary form for all major platforms from the Python Web site, http://www.python.org/, and may be freely distributed. The same site also contains distributions of and pointers to many free third party Python modules, programs and tools, and additional documentation.

The Python interpreter is easily extended with new functions and data types implemented in C or C++ (or other languages callable from C). Python is also suitable as an extension language for customizable applications.

This tutorial introduces the reader informally to the basic concepts and features of the Python language and system. It helps to have a Python interpreter handy for hands-on experience, but all examples are self-contained, so the tutorial can be read off-line as well.

For a description of standard objects and modules, see The Python Standard Library. The Python Language Reference gives a more formal definition of the language. To write extensions in C or C++, read Extending and Embedding the Python Interpreter and Python/C API Reference Manual. There are also several books covering Python...
Running Python
Typical Python implementations offer both an interpreter and compiler

Interactive interface to Python with a read-eval-print loop

```
[finin@linux2 ~]$ python
Python 2.4.3 (#1, Jan 14 2008, 18:32:40)
[GCC 4.1.2 20070626 (Red Hat 4.1.2-14)] on linux2
Type "help", "copyright", "credits" or "license" for more information.

>>> def square(x):
...    return x * x
...

>>> map(square, [1, 2, 3, 4])
[1, 4, 9, 16]
```
Installing

- Python is pre-installed on most Unix systems, including Linux and MAC OS X
- The pre-installed version may not be the most recent
- Two “latest versions”
  - 2.7 released 7/10 & 3.2 released 10/10
  - Python 3 is a non-backward compatible version which you should not use for 331
- Download from http://python.org/download/
- Python comes with a large library of standard modules
There are many Integrated Development Environments

- IDLE
- Eclipse + PyDev
- Emacs

As well as enhanced shells
IDLE Development Environment

• **IDLE** is the “official” IDE distributed with Python
• Preinstalled on MAC OS X
• Written in Python with the **Tkinter** GUI package
• Multi-window text editor with syntax highlighting, auto-completion, smart indent and other features
• Python shell with syntax highlighting, line recall, …
• Integrated debugger with stepping, persistent breakpoints, and call stack visibility
Pydev is an Eclipse plugin for Python

Download from http://pydev.org/

Syntax highlighting, code completion, goto function, debugger, …
Emacs *python-mode.el* has good support for editing Python, enabled by default for .py files.

Features: completion, symbol help, eldoc, and inferior interpreter shell, etc.
Emacs as a Python IDE

• You can fire up a shell in emacs via M-x python-shell
• You can also set up a more powerful Python IDE environment in EMACS
  • Pymacs allows two-way communication between Emacs Lisp and Python
  • Ropemacs provides advanced features such as completion, refactoring, etc
On Unix…

% python
>>> 3+3
6

- Python prompts with ‘>>>’.
- To exit Python (not Idle):
  - In Unix, type CONTROL-D
  - In Windows, type CONTROL-Z + <Enter>
  - Evaluate exit()
Call python program via the python interpreter

`% python fact.py`

Make a python file directly executable by

- Adding the appropriate path to your python interpreter as the first line of your file
  
  `#!/usr/bin/python`

- Making the file executable
  
  `% chmod a+x fact.py`

- Invoking file from Unix command line
  
  `% fact.py`
#! /usr/bin/python

def fact(x):
    if x == 0:
        return 1
    return x * fact(x - 1)

print "\n\nN  fact(N)"
print "-------"
for n in range(10):
    print n, fact(n)
When you call a python program from the command line the interpreter evaluates each expression in the file.

- Familiar mechanisms are used to provide command line arguments and/or redirect input and output.
- Python also has mechanisms to allow a python program to act both as a script and as a module to be imported and used by another python program.
import re
from sys import stdin

# a regular expression for a valid email address
pat = re.compile(r'[-\w][-\w]*[@][-\w][-\w.]+[a-zA-Z]{2,4}')

for line in stdin:
    for address in pat.findall(line):
        print address
python> python email0.py <email.txt
bill@msft.com
gates@microsoft.com
steve@apple.com
bill@msft.com
python>
import re
from sys import stdin

pat = re.compile(r'[-\w][.-\w]*@[\w][.-\w.]+[a-zA-Z]{2,4}\)')
# found is an initially empty set (a list w/o duplicates)
found = set()
for line in stdin:
    for address in pat.findall(line):
        found.add(address)

# sorted() takes a sequence, returns a sorted list of its elements
for address in sorted(found):
    print address
python> python email2.py <email.txt
bill@msft.com
gates@microsoft.com
steve@apple.com
python>
Conclusion: Python is ..

- Popular as a scripting language
- Popular as a general purpose language
- Open sourced
- Interesting from a program language perspective
- Easy to learn and use, so being used in many CS 101 courses