CASA 6.0: Modular Integration in Python

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The CASA radio astronomy software suite has always been distributed as a single, integrated application, including a Python interpreter and all the libraries, packages and modules. As part of the ongoing development of CASA 6, and the switch from Python 2 to 3, CASA will provide greater flexibility for users to integrate CASA into existing Python workflows by using a modular architecture and standard pip wheel installation. This poster gives an overview of the CASA 6 project.

https://casa.nrao.edu

CASA Posters

Common Astronomical Software Applications Version 6

The CASA infrastructure historically consisted of a set of C++ tools bundled together under an iPython interface as data reduction tasks that are scriptable or can be called via task interface. CASA has always been distributed as a single integrated application, but many users find it difficult to use CASA tools and tasks along with the other python packages. CASA 6 will allow users to integrate CASA into their existing Python environment, with tools and tasks as standard Python modules.
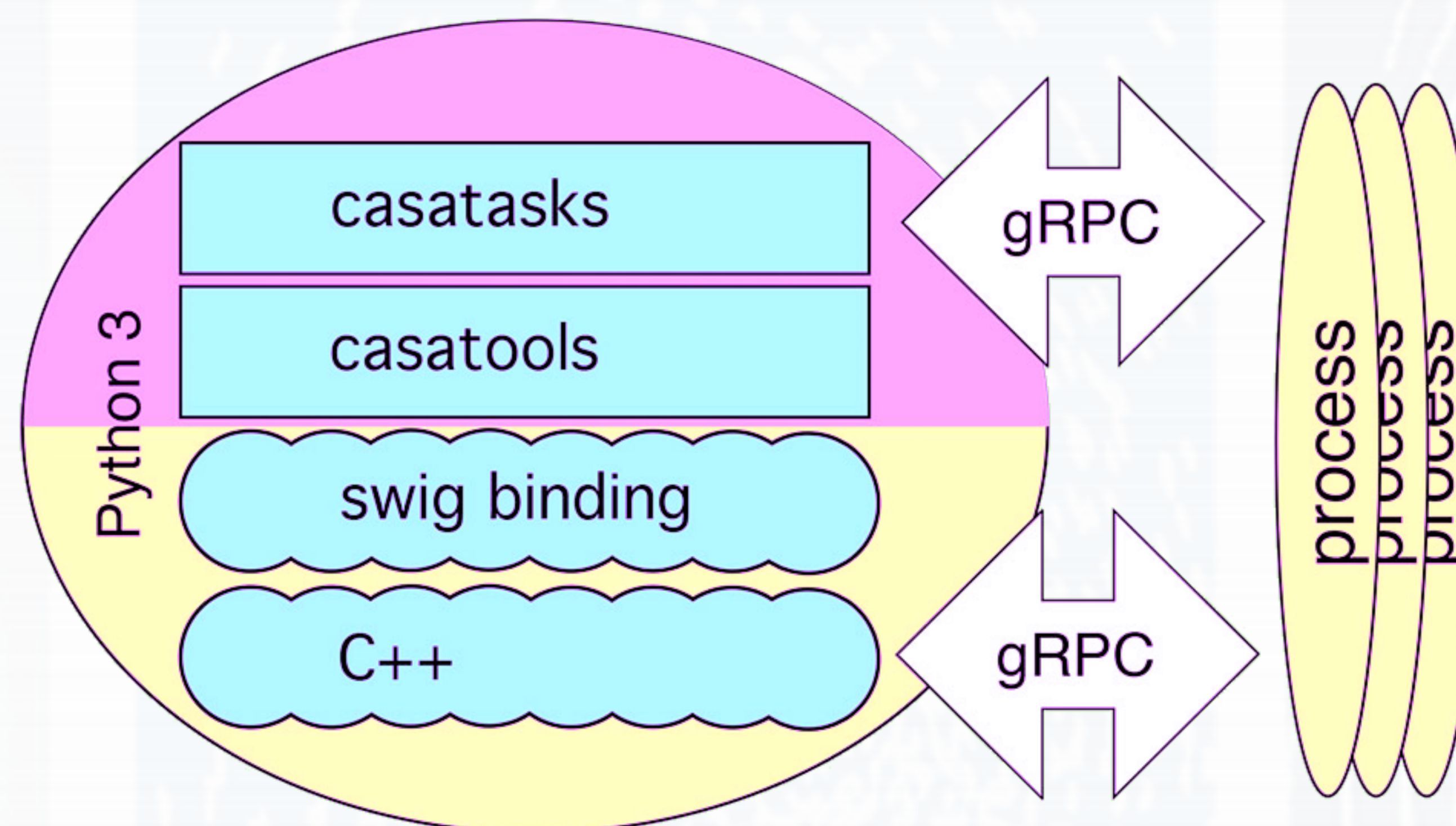
From CASA 6 onward, CASA should be thought of as the system described in the Figure. CASA Python modules built over top of the C++ code base will be available via PIP wheels. GUI applications such as PlotMS run as separate executable processes that communicate with CASA Python via gRPC. Additional Python modules are provided to automatically start and control these external processes.

Python 3 changes

CASA 5 uses Python 2.7, which is only supported until 2020. CASA 6 makes the transition to Python 3.6 by migrating the task and tool wrappers and overall execution environment. This involved both developer maintained code and the automated C++ to Python bindings and provided an important motivation for making CASA more Pythonic.

Monolithic version

For users that are not interested in these new modular features, CASA will continue to offer an all-inclusive distribution under Python 3 as a single tar file download. This monolithic package is built from the same modular pip wheels but adds a CASA-shell component to replicate the appearance of previous CASA versions.

PIP-wheels

PIP wheels for casatools and casatasks are available as beta-versions from the public PyPI server casa-pip.nrao.edu. This allows simple installation and import in to standard Python 3.6 environments. There may be compatibility issues as we refine the included shared libraries to maximize OS support. With the PIP installation, CASA may be used in a standard Pythonic manner such as:

```
from casatasks import listobs
rc = listobs('mydata.ms')
```

For a more comprehensive installation and usage, see the CASA 6 Jupyter notebook in the bottom section.

Jupyter notebooks and Google Colaboratory

Jupyter notebooks are ideally suited for code tutorials, exploration, and collaborative development. Together with Google Colaboratory, which hosts Jupyter notebooks on free virtual hardware in the cloud, the door is opened to powerful new ways of developing and sharing software. CASA 6 casatools and casatasks modules are compatible with the Google Colab environment. The CASA team is working towards making additional modules compatible in the future as well as introducing new Jupyter-based CASAguide tutorials. Example installation and usage is available here: `https://go.nrao.edu/casa6`

Careers: the CASA team is continuously growing, and we are often looking for qualified software engineers and scientists to join us! See http://jobs.jobvite.com/nrao for the latest job info

Ideas or feedback? Please contact us at casa-feedback@nrao.edu