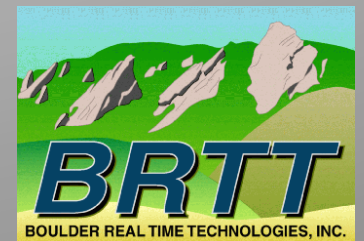


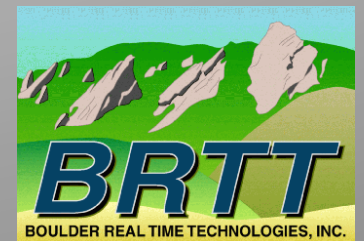
New Python Capabilities in Antelope

*Dr. Kent Lindquist
EAUG Trieste, Italy
February 23-24, 2012*



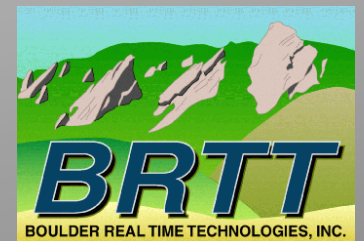
Outline

- Goals at BRTT
- Background
- Interpreter Compilation
- **Python in Antelope**
- Rtwebserver
- Linux
- Contrib
- Dbloc2 replacement



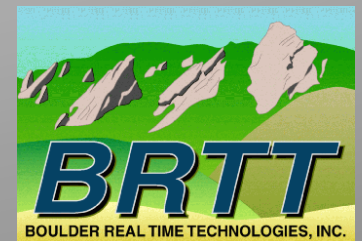
Goals at BRTT

- Continued Operations Excellence
 - Software release
 - First-principles Interpreter compilation
 - Atlassian JIRA task management system
- Free up development time for Dan and Danny
- Development projects for myself
 - Python Antelope Interface
 - Dbloc2 replacement
 - Etc.



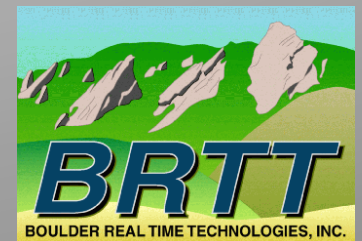
How I Got Here

- Started in Physics U. Colorado, Boulder
 - Laser atom trapping with Dr. C. Wieman
 - -> Computer Modeling -> JSPC Seismology ->
- PhD Geophysics U. Alaska, Fairbanks
 - Passive Earthquake monitoring
 - Iceworm system: Earthworm + Antelope
- Alaska Earthquake Information Center
 - 5 yrs Real-time processing lead
- Lindquist Consulting, Inc.
 - 10 yrs, Antelope Specialist
 - SSN, ROADNet ITR, Australian Tsunami Warning System, etc
- BRTT 1/1/2012



Interpreter compilation

- Task fell to me:
 - Generic interpreters for next release
 - Daunting and Time-consuming
- Automated Compilation from First principles
 - Tarballs plus Makefiles
 - Inline perl etc. to get all the linking etc. right
 - Total control of build process
 - 2 weeks -> 5-20min (or 2hrs on Solaris)
- The interpreters:
 - 64-bit
 - Linux, Mac, SunOS
 - Perl, TCL/Tk, Python
- Benefits
 - Repeatable, especially CPAN modules
 - Stable
 - Consistent across platforms
 - Easier to maintain now the investment is done
 - Easier to stay current and change versions



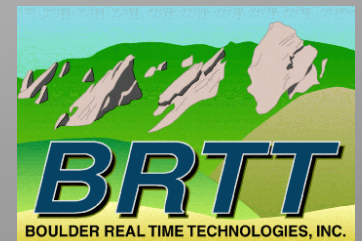
Python in Antelope

- Started from Antelope contrib 2007
- Assembled Oryx at Lindquist Consulting, Inc.
- Now in Antelope
 - Generic Python interpreter, like Perl
 - Antelope functions in Python (dbopen, orbread,...)
 - Build system integration
 - Programmer's ".xpy" instead of ".xpl"
- Major rewrites of interface libraries
- Contrib Python interface deprecated
- Danny's graphics extensions -> lots of new prototype GUIs already



Python: Why?

- Need a scripting language
- Choice of alternatives
 - Perl:
 - Strong but waning?
 - Perl Tk: disjoint branch
 - TCL/Tk:
 - Dead
 - Others:
 - Faddish, unproven, or parochial
- Python:
 - Sustained traction
 - Stable Tkinter hooks to Tk
 - Twisted Web Framework
 - Modern tools: obspy, matplotlib, numpy
- Straightforward GUIs, powerful processing, Scientific Computing



Python: What

Interpreter:

Ipython

Numpy

Matplotlib

Zope

Twisted

PIL

setuptools

Antelope:

Datascope

Orb

Pkt

Stock

Coords

Elog

Sysinfo

Buhistory

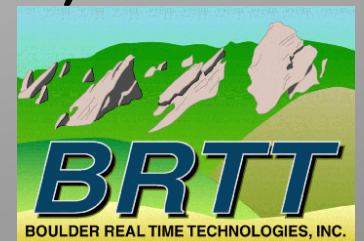
Buvector

Brttpkt

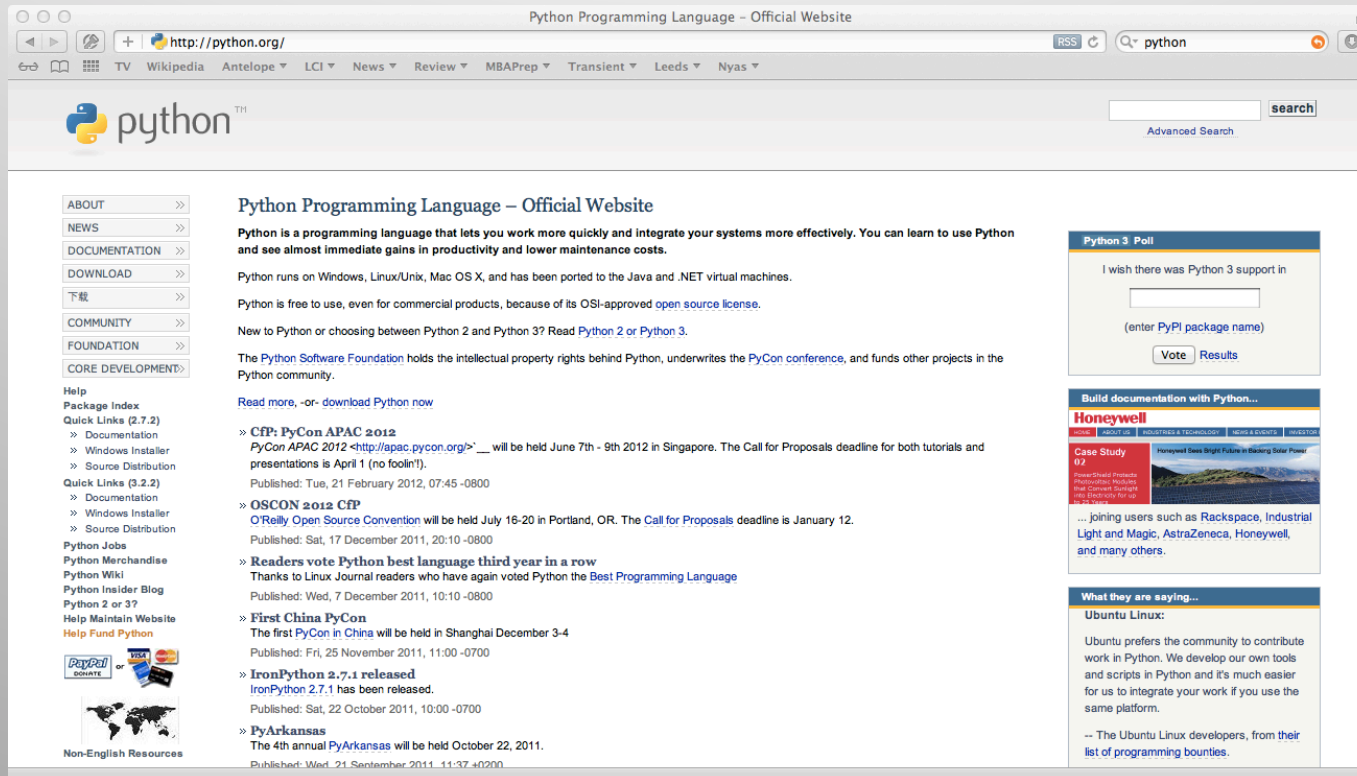
Buplot

(_.*)

(libpyutil)



python



The screenshot shows the Python Programming Language Official Website in a browser window. The browser's address bar displays 'http://python.org/' and the search bar contains 'python'. The website header features the Python logo and a search box. The main content area is titled 'Python Programming Language – Official Website' and includes a navigation menu on the left with categories like ABOUT, NEWS, DOCUMENTATION, and DOWNLOAD. The main text describes Python as a programming language that lets you work more quickly and integrate your systems more effectively. It also mentions that Python runs on Windows, Linux/Unix, and Mac OS X, and is free to use. The right sidebar contains a 'Python 3 Poll' section, a 'Build documentation with Python...' section featuring a Honeywell case study, and a 'What they are saying...' section with a quote from Ubuntu Linux.

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](#)

» **CFP: PyCon APAC 2012**
PyCon APAC 2012 <<http://apac.pycon.org/>> ___ will be held June 7th - 9th 2012 in Singapore. The Call for Proposals deadline for both tutorials and presentations is April 1 (no foolin!).
Published: Tue, 21 February 2012, 07:45 -0800

» **OSCON 2012 CFP**
O'Reilly Open Source Convention will be held July 16-20 in Portland, OR. The [Call for Proposals](#) deadline is January 12.
Published: Sat, 17 December 2011, 20:10 -0800

» **Readers vote Python best language third year in a row**
Thanks to Linux Journal readers who have again voted Python the [Best Programming Language](#)
Published: Wed, 7 December 2011, 10:10 -0800

» **First China PyCon**
The first [PyCon](#) in China will be held in Shanghai December 3-4
Published: Fri, 25 November 2011, 11:00 -0700

» **IronPython 2.7.1 released**
IronPython 2.7.1 has been released.
Published: Sat, 22 October 2011, 10:00 -0700

» **PyArkansas**
The 4th annual [PyArkansas](#) will be held October 22, 2011.
Published: Wed, 21 September 2011, 11:37 +0200

Python 3 Poll

I wish there was Python 3 support in

(enter PyPI package name)

Build documentation with Python...

Honeywell

Case Study 02

PowerShield Powers...
Honeywell Best Bright Future in Building Solar Power

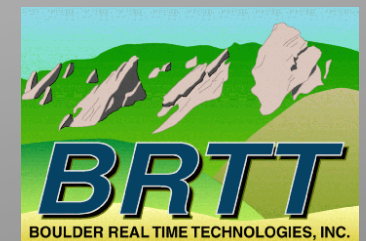
... joining users such as Rackspace, Industrial Light and Magic, AstraZeneca, Honeywell, and many others.

What they are saying...

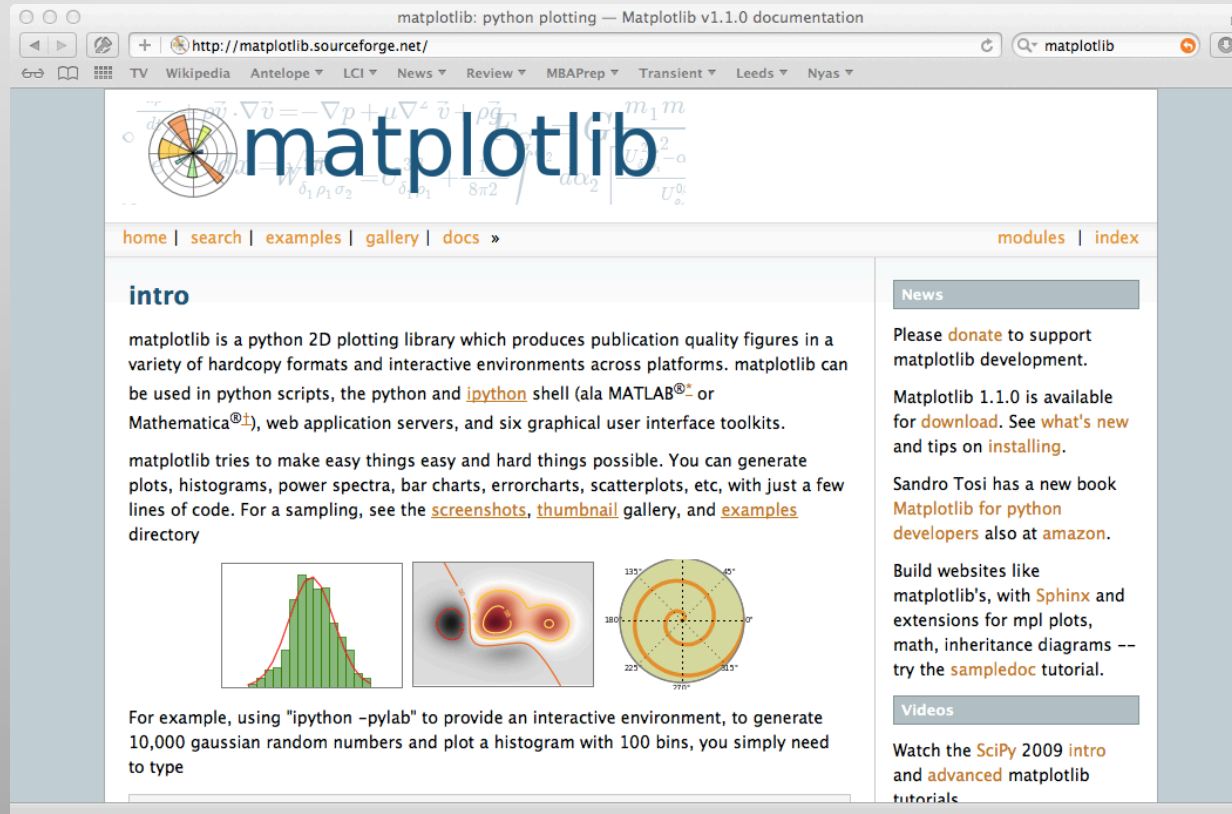
Ubuntu Linux:

Ubuntu prefers the community to contribute work in Python. We develop our own tools and scripts in Python and it's much easier for us to integrate your work if you use the same platform.

-- The Ubuntu Linux developers, from their list of programming bounties.



matplotlib



The screenshot shows a web browser window displaying the matplotlib documentation page. The browser's address bar shows the URL `http://matplotlib.sourceforge.net/`. The page features a header with the matplotlib logo and navigation links for `home`, `search`, `examples`, `gallery`, `docs`, `modules`, and `index`. The main content area is titled "intro" and contains the following text:

matplotlib is a python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms. matplotlib can be used in python scripts, the python and [ipython](#) shell (ala MATLAB[®] or Mathematica[®]), web application servers, and six graphical user interface toolkits.

matplotlib tries to make easy things easy and hard things possible. You can generate plots, histograms, power spectra, bar charts, errorcharts, scatterplots, etc, with just a few lines of code. For a sampling, see the [screenshots](#), [thumbnail gallery](#), and [examples](#) directory

Below the text are three small plots: a histogram with a red normal distribution curve overlaid, a 2D contour plot with red and yellow regions, and a polar plot with concentric circles and radial lines.

For example, using "ipython -pylab" to provide an interactive environment, to generate 10,000 gaussian random numbers and plot a histogram with 100 bins, you simply need to type

The right sidebar contains a "News" section with the following text:

Please [donate](#) to support matplotlib development.

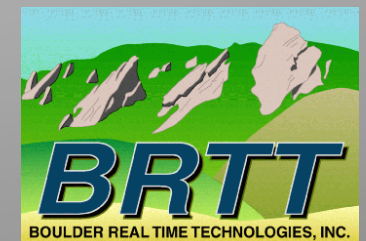
Matplotlib 1.1.0 is available for [download](#). See [what's new](#) and tips on [installing](#).

Sandro Tosi has a new book [Matplotlib for python developers](#) also at [amazon](#).

Build websites like matplotlib's, with [Sphinx](#) and extensions for mpl plots, math, inheritance diagrams -- try the [sampledoc](#) tutorial.

Below the news is a "Videos" section with the text:

Watch the [SciPy 2009 intro](#) and [advanced matplotlib tutorials](#).



matplotlib

Thumbnail gallery — Matplotlib v1.1.0 documentation

http://matplotlib.sourceforge.net/gallery.html

TV Wikipedia Antelope LCI News Review MBAPrep Transient Leeds Nyas

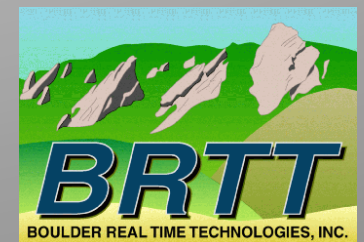
home | search | examples | gallery | docs » modules | index

Click on any image to see full size image and source code

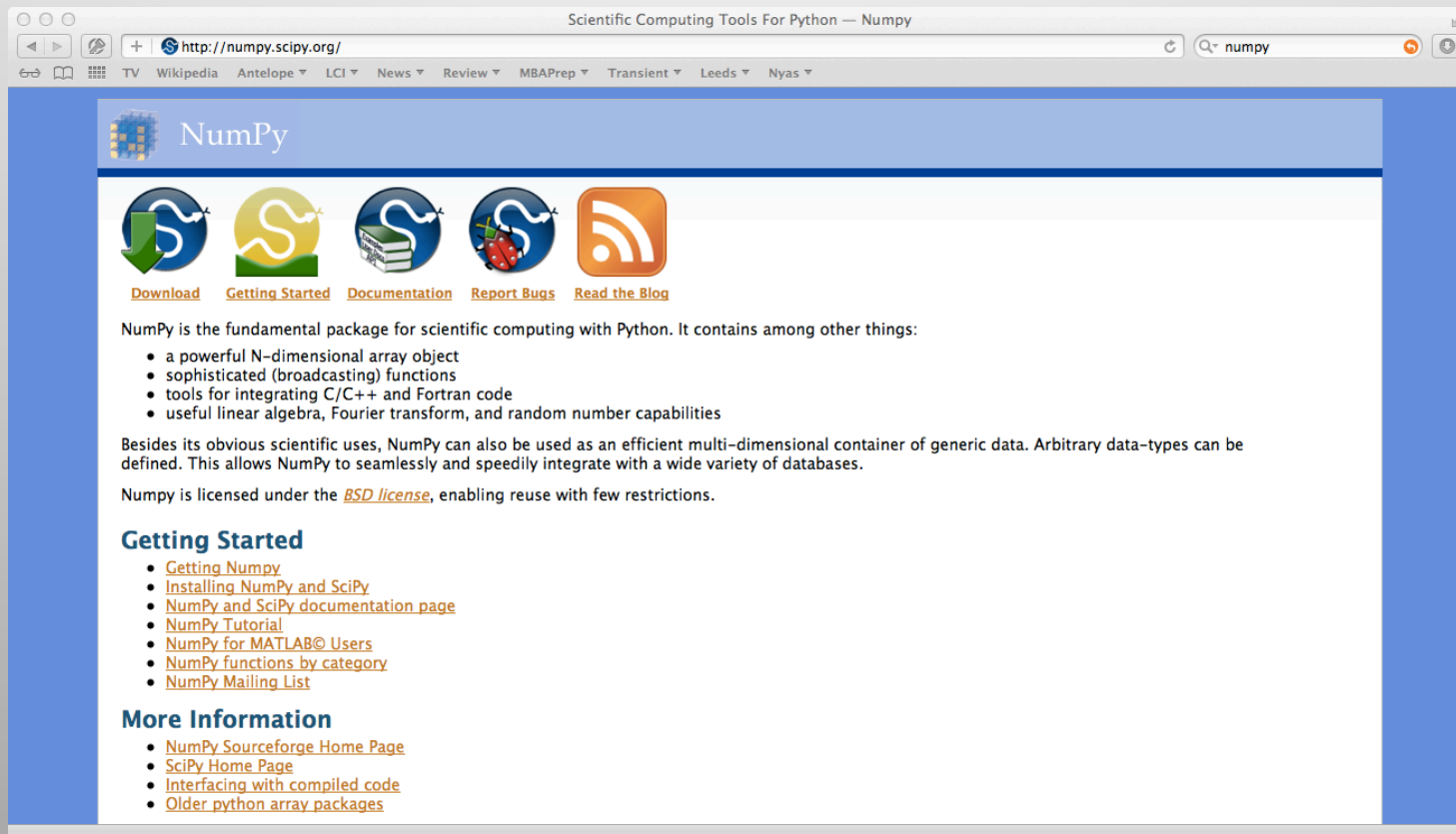
Quick search

Enter search terms or a module, class or function name.

The gallery displays a variety of plots created with Matplotlib, including: a pie chart, a bar chart titled 'Scores by group and gender', a line plot with multiple series, a scatter plot, a heatmap, a plot titled 'Iteration Properties of the Operator', a plot titled 'Tea sales, Fahrenheit and Celsius', a histogram, a plot titled 'Minimum Message Length', and several other data visualizations.



numpy



The screenshot shows the NumPy website homepage in a browser window. The browser's address bar displays 'http://numpy.scipy.org/'. The page features a blue header with the NumPy logo and navigation links: 'Download', 'Getting Started', 'Documentation', 'Report Bugs', and 'Read the Blog'. Below the navigation links, there is a list of features and a 'Getting Started' section with links to installation and documentation resources.

Scientific Computing Tools For Python — Numpy

http://numpy.scipy.org/

TV Wikipedia Antelope LCI News Review MBAPrep Transient Leeds Nyas

NumPy

[Download](#) [Getting Started](#) [Documentation](#) [Report Bugs](#) [Read the Blog](#)

NumPy is the fundamental package for scientific computing with Python. It contains among other things:

- a powerful N-dimensional array object
- sophisticated (broadcasting) functions
- tools for integrating C/C++ and Fortran code
- useful linear algebra, Fourier transform, and random number capabilities

Besides its obvious scientific uses, NumPy can also be used as an efficient multi-dimensional container of generic data. Arbitrary data-types can be defined. This allows NumPy to seamlessly and speedily integrate with a wide variety of databases.

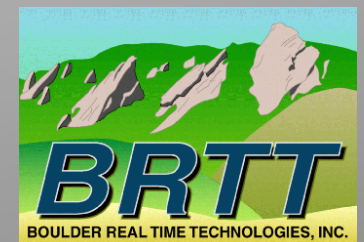
NumPy is licensed under the [BSD license](#), enabling reuse with few restrictions.

Getting Started

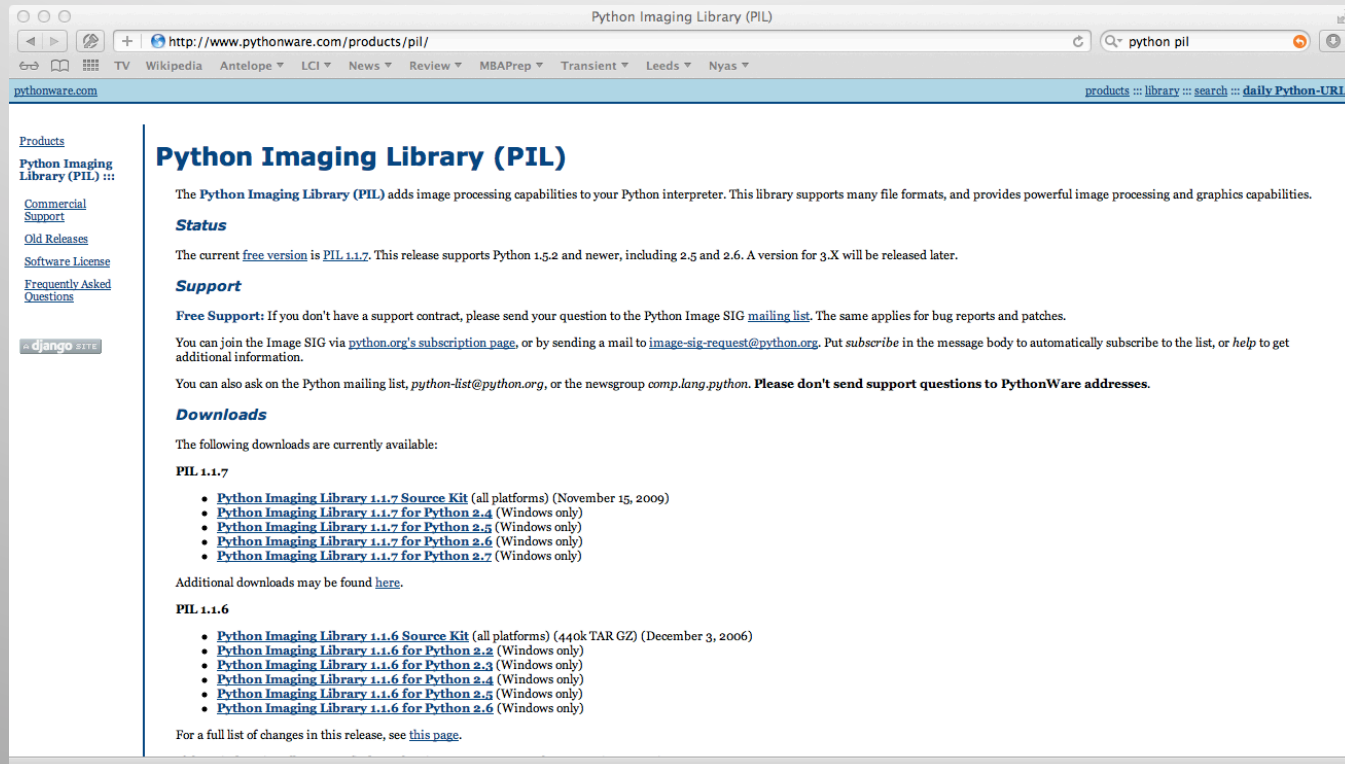
- [Getting Numpy](#)
- [Installing NumPy and SciPy](#)
- [NumPy and SciPy documentation page](#)
- [NumPy Tutorial](#)
- [NumPy for MATLAB® Users](#)
- [NumPy functions by category](#)
- [NumPy Mailing List](#)

More Information

- [NumPy Sourceforge Home Page](#)
- [SciPy Home Page](#)
- [Interfacing with compiled code](#)
- [Older python array packages](#)



Python Imaging Library



The screenshot shows a web browser window displaying the Python Imaging Library (PIL) page on the PythonWare website. The browser's address bar shows the URL <http://www.pythonware.com/products/pil/>. The page title is "Python Imaging Library (PIL)".

Products
Python Imaging Library (PIL) :::
Commercial Support
Old Releases
Software License
Frequently Asked Questions

Python Imaging Library (PIL)

The **Python Imaging Library (PIL)** adds image processing capabilities to your Python interpreter. This library supports many file formats, and provides powerful image processing and graphics capabilities.

Status

The current [free version](#) is [PIL 1.1.7](#). This release supports Python 1.5.2 and newer, including 2.5 and 2.6. A version for 3.X will be released later.

Support

Free Support: If you don't have a support contract, please send your question to the Python Image SIG [mailing list](#). The same applies for bug reports and patches.

You can join the Image SIG via [python.org's subscription page](#), or by sending a mail to image-sig-request@python.org. Put *subscribe* in the message body to automatically subscribe to the list, or *help* to get additional information.

You can also ask on the Python mailing list, python-list@python.org, or the newsgroup [comp.lang.python](#). **Please don't send support questions to PythonWare addresses.**

Downloads

The following downloads are currently available:

PIL 1.1.7

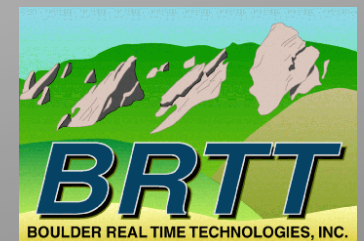
- [Python Imaging Library 1.1.7 Source Kit](#) (all platforms) (November 15, 2009)
- [Python Imaging Library 1.1.7 for Python 2.4](#) (Windows only)
- [Python Imaging Library 1.1.7 for Python 2.5](#) (Windows only)
- [Python Imaging Library 1.1.7 for Python 2.6](#) (Windows only)
- [Python Imaging Library 1.1.7 for Python 2.7](#) (Windows only)

Additional downloads may be found [here](#).

PIL 1.1.6

- [Python Imaging Library 1.1.6 Source Kit](#) (all platforms) (440k TAR GZ) (December 3, 2006)
- [Python Imaging Library 1.1.6 for Python 2.2](#) (Windows only)
- [Python Imaging Library 1.1.6 for Python 2.3](#) (Windows only)
- [Python Imaging Library 1.1.6 for Python 2.4](#) (Windows only)
- [Python Imaging Library 1.1.6 for Python 2.5](#) (Windows only)
- [Python Imaging Library 1.1.6 for Python 2.6](#) (Windows only)

For a full list of changes in this release, see [this page](#).



Twisted

The screenshot shows the Twisted Matrix Labs website. The browser address bar is <http://twistedmatrix.com/trac/>. The page features a navigation bar with links for HOME, FAQ, DOCS, and DOWNLOAD. A search bar is also present. The main content area is titled "What is Twisted?" and includes a "Downloads" sidebar with links to source code and binaries. The main text describes Twisted as an event-driven networking engine and provides a code example for a TCP echo server.

Downloads

Source

- Twisted 12.0.0 tar.bz2

Windows (32-bit)

- Twisted 12.0.0 for Python 2.7
- Twisted 12.0.0 for Python 2.6
- Twisted 12.0.0 for Python 2.5

Other

- More downloads

Dependencies

- zope.interface

What is Twisted?

Twisted is an event-driven networking engine written in Python and licensed under the open source [MIT license](#).

Easy Custom Servers and Clients

Twisted makes it easy to implement custom network applications, both servers and clients. Here's a TCP server that echoes back everything that's written to it:

```
from twisted.internet import protocol, reactor

class Echo(protocol.Protocol):
    def dataReceived(self, data):
        self.transport.write(data)

class EchoFactory(protocol.Factory):
    def buildProtocol(self, addr):
        return Echo()

reactor.listenTCP(1234, EchoFactory())
reactor.run()
```

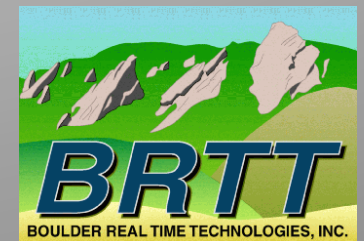
Learn more about [writing servers](#), [writing clients](#) and the [core networking libraries](#), including support for SSL, UDP, scheduled events, unit testing infrastructure, and much more.

Event-Driven Web Applications

Twisted includes an event-driven web server. Here's a sample web application:

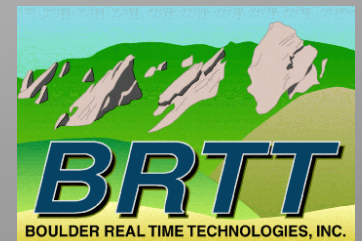
```
from twisted.web import server, resource
from twisted.internet import reactor

class HelloResource(resource.Resource):
    def render_GET(self):
```



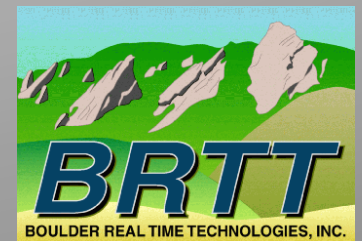
Python: Switching from Perl etc.

- Straightforward switch for competent Perl programmer
 - No semicolons
 - Semantically meaningful indenting
 - (no tabs or {} blocks)
 - Everything is an object
 - Can still do procedural programming
 - Many familiar Antelope routines will be present and semantically similar
- You can stay with Perl



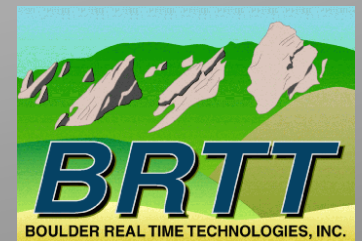
Python: Switching from contrib

- Template “.xpy” – same idea as now
- Remove previous \$ANTELOPE/local/data/python
- Interface changing daily until release
- no Exception throwing in elog routines
- Overall similar feel, hopefully straightforward porting
- Documented main interface
 - dbopen(dbname, “r”)
- Documented ‘raw’ interface
 - _db._dbopen(dbname, “r”)
 - _Pkt._newPkt()



Embedded Web Server

- `rtwebserver(1)`
- Beginning version, Will take years to fully develop
- Convenience – embedded in `rtexec`
- Configuration – Antelope parameter file
- Access to Antelope extensions
- New extensions specifically to support web

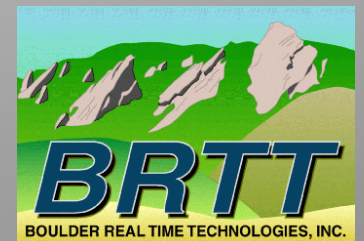


Embedded Web Server

- Starting on utility to display any X GUI to web

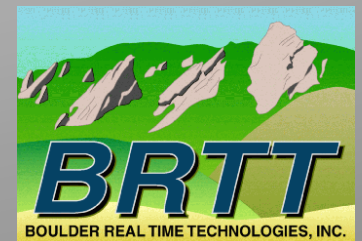


- Probably based on Xvfb
- Experimental
- DImon, rtm, etc.
- Surprisingly hasn't been done before
 - (contrary evidence?)



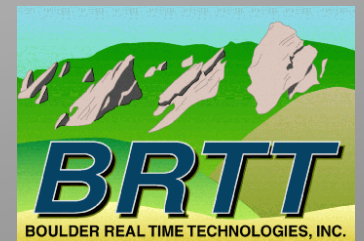
RHEL

- Red Hat Enterprise Linux 6.2 for Antelope 5.2-64
- Installed on Mac Mini, with some battles
 - Not recommended
- RHEL Certified Hardware List
- register_antelope will check Linux version
 - No support at all for non-RHEL Linux
- RHEL Version auto-updates
- Focused on rack-mount Enterprise processing
 - Not laptops or desktop workstations



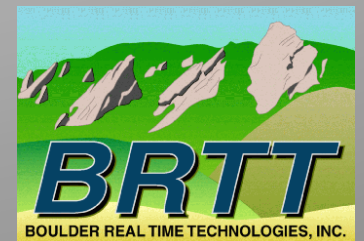
Contrib

- Brief review of Antelope contributed-code repository from previous years' presentations



Dbloc2 Replacement

- Probably Python-based
- Hope to leverage Antelope Tk graphics
 - Maps
 - Waveform viewers
- Soliciting Feedback and Ideas
 - Please send to support@brtt.com
- Need better name than “dbloc3”



Thank You

- Comments / Questions ?

