Esri International User Conference | San Diego, CA

Technical Workshops | Tuesday, July 12th

Python: Integrating Standard and Third-Party Libraries

Jason Scheirer

Other Sessions

- Building Tools with Python (Technical Workshop)
  - Thursday 10:15AM 9
- Getting Started With Map Algebra Using the Raster Calculator and Python (Demo Theater Presentation)
  - Wednesday 10:00AM Exhibit Hall C (Spatial Analysis Demo Theater)
- Python - Analyzing your GPS tracking data (Demo Theater Presentation)
  - Thursday 11:00AM Exhibit Hall C (Spatial Analysis Demo Theater)
- Python - Automating Geodatabase Administration (Tech Workshop 20 Minute)
  - Thursday 11:05AM 23 B
- Python - Creating an ArcGIS Script Tool (Demo Theater Presentation)
  - Tuesday 4:00PM Exhibit Hall C (Spatial Analysis Demo Theater)
- Python - Getting Started (Technical Workshop)
  - Tuesday 1:30PM 2
  - Thursday 8:30AM 2

Other Sessions (continued)

- Python - Getting to know the Python Window (Demo Theater Presentation)
  - Tuesday 10:00AM Exhibit Hall C (Spatial Analysis Demo Theater)
- Python - Improving the Performance of your Script Tools (Tech Workshop 20 Minute)
  - Tuesday 8:30AM 6 A
- Python - Raster Analysis (Technical Workshop)
  - Tuesday 3:15PM 6 C
  - Wednesday 3:15PM 5 A/B
- Python - Scripting for Map Automation (Technical Workshop)
  - Tuesday 10:15AM 9
  - Wednesday 3:15PM 9
- Python - Spatial Analysis (Intermediate) (Technical Workshop)
  - Tuesday 3:15PM 1 A/B
  - Thursday 10:15AM 2

Other Sessions (yes, there are more)

- Python - The Ease and Power of Cursors (Demo Theater Presentation)
  - Tuesday 11:30AM Exhibit Hall C (Spatial Analysis Demo Theater)
- Python Scripts - Using A Template (Demo Theater Presentation)
  - Tuesday 11:00AM Exhibit Hall C (Spatial Analysis Demo Theater)
- Road Ahead - Python Scripting Abilities
  - Thursday 4:05PM 6 B

Python in ArcGIS

- Implementing geoprocessing script tools
  - Creating an ArcGIS Script Tool (Tuesday 4:00PM)
  - Building Tools with Python (Thursday 10:15AM)
- Automating workflows
  - Gluing together other GP tools
  - Scheduled tasks
- Integrating ArcGIS with other systems, other systems into ArcGIS
  - Data interop: import/export
  - Automating ArcGIS processes from other applications
  - Preparing data from ArcGIS for consumption by other applications

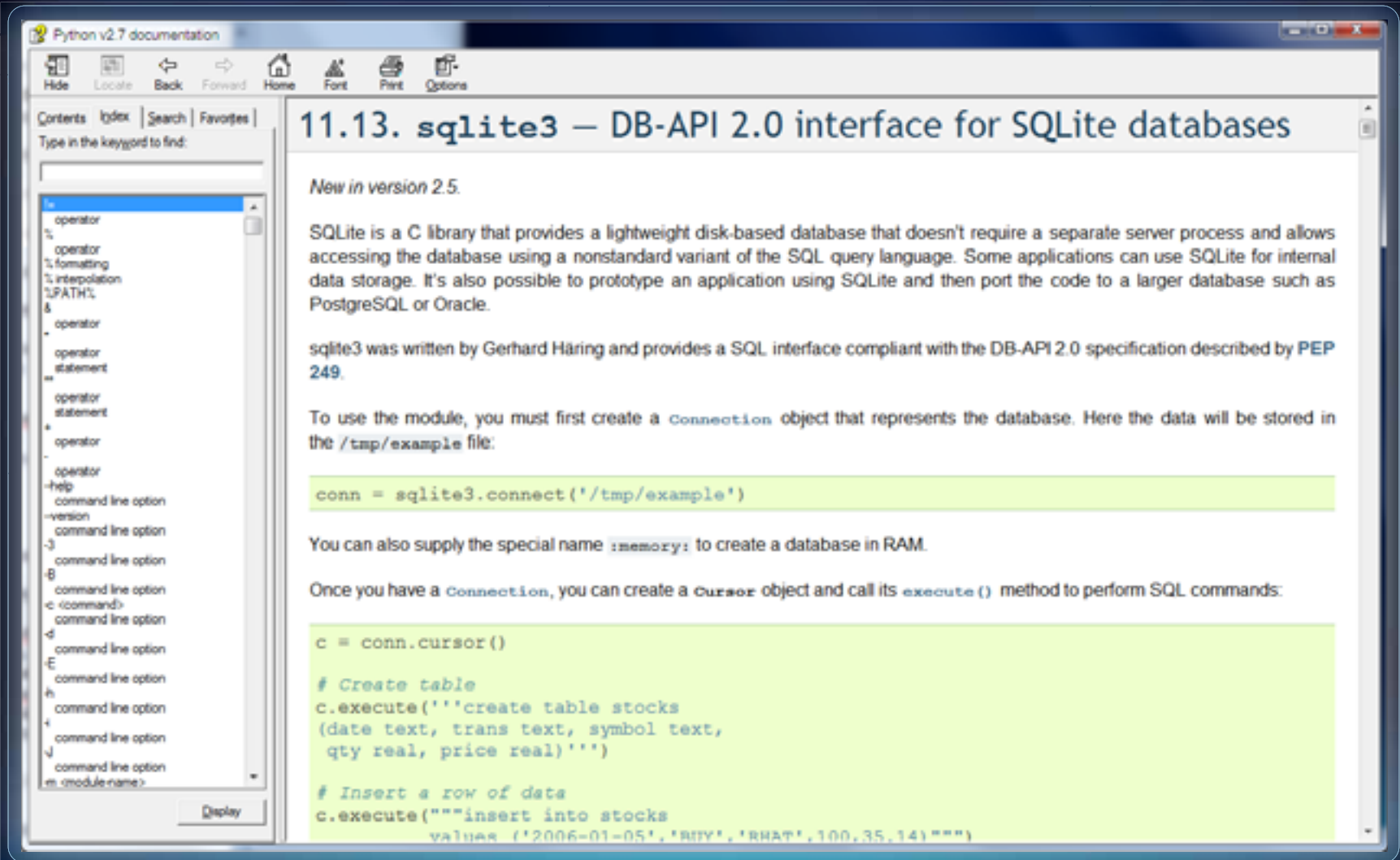
Built-in Libraries

Batteries Included

- Libraries for many common tasks come with the language
  - File formats: XML (`DOM`, `SAX`, `ElementTree`), `JSON`, CSV, .ZIP (`zipfile`)
  - Networking: HTTP (`urllib`, `urllib2`), TCP/UDP (`socket`)
  - Parallelism: `threading`, `multiprocessing`, `subprocess`
  - Command line applications: `optparse`
  - Paths, directories, files: `sys`, `os`, `os.path`
  - User Interfaces: `tkinter`
  - Data structures and algorithms: `collections`, `itertools`, `heapq`, `struct`, many more
  - Date/time (`time`, `datetime`)
  - Calling C++/C (`ctypes`)

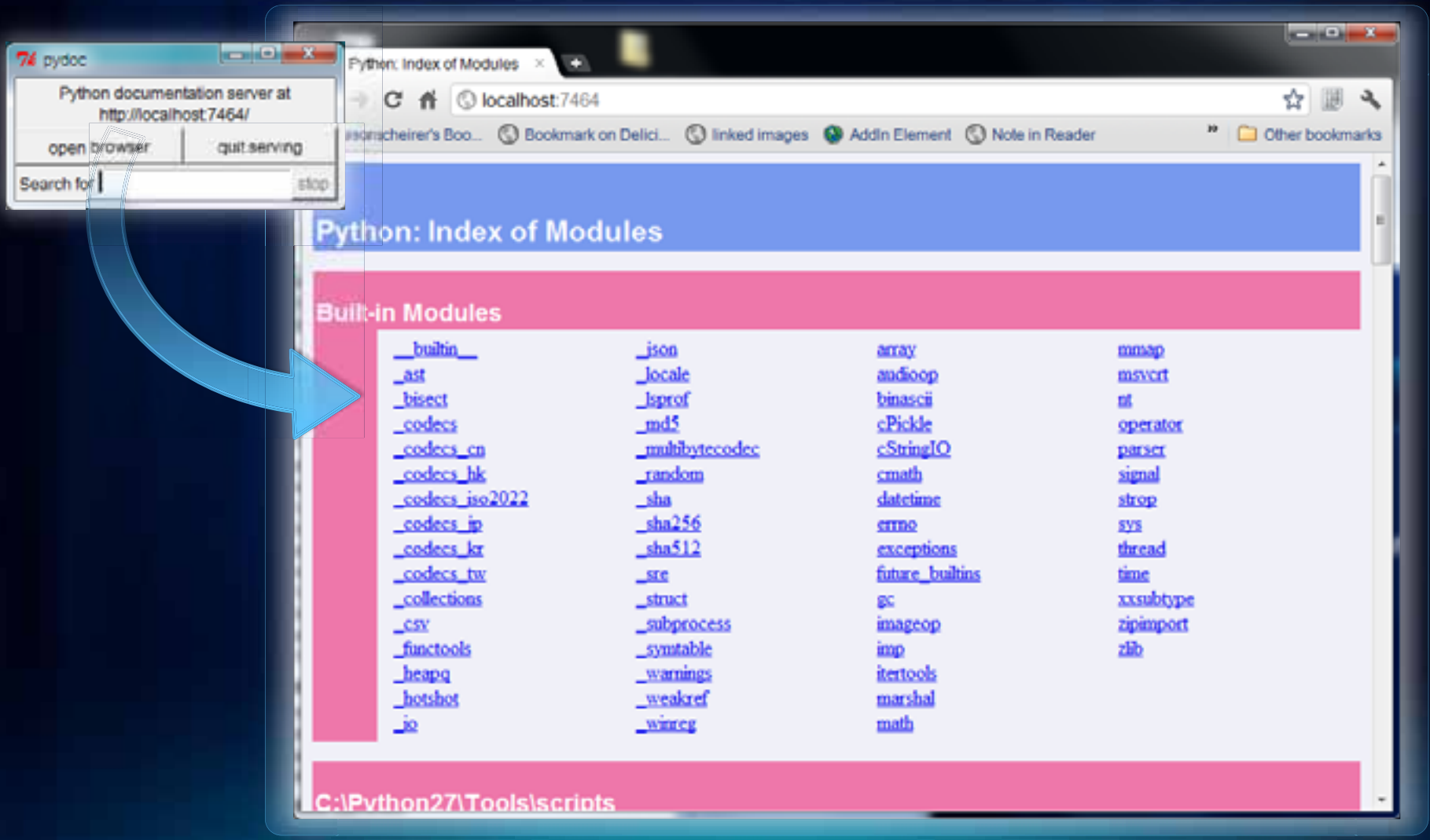
Read the Docs!

- Help file: ArcGIS 10.0 | Python 2.6 | Python Manuals



Read the Docs!

- What's installed: ArcGIS 10.0 | Python 2.6 | Module Docs

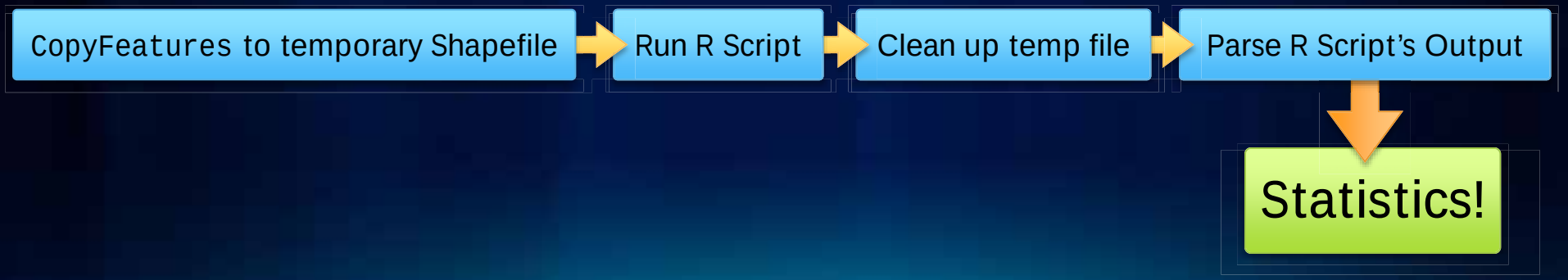


More Help

- PyMOTW (Python Module of the Week)
  - http://www.doughellmann.com/PyMOTW/
  - Also available as a book

Example

- Summary Statistics in R
  - Uses a third-party module for reading spatial data: `maptools`
  - Only accepts shapefiles!
- Going to use two different system libraries:
  - **`subprocess`** (Open/monitor other programs)
  - **`re`** (Regular Expressions)



Demo

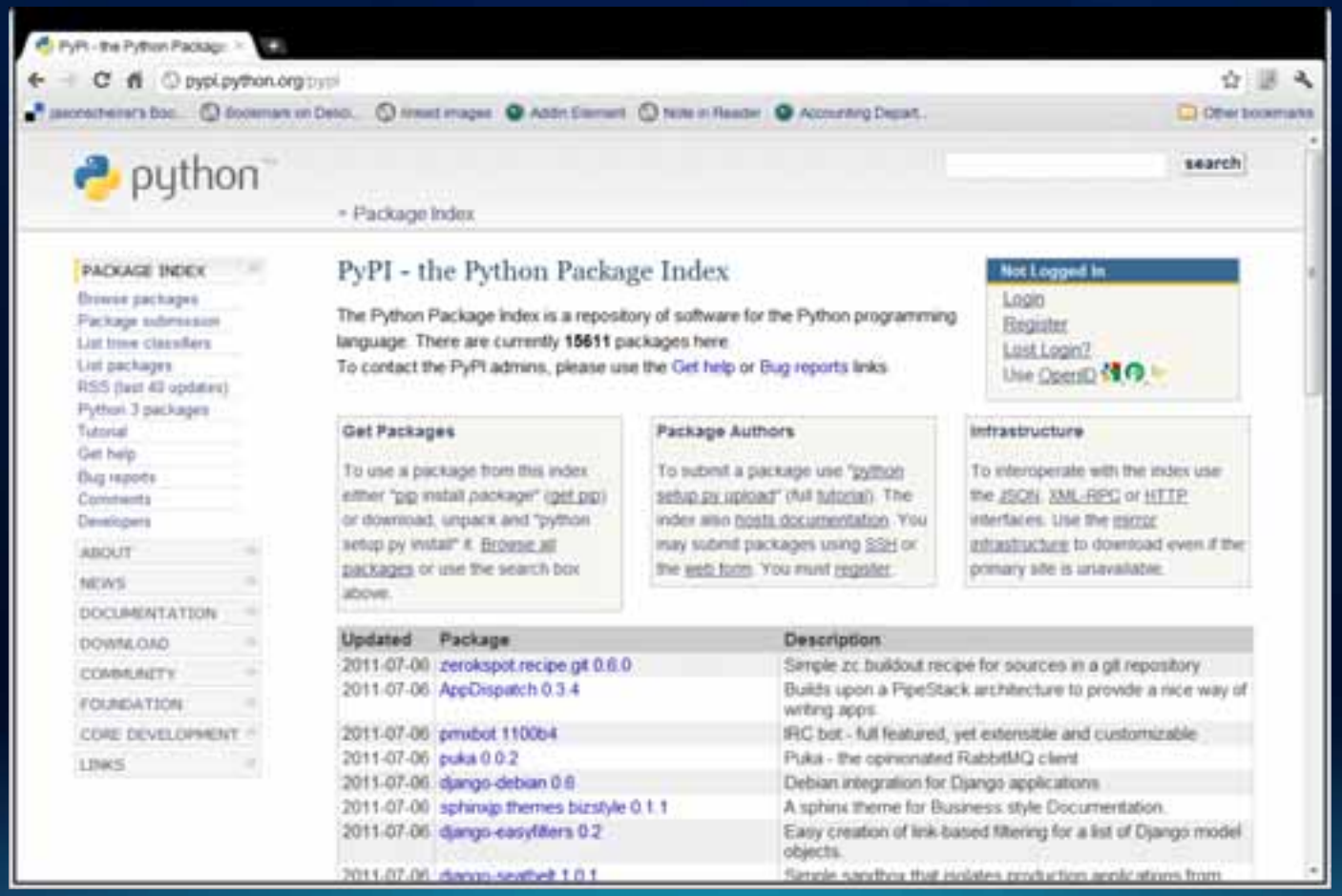
But don’t reinvent the wheel!

- `wget`: Popular utility to download resources over HTTP/FTP
- Do I need it?
  - `urllib2` can download simple URLs
- But I need to follow links
  - Don’t write a web spider in Python, use the `-r` option on wget
  - Use subprocess, like in the previous example

Third-Party Libraries

The Cheese Shop

- http://pypi.python.org/pypi
- The official place for 3rd party Python modules



Some Interesting Modules

- PDF writing – `reportlab`
- Image manipulation – `PIL`
- (Messy) HTML – `beautifulsoup`
- Advanced graphing/plotting – `matplotlib`
- Advanced date/time handling – `dateutil`
- Excel
  - Read – `xlrd`
  - Write – `xlwt`
- Consuming .Net
  - `http://pythonnet.sourceforge.net/`
- `.docx` Read/write – `docx`
  - `https://github.com/mikemaccana/python-docx`
  - This brings us to…

There's No Installer!

- Find `python.exe` in your install, add it to `%PATH%`. `Scripts\` too.
- Try pip:
  - http://python-distribute.org/
- Or on the command line:
  - `python.exe setup.py install`
- Look for it on an unofficial Python library builds site:
  - http://www.lfd.uci.edu/~gohlke/pythonlibs/

Conclusion

- A lot of what you need is already there
- Amazing documentation at your fingertips, more online
- There are built-in ways of interfacing with non-Python utilities (great for using script tools to integrate into ArcGIS)
- There’s a HUGE ecosystem out there that probably already has what you need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