What Is Python?

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What Is Python?

- A very brief history of Python
- A less brief introduction to the language
- Code samples along the way…
  - For programmers…
  - …but not Python programmers (yet)

"What is your favorite color?"

"Blue, no yel--- *auuggghhh!*"

Who am I?

- A professional programmer for 25+ years
- Pre-Python background in C, C++, Perl, Tcl, Fortran, FORTH, Lisp
- Pythonlabs member, core developer since 1995 (CNRI, BeOpen, Zope Corporation)
- Currently Principal Engineer at Secure Software
- Project leader, GNU Mailman
- Former project leader, Jython

What Is Python?

- Open-source
- Cross-platform
- Object-oriented
- Dynamically typed
- Modular
- Extensible
- Batteries included
- Programming language

A Brief History of Python

- Invented by Guido van Rossum in 1989
- CWI in the Netherlands
- 1.0 released January 26, 1994
- Guido joins CNRI in Reston VA, April 1995
- Python 1.3 - 1.5 (1995 - 1998)
- JPython 1.0 released 1998
- 2.0 released October 16, 2000
- July 2003, Guido moves to California
- Python 2.5 released September 19, 2006

Who uses Python?

- Who doesn't? :-)
- Commercial
  - Google
  - Apple
  - Industrial Light and Magic
  - AstraZeneca
  - Yahoo!
  - Ultraseek
  - Game vendors
  - NASA
  - Secure Software :-)

Hello World

- Interactive
- Programmatic
- Imperative style of programming
- `print` statement
- strings in quotes:
  - `'hello world'`
  - `"hello world"`
  - `'''hello world'''`
  - `"""hello world"""`

Hello (again!) World

- Structure defined by indentation
- Defining a function using `def` keyword
- Pass parameters inside parentheses
- Function calls
- All functions return something, in this (default) case the special object `None`

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Open Source

- Python Software Foundation License
  - BeOpen.com
  - CNRI
  - CWI
- Not GPL'd, but GPL-compatible
- Free for any use
  - commercial use
  - derivative works

Open Source

- BitTorrent
- Zope
- Plone
- Twisted
- TurboGears
- Roundup
- Buildbot
- Mailman :-)
- SQLAlchemy

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Cross-platform

- C Python requires C89 to build
- Most *nix (POSIX) platforms
  - Linux
  - SunOS
  - Mac OS X
- Windows
- OS/2, Amiga, Palm, Nokia, …
- Java (Jython)
- .NET (IronPython)
- Python (PyPy)

Cross-platform

- Unlike Java, not lowest-common functionality
- Common APIs where possible
- Access to lower level operating system
- Easier to write cross-platform code without sacrificing functionality

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Python Object-Orientation

- In the traditional sense, i.e. Python has classes and instances:

```
class Point:
    def __init__(self, x, y):
        self.x = x
        self.y = y

p = Point(1, 2)
```

Python Object-Orientation

- Object-orientation is optional
  - Unlike Java not everything has to be defined inside a class
- Imperative/structural paradigm
- Functional paradigm

Python Object-Orientation

- Deeper, everything is an object
  - Built-in types for integers, floats, lists, tuples, dictionaries, sets, strings, unicodes, functions, classes, methods, modules, packages
  - Exceptions
  - User-defined classes
  - Multiple inheritance
  - Derived classes from built-in types
  - Metaclasses (brain hurty)

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Python's Type System

- Strongly typed
  - Objects cannot change their type
  - Objects only implement methods in their class and base classes
  - No automatic type conversion (but numeric and string promotion)
- Dynamically typed
  - No declaration of variables
  - No compilation phase
  - No static type checking
  - Run time checks

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Modularity

- Granularity
  - Functions
  - Classes
  - Modules
  - Packages
  - Distutils/Python Eggs
- Supports
  - Quick and dirty scripts…
  - …that evolve to tools…
  - …that evolve into applications…
  - …that evolve into frameworks

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Extensibility

- Native language FFI
  - C/C++
  - Java
  - .NET (e.g. C#)
  - Hybrids?
- For speed
- For integrating external libraries
- Extensions:
  - Modules
  - Types

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- **Batteries included**
- Programming language

Batteries included

- An extensive standard library
- Lots of available 3rd party tools
- Packagers & freezers
- Frameworks

Standard Library

- Regular expressions
- Date/time types, calendar
- Threading, mutex, Queue
- Decimal, random numbers
- Internet protocols: RFCs, XML, HTML
- csv and other file formats
- Crypto and data compression
- Database access, sqlite, bsddb, dbm
- OS services, IPC
- GUIs, i18n, audio

Standard Library

- Internet services:
  - smtp, ftp, pop, imap, nntp, telnet, gopher
  - http, html, cgi
  - cookies, url parsing
- XML
  - DOM
  - SAX
  - xmlrpc
- Demo servers:
  - httpd
  - smtpd
  - generic "socket" server

3rd Party Libraries

- The Python Cheeseshop
  - Python's answer to CPAN
  - 1732 registered packages and growing
  - Easy to add to, easy to install
  - Browsable by Trove classifiers
    - Topic
    - Environment
    - License
    - OS, etc.
  - RSS feed

Packagers and freezers

- py2exe
- py2app
- cx_Freeze
- Innosetup
- eggs
- distutils

Frameworks

- Zope
- Plone
- Twisted
- Django
- TurboGears

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A programming language

- Not just an implementation
- A language specification
- Multiple implementations
- Some differences
  - Garbage collection semantics
  - String types (all unicode?)
  - Platform oddities
  - CPython tends to be the most advanced
  - Differences due to intentionally undefined semantics

Python References

- Main Python website:
  http://www.python.org
- On line tutorial:
  http://docs.python.org/tut/tut.html
- Download Python:
  http://www.python.org/download/
- Community:
  comp.lang.python
  http://mail.python.org/mailman/listinfo/python-list
  http://python-forum.org
  irc.freenode.net #python