Software development experiences from the CASA project

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CASA

- General purpose radio astronomy data processing
- Primary software package for ALMA and EVLA
- Used for other radio telescopes as well
- Used by end-users and (instrument) pipelines
- Used on laptops and (small) clusters
- (L)GPL license
- Developed by a consortium (**NRAO**, ESO, NAOJ, ASIAA, CSIRO CASS, ASTRON)

Some History

aips++   C++ with glish interpreter   (1990-2004)

CASA   C++ with Python (IPython)   (2004-)

CASA   casacore   (2011?)

CASA5 (Monolithic) → CASA6 (Python modules)   (2019)
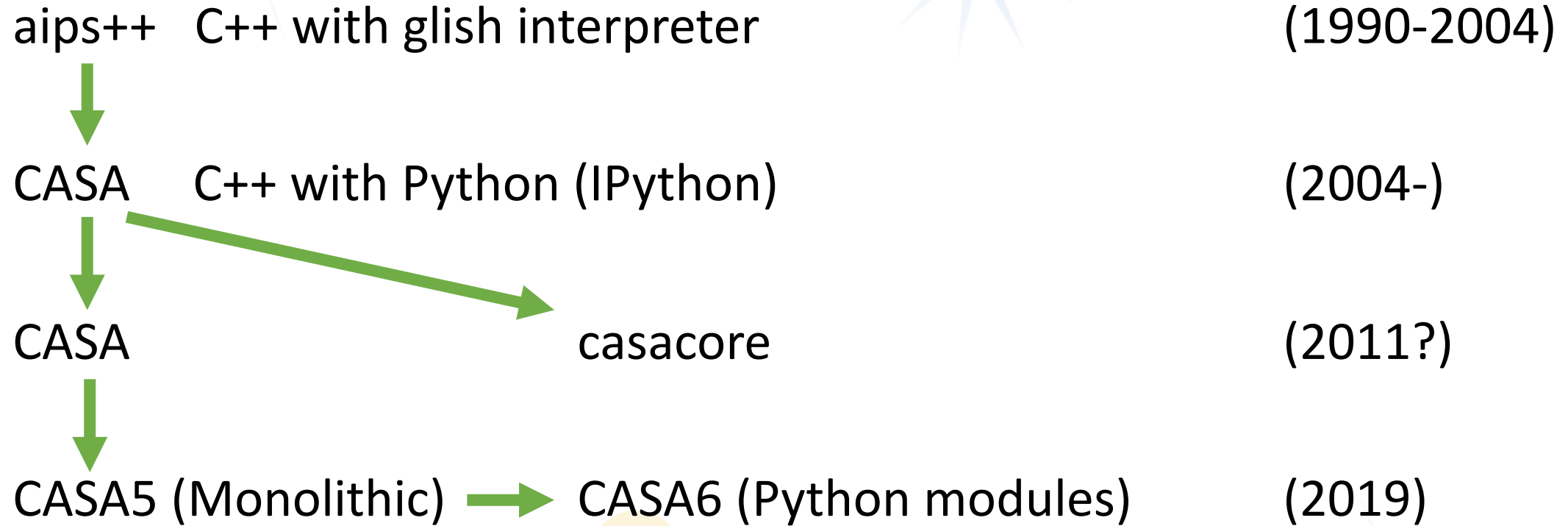
VLBI

- Very Long Baseline Interferometry
  - Long baselines -> Higher resolution
  - Independent clocks, different atmosphere at sites
- Requires (some) additional algorithms
- Recently only implemented in

CASA & VLBI

- JIVE has MOU with NRAO to implement VLBI support in CASA
  - Access to NRAO development environment
  - Some NRAO developer support
  - JIVE does user support for VLBI functionality

- CASA 5.7/6.1 will be usable for VLBI

- Lots of work still to

Development environment

- CASA: Atlassian suite hosted at NRAO
  - JIRA (project and issue tracking)
  - Bitbucket (git code management)
    - Switched from subversion 2.5 years ago (and cvs before that)
  - Bamboo (CI)
    - Supports both Linux and Mac OS X

- casacore: github with Travis CI

- casacore gets far more external contributions than CASA
  - Partly because it is generic code

JIRA ticket workflow
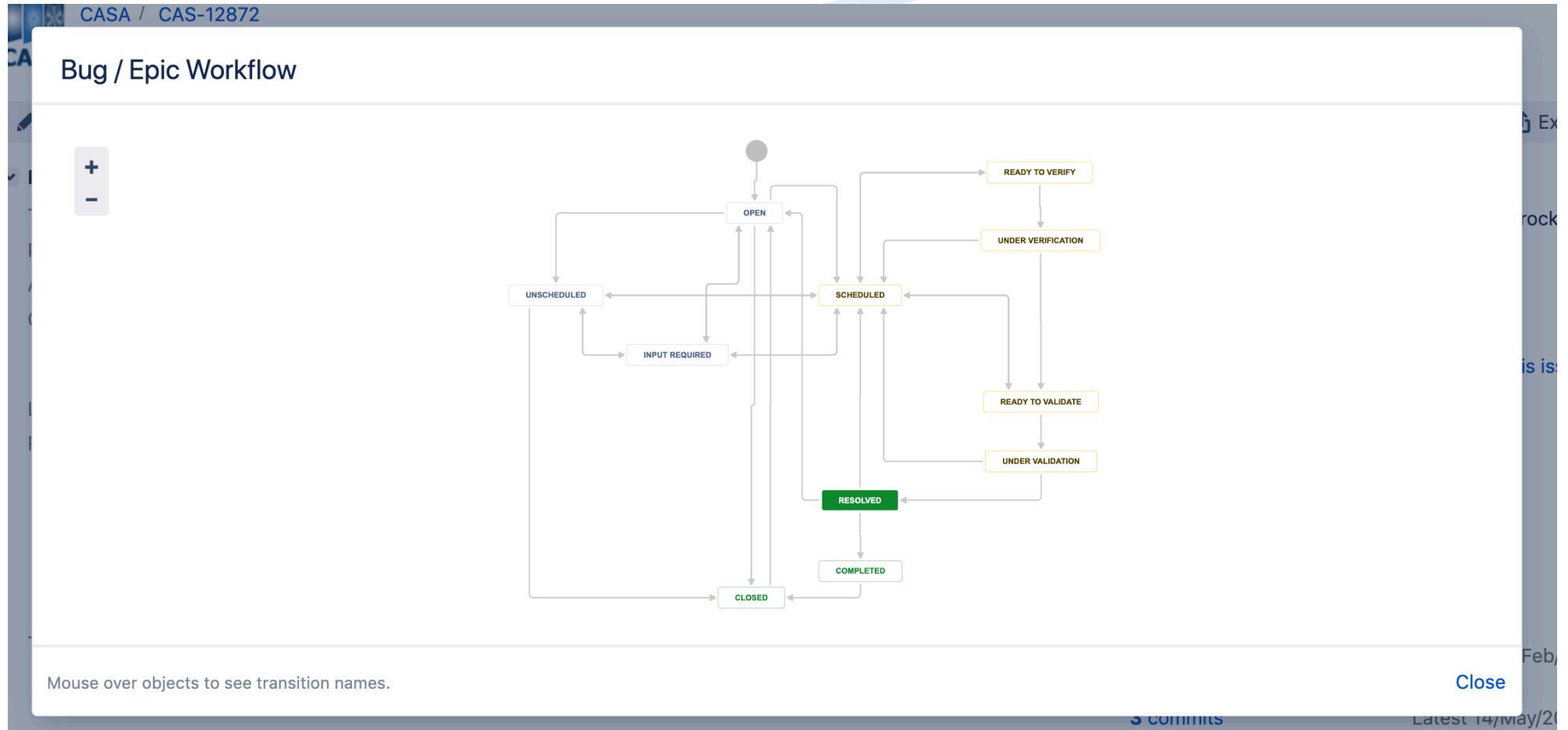
Testing

- C++ level unit tests
  - Test functionality of individual classes
- Task-level unit tests
  - Test functionality of individual tasks
- Regression tests
  - Test more complicated data reduction tasks
  - i.e. a small ALMA data reduction

- Small subset run on every commit
- Larger subset upon verification
- Almost all tests run when pull request is generated

Interaction with user community

- Users committee (meets yearly)

- Stakeholders meetings (meets each release cycle)

- Helpdesk (separate from JIRA)

- Integration between JIRA, Bitbucket and Bambooe
  - Easy to build packages for end-user to test (Linux and Mac OS X)

- (Weekly?) pre-releases from "master"