

Tigger, Owlcat, and the use of Python for “Serious” Things

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Tigger

- An integrated sky model management and data product visualization solution leveraging the synergy of Python packages and APIs delivered with modern Unix-based platforms.
- Luxury software for luxury problems.



Local Sky Models (and source catalogs)

- Information overload!
 - Wetware problem
- 3C147 project:
 - 300 sources
 - ...some need differential gains solutions
 - Others can probably be moved to an image
 - Need to deal with subsets, etc.
- Hybrid models (components plus images plus shapelets plus whatever)

Hybrid models

- Sources plus images plus shapelets...

Image Viewing

- Inspired by Karma (kvis), the world's most advanced FITS viewer...
- ...with the world's most abysmal user interface
 - The little-appreciated “Infinite Number of Green Windows” UI paradigm

Python Is Faster Than Most People Think

- Still thought of as a “scripting language” by some
- Is actually an **excellent** general purpose language
 - Only really “too slow” for very specific things
 - Can be slow if badly written
 - (...but then badly written C++ doesn't work at all)

Donald Knuth

(First Law Of Smirnov According To Noordam)

“Premature optimization is the root of all evil.” -
Donald Knuth

“More computing sins are committed in the name of efficiency (without necessarily achieving it) than for any other single reason - including blind stupidity.” - W.A. Wulf

Choice of language is often a premature optimization:

“This will obviously be too slow if I write it in language X , I'm going to write it in language Y from the start.”

Why Python?

- We are often attached to languages for emotional reasons
- Nothing particularly groundbreaking about Python, just many small things:
 - Clear syntax
 - Straightforward OO
 - Readable code (by default)
 - Easy to make lightweight APIs
- A HUGE collection of packages
 - numpy/scipi
 - GUIs: (Qt, ...)
 - pyrap/casacore
 - formats: FITS, HDF5, MS, etc...

The CASA Distribution Model

HOWL'S
MOVING CASTLE



Pythonville



CASA



ALIM2

What's Important About Python

- Great “glue” because it offers so many things to glue together (and vice versa)
- Tigger as an example:
 - Qt4: industrial-strength GUI
 - Qwt: plotting, visualization
 - numpy/scipy: data processing
 - Pyfits: reading FITS images
 - astLib: coordinate conversions
- Favourite silly question: “can you make it read format X ”:
 - Of course! (For all $X \neq \text{CASA}$)
- For CASA, Python is just Glish++

Owlcat

- A loosely-integrated and low-cohesion agile data management solution leveraging the synergy of Python packages and APIs to deliver end-user functionality not available in professionally managed packages designed using modern software development procedures and processes for use-case and requirements analysis.

Owlcat

Loose collection of scripts for all the little odd jobs (uv-data management!) missing from big packages

- MS manipulation
 - Split/combine
 - Proper weighting!
- Simple flagging
- Non-interactive plotting



Crucial Feature Of Owlcat

- **Lightweight**
- Just a bunch of scripts, most of which originate from a version 0 slapped together in under an hour
- Nothing an “astronomer” couldn't do.

Why Is This Important?

- We're not going to calibrate the SKA in Python
- We're certainly not going to calibrate the SKA in C++ either!
- If Duncan is right, we're not going to calibrate it at all
- ...unless we come up with orders of magnitude improvements in algorithms
- This is a wetware problem, not a software one
 - We're not going to solve it by going off and working harder on our algorithms
- Need to get more wetware involved.
 - Can't afford to have a High Priesthood anymore
 - **simple** tools are crucial.

casacore/pyrap

- **THE** most important project in our field today
- MS is our common format, for better or for worse
- casacore/pyrap provides the connection.
- Which enables *everybody* to play with data.
- Lack of official support is ridiculous!