

Google™



Python @ Google

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Google, Inc.



Administrivia

- Social tips
 - @GoogleIO #io2011 #TechTalk #Python
- Feedback
 - goo.gl/nffpv

Something Completely Different

- "Perl is worse than Python because people wanted it worse."
 - Larry Wall, Creator of Perl, Oct 1998
- "Life is better without braces."
- "Python fits your brain."
 - Bruce Eckel, *Thinking in Java*
- "Python is an excellent language & makes sensible compromises."
 - Peter Norvig, *Artificial Intelligence*

Favorite language?

```
C Hello World in (old) ForTran

WRITE (6,10)
10 FORMAT('Hello World!', A13)
STOP
END
```

```
/* Hello World in C */
#include <stdio.h>
void main() {
    printf("Hello World!\n");
}
```

```
{ Hello World in Pascal }
program hello(output);

BEGIN
    writeln('Hello World!')
END.
```

```
// Hello World in C++
#include <iostream.h>
int main() {
    cout << "Hello World!\n";
    return(0);
}
```

```
// Hello World in Java
public class HelloClass {
    public static void main(String[] argv) {
        System.out.println("Hello World!");
    }
}
```

```
#!/bin/*sh
# Hello World in a shell
echo "Hello World!"
```

```
#!/usr/bin/env ruby
# Hello World in Ruby
puts 'Hello World!'
```

```
#!/usr/bin/env perl
# Hello World in PERL
print "Hello World!\n";
```

Hello World

```
print 'Hello World!'
```

Why are you here? You...

- Heard good word-of-mouth
- Came via Django, App Engine, etc.
- Discovered others use it
- Want to hear about Google
- Were forced by your boss

About this talk

- Assumes you == _____
 - Apologies
- What is Python?
- Python NOT @ Google
- Python @ Google
- Python & You

About Wesley

- Software engineer
- At work:
 - Developer Advocate at Google
- After-hours:
 - Python advocate
 - Teacher (28 years, 12+ Python)
- 14+ yrs of Python
- More about me later

About Guido

- Creator of Python (BDFL)
- Software Engineer at Google
- Google App Engine
 - Python libraries, API design
 - UI programming, developer tools
- 22+ yrs of Python
- Will keep me honest + Q&A

What Is Python?



Python in a Nutshell

- Object-oriented programming language
- Scripting or mission-critical servers
- Interpreted but bytecode-compiled
- Simple yet robust syntax
- Easy-to-read, -learn, -maintain
- Batteries included

Twenty



That's right

- Released Feb 1991
- Mostly word-of-mouth
- Includes silence (more later)

Gains in popularity

- Jump in job listings
- Safari Top 5 Queries, Apr 2009
 - 1. iPhone
 - 2. Java
 - 3. Python
 - 4. C#
 - 5. PHP
 - Source: Safari Books Online (O'Reilly, Pearson)

Fan favorite

- Tiobe Language of the Year (2010, 2007)
 - www.tiobe.com
 - Alternates between #6 & #7 (vs. Objective-C)
- LinuxJournal
 - Favorite Programming Language (2010, 2009)
 - Favorite Scripting Language (2010, 2008, 2007, 2006)
 - linuxjournal.com
- LinuxQuestions.org Members Choice Awards
 - Language of the Year (2010, 2009, 2008, 2007)
 - linuxquestions.org

Availability on most platforms



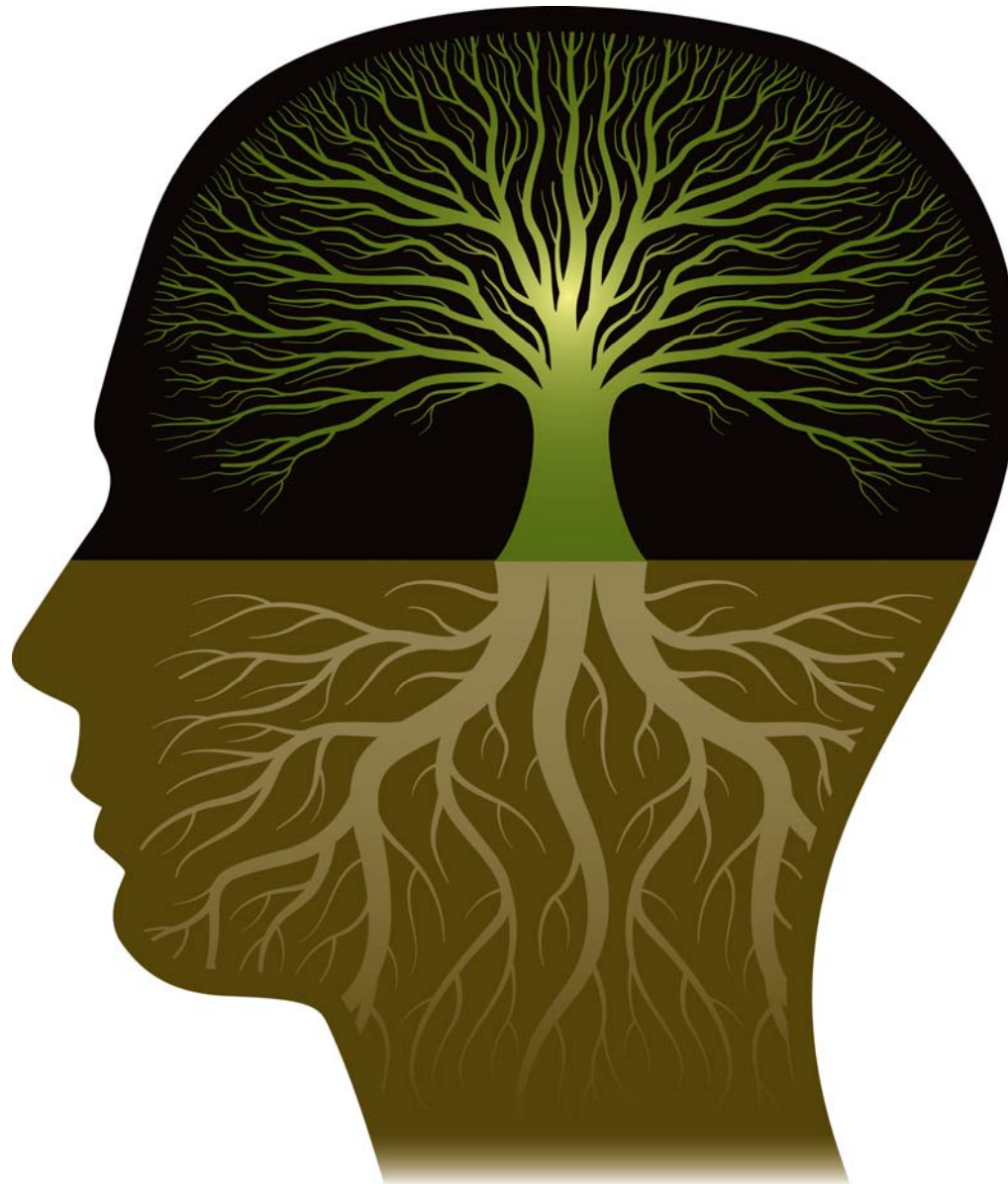
Gaining more mindshare

- Google App Engine announcement
 - Launches with Python
 - Parts of Django framework
- Change at MIT
 - First undergrad course
 - Switches from Scheme to Python
 - Focuses on robotics

History of Python

- CWI, Holland
 - Amoeba distributed OS
- Wanted: tool for apps & system tasks
 - Choices: C or sh, desired ABC
 - Also worked on ABC
 - Failed edu language attempt
 - Urge for successor
- Solution: more powerful scripting language
 - Combines power & simplicity
 - Began work ~holidays 1989
 - Named after British comedy troupe

Roots in Education



Python & Education

- Heavily inspired by ABC
 - Simplistic yet robust syntax
- Computer Programming for Everybody (CP4E)
 - Programming a basic skill
 - Should be taught with reading & writing?
- High School Success Story
 - Computer Science Advanced Placement Exam
 - Python helped with retention/understanding

Programming Languages

- Adults: tools to get work done
 - C/C++/C#, Java, PHP, Python, Ruby
- Kids: used to teach programming
 - Scratch, Alice, Python, Basic, Flash/AS
- Conclusion: if made for kids...

Demo

```
def foo():  
    factor = 10  
    try:  
        f = open('data.txt', 'w')  
    except IOError as e:  
        print 'file open error:', e  
        return  
  
    # think for (int i=0; i<10, i+=1)  
    for i in range(0, 10, 1):  
        print >> f, i * factor,  
        if i % 2 == 0:  
            print >> f, 'even'  
        else:  
            print >> f, 'odd'  
    f.close()
```

Community



We get along

- Open and welcome to all
 - New programmers **and** refugees
 - Main newsgroup, #IRC
 - Tutor mailing list
- Personality
 - Non-argumentative
 - Not language elitists
 - Know flaws of our fave
 - Strong non-destructive debates

Conferences accessible

- Which ones?
 - PyCon main conference
 - PyCons around the world
 - EuroPython
 - OSCON
- Beginners or experienced
- Grassroots efforts
 - Volunteer-driven
 - Financial aid
 - Diversity grants

Well-known projects

- NumPy, SciPy
- Jython, IronPython, PyPy
- virtualenv
- SQLAlchemy
- nose, py.test
- windmill, Selenium
- BeautifulSoup, html5lib, lxml
- IPython, bpython
- Sphinx, ReportLab
- Python Extensions for Windows

Web frameworks

- Django
- TurboGears, Pylons, repoze.bfg, Pyramid
- web2py
- web.py
- Google App Engine's webapp
- Werkzeug, Flask, Tipfy
- Zope, Plone
- Tornado
- etc.
- "Python: the only language with more web frameworks than keywords."
 - Harald Armin Massa, Dec 2005
 - groups.google.com/group/comp.lang.python/msg/2f542c568e94f6dd

Python used for...

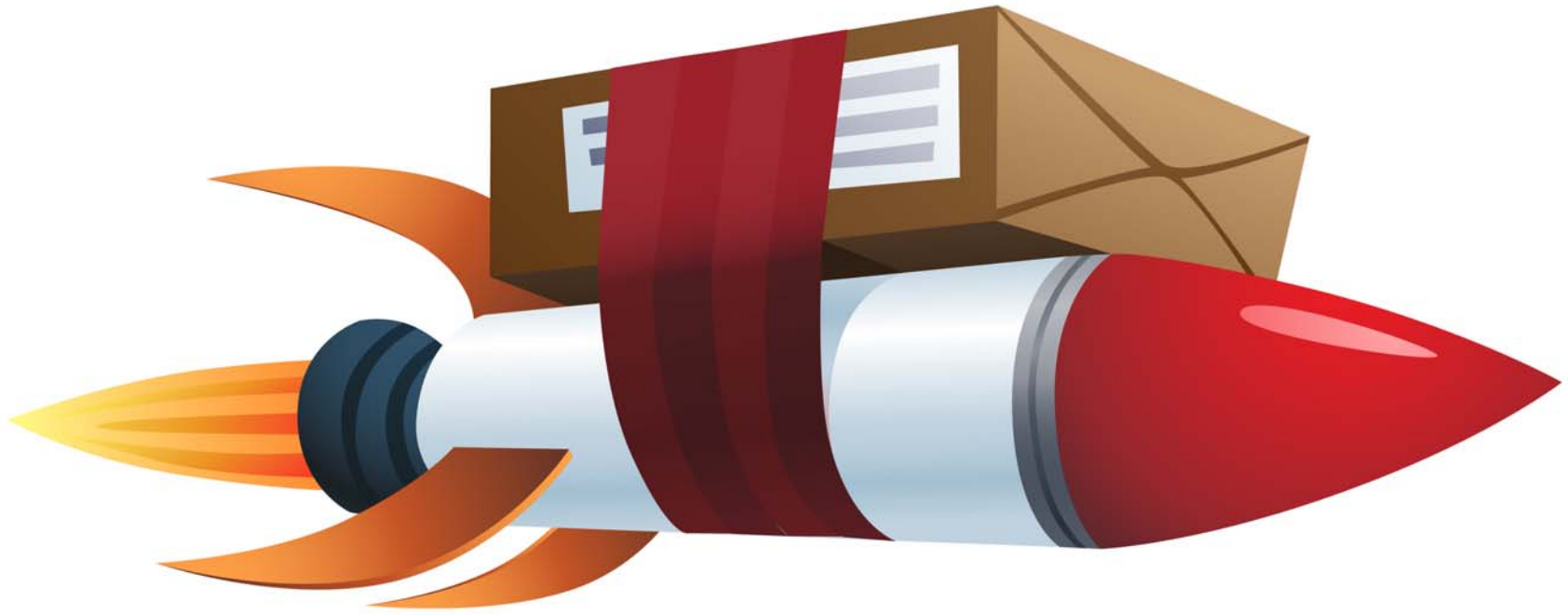
- Networking
- Web/RIA apps
- QA/testing, automation frameworks
- Text Processing
- Database Programming
- Scientific, mathematical/numeric processing
- Hardware/embedded system design
- Multimedia, graphics/imaging, animation
- GUI development
- Java, .NET, COM/MFC
- **Batteries Included**

Python Not @ Google

I've used it at lots of places!



Yahoo!



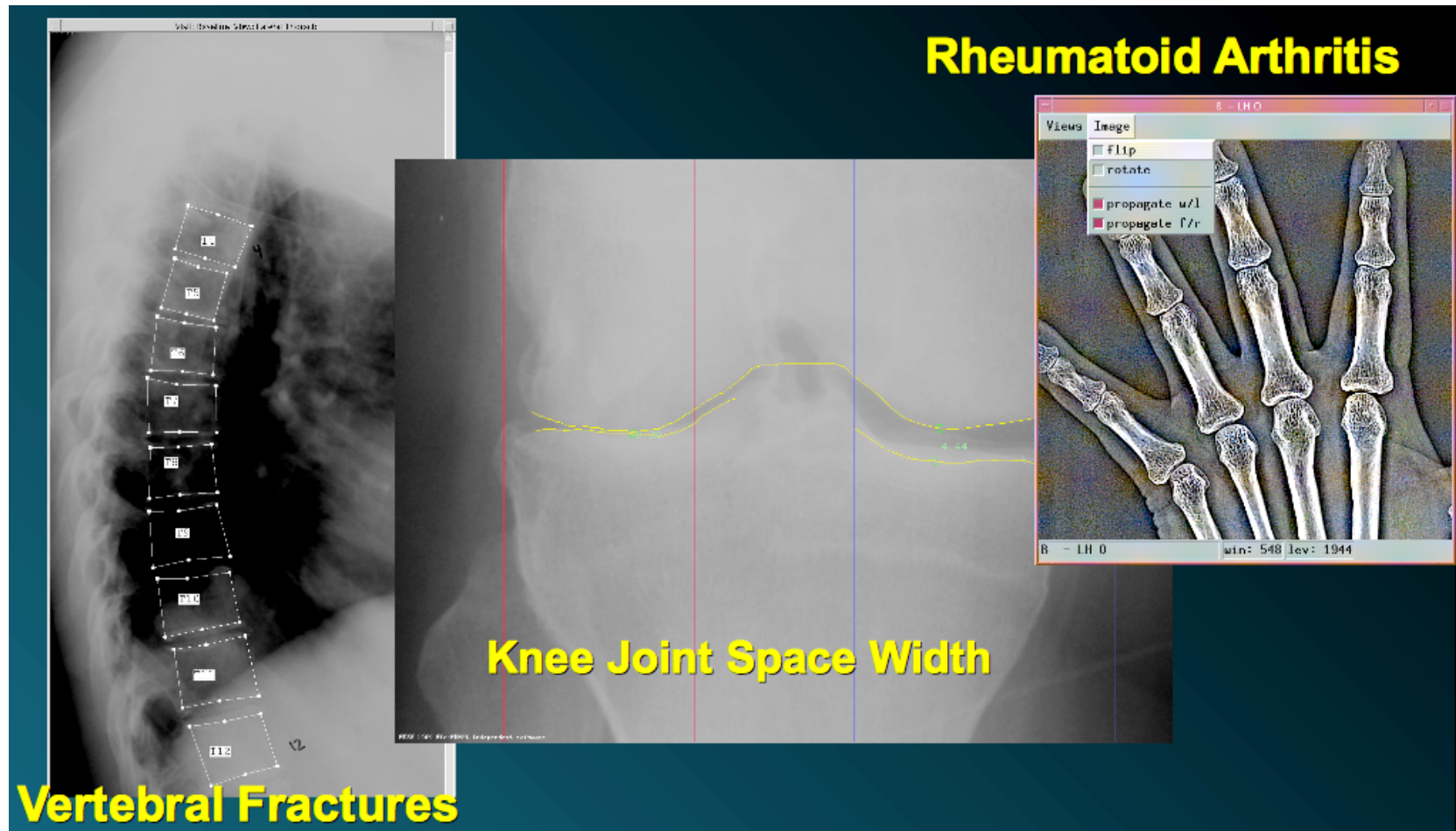
IronPort/Cisco



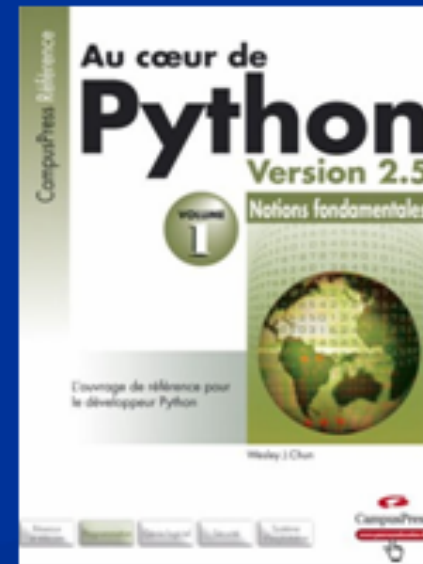
Slide



Synarc: fish out of water



Python Writings



Interesting Factoid

- *Python Web Development with Django*
- Three authors collaborated
 - Two on east coast, one on west
 - Wrote entire book in plain text
 - Markdown (then), reST (future)
- Python primary driver
 - Used to "compile" text, suck in code
 - Execute code unit tests
 - Generated HTML/PDF for publisher

Python @ ???

- Disney, Pixar, Dreamworks
- Lucas: Lucasfilm, ILM, LucasArts
- VMware, Broadcom, QNX
- Evite, Eventbrite, Justin.tv
- Yelp, Triplt, Zillow, Netflix
- Red Hat, Ubuntu/Canonical, OLPC
- NASA, NOAA (NWS), NSA
- etc.

Startup Secret Sauce

- Many Y-Combinators use it
- Rapid development
 - First to market
- Adopt web framework du jour
- "Anti-marketing" campaign
 - Companies reluctant to admit use
 - Strategic advantage over competition
 - You'd do the same

Python @ Google



Python and Google

- An official language
 - Can deploy to production servers
- C++ primary development language
 - Need for systems/scripting language
- Java came later

History

- Use of Python before company founded
- "In order to scale to hundreds of millions of web pages, Google has a fast distributed crawling system. A single URLserver serves... URLs to a number of crawlers.... Both the URLserver and the crawlers are implemented in Python."
 - From "The Anatomy of a Large-Scale Hypertextual Web Search Engine"
 - S. Brin & L. Page, Stanford University, 1998
 - infolab.stanford.edu/~backrub/google.html

Another quote

- "Python has been an important part of Google since the beginning, and remains so as the system grows and evolves."
 - Peter Norvig, Director of Research

Python community Googlers

- Guido van Rossum
- Alex Martelli
- Jim Hugunin
- Fredrik Lundh
- Neal Norwitz
- Mark Pilgrim
- Collin Winter
- Thomas Wouters
- Jeremy Hylton
- Wesley Chun

Google committed to Python

- Mainstay top sponsor
 - PyCon
 - EuroPython
 - OSCON
- Consistently sends speakers
- Employs the BDFL

Google and Python education efforts

- Google internal course externalized
 - code.google.com/edu/languages/google-python-class
 - Videos, labs, lectures, lessons
- Educational Videos
 - code.google.com/edu/languages/index.html#_python_understanding

Products using Python

- Google App Engine
- YouTube
- `code.google.com`
- Various open source libraries

Open source libraries

- Protobufs library
 - Serialized structured data
 - Think highly-efficient XML/JSON
 - Heavily-used internally for RPCs
 - code.google.com/p/protobuf
- Google Data Protocol client library
 - Access Google data
 - Google Analytics, Calendar, Maps, Contacts
 - Google Spreadsheets; Blogger, Picasa, YouTube
 - code.google.com/p/gdata-python-client

code.google.com

- Main website for developers today
- Google APIs
 - Docs
 - Tools
 - Downloads
 - Samples
- Source code project hosting

Google App Engine

- Launches with Python
 - First supported language
- Simple VM
 - Easily wrapped in C++ & sandboxed
- Easy to get started
 - Doesn't require Eng degree to be effective
- Boost to Python, Django communities

Demo



You  **Tube**



YouTube: Python everywhere

- Almost entire site as seen by you
 - Viewing videos
 - Frontends & templates for www/admin
 - Backend API servers
 - Batch tools
 - Test utilities
 - Canonical YT data access
- All the glue is Python

YouTube: Key factors

- Python around since early days
 - Small team: loved Python
 - Discipline and honor
 - Not compiler police here!
- Early architecture
 - Apache (mod_python), MySQL
 - Lasted for awhile
 - Survived longer than one would think

YouTube: Scaling Growth

- Remove bottlenecks
- Use good components
- Balance machine resources
- Migrate pieces & optimize as necessary
- Object caching
- Scale MySQL

YouTube: Python Optimization

- Port bottlenecked Python into C
 - Ex: pure Python HMAC replaced
- Simplify overly-complex algorithms
- Developer efficiency

- Scale-aware code hidden from them

```
User.select_by_username(db_context, user)
```

```
Video.select_by_id(db_context, vid)
```

- Be aware however... don't become a hog!

YouTube: Bottom line

- Python provides...
 - Flexibility
 - Rapid development
 - Simplicity
- Secret to success: just-in-time optimization
 - Take reliable open software... customize it
- Python & scale? Stats to think about
 - Over 2 billion views/day
 - Over 200 million mobile views/day
 - Over 35 hrs of video uploaded/minute
- slideshare.net/didip/super-sizing-youtube-with-python



Awareness

- Proceed with caution
- Most production uses C++, Java
- Interpreted languages...
 - Keep an eye on PyPy
- Strengths: flexibility, rapid development
- Scaling: architect properly (e.g., security)
- First to market
 - Port elsewhere as necessary
 - Or optimize

Other uses of Python

- Build system
- System administration tools
 - Monitoring, managing systems
 - Log analysis
 - Report generation
- Code review tool
- QA/testing
- Automation
- Extensive use of SWIG
- App Engine apps
 - See "Coding For The Cloud" talk!

Python & You



Getting Started

- python.org (not python.com!)
 - Docs, downloads, tutorial
- Books
 - diveintopython.org (quick dive)
 - corepython.com (deep dive)
 - cp4k.blogspot.com (kids dive)
- Videos
 - showmedo.com/videotutorials/python
- Community
 - comp.lang.python newsgroup
 - Tutor mailing list
 - PyCon conferences

Caveat



Two versions of Python

- Python 2: current version
- Python 3: next generation
- Language evolving
- Backwards-incompatible
- Insert FUD here
- No community fragmentation

Hello World (again)

- Use `print`

```
print 'Hello World!' # 2.x
```

```
print('Hello World!') # 3.x
```

- Or use the standard file methods

```
import sys
```

```
sys.stdout.write('Hello World!\n')
```

Don't Panic!



Instead...

- Get
 - Excited
 - and
 - Make
 - » Things



Which to start with?

- Python 3: next generation
 - Do this if completely new
- Python 2: current version
 - Most books/tutorials still here
 - Do this if have existing software
- Bottom-line: either is fine

Summary

- Great first language
- Rapid development
- Flexible
- Many applications
- @Google
 - Popular & will continue to be
 - Many libraries and tools
 - Python, Education
- Google hiring strong developers

Would love to meet users!

- Google I/O, San Francisco, May 2011
- Python course, San Francisco, May 2011
- EuroPython, Florence/Firenze, Jun 2011
- ACM CSTA CS&IT, New York, Jul 2011
- OSCON, Portland, Jul 2011

Colophon: slide generator tool

- Python (os, sys, time, Tkinter)
- Python Extensions for Windows
- Coming in Core Python, 3rd ed.
- Open source project soon too!

Thank You!

Questions?



Feedback: goo.gl/nffpv



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