Sardana – a Python Based Software Package for Building SCADA Applications

Guifre Cuní

Roberto Homs

Zbigniew Reszela

on behalf of the ALBA Controls Group and the Sardana Community

Tango Meeting 2015

Agenda

1
Why Sardana?

2
Sardana demo

3
More advanced topics…

4
Roadmap

Mission

- Produce supervision control and data acquisition software for modern scientific installations.
- Do not program if you do not need to

Sequencer
Macro edition &
Macro execution
environment

Resilient **Human machine interfaces**:
CLI (spock), GUI (Taurus)

⇧ focus on **synchronization,** triggering

⇧ Buffering

⇧Detectors, ⇧ motors,

Archiving and Alarms integrated

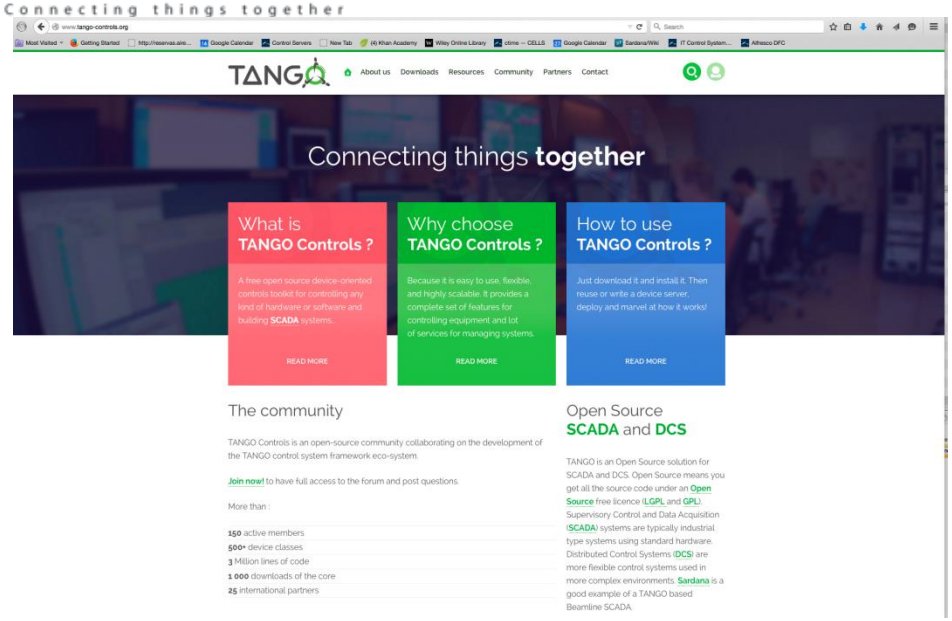
Standardized data formats

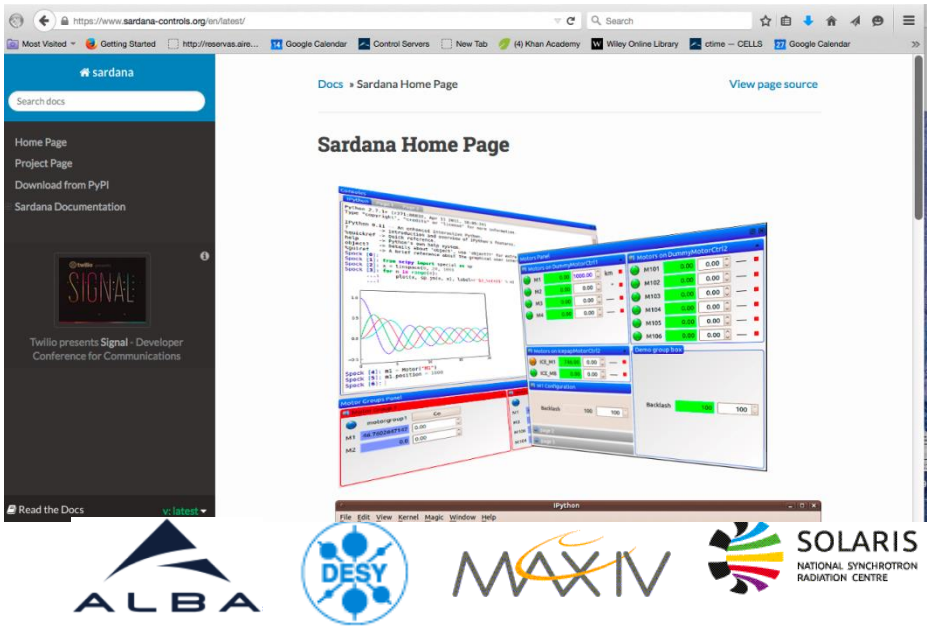
Support for a large catalogue of hardware

Configuration centralized

Installation process simplified

Tango & Sardana





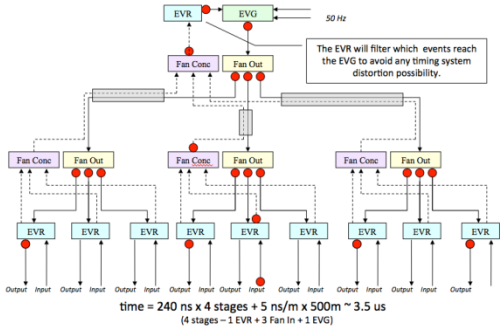
- Toolkit for building distributed control systems
  - Client - Server
  - Device servers managing hardware
  - Full support for Python, C++, Java,
  - Alarms, Archivers…
- 1 Control system for the Accelerators
- 1 Control system per Beamline

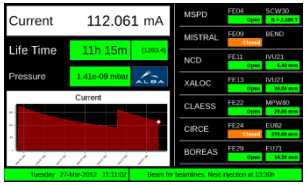
- Supervision, Control and Data Acquisition
  - Uses Tango, but has also schemes for others, such as SPEC or EPICS,
  - Sequencer and Macro execution environment
  - Tailored HMI:
    - SPOCK: Command Line Interface (IPython)
    - TAURUS: Graphical Interfaces
- Tailored for Experiment controls

TANGO controls SCADA Sardana

Accelerators

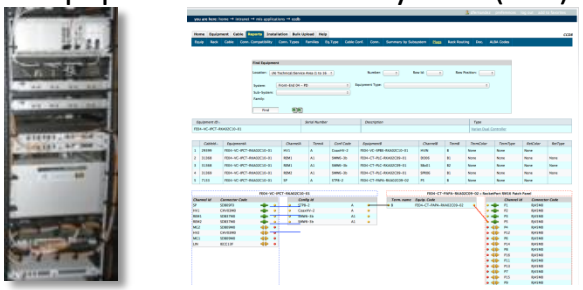
- 1 Tango Control system in the machine (**~4500 devices**)
- 1 **PSS** for the Machine (connected with all Beamlines)
- 1 **EPS** for the Machine (~ 7000 signals 150 CPU/RIO)
- Central **Cabling Database** where equipments cables and connections are stored. Variables and configuration automatically generated
- 1 MRF **Timing** system based on events and bidirectional (Synchronization and Fast Interlocks)
- Standard **Motion** controls including IDs





Personnel Safety System (PSS)

Equipment Protection System (EPS)



CCDB: Equipment Repository

Timing System (Event based)

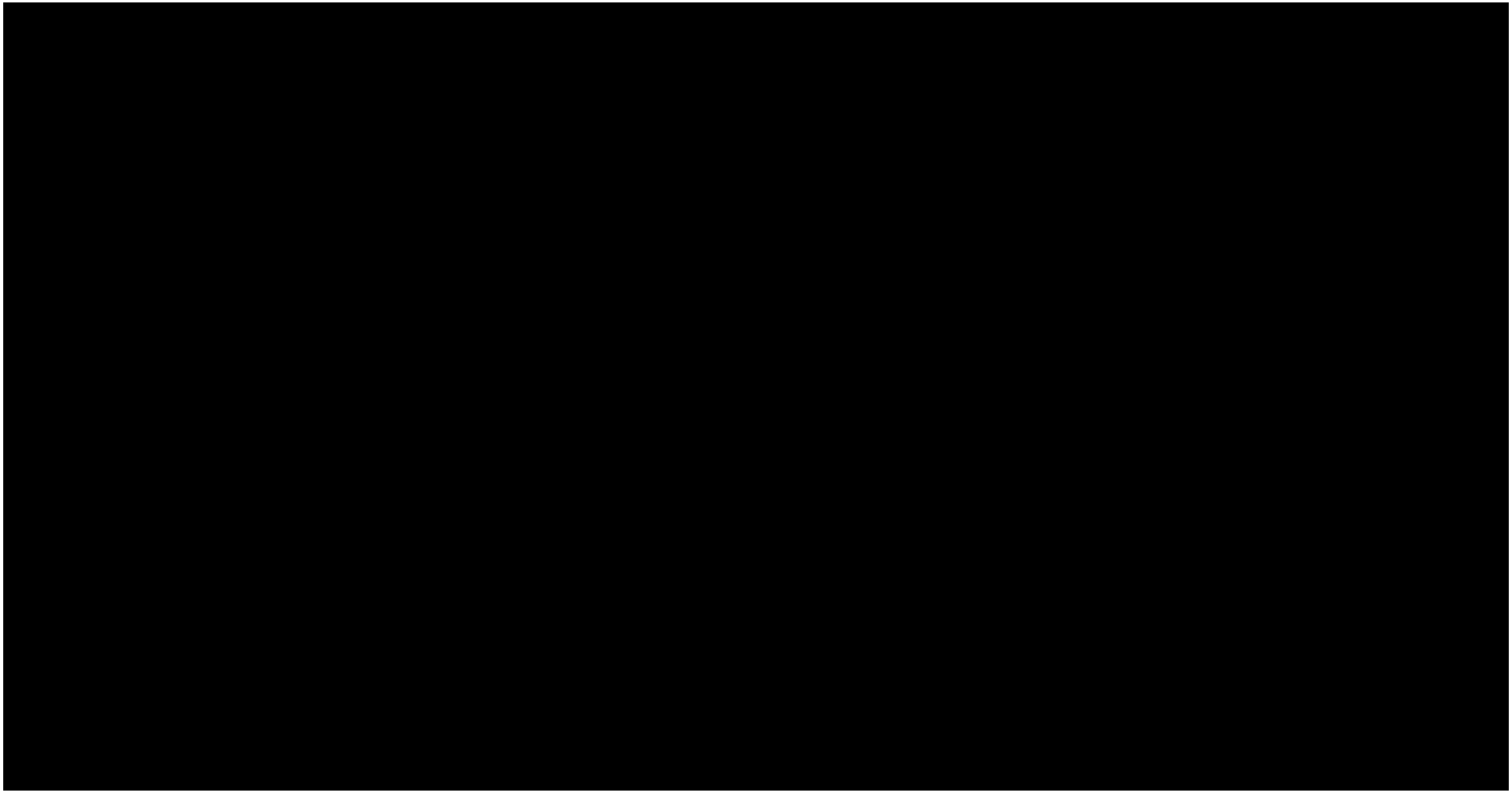
Icepap

Motion Controls
Electronics developments

Beamlines

- 1 Tango Control per BL (**~600 devices**) Communication **BL-MACH** (Tango)
- 1 **PSS** for the BL (modular and extensible)
- 1 **EPS** per BL (~ 250 signals) communicates with the Machine Variables and configuration automatic from Cabling Database
- 1 **Sardana** installation per BL:
  - * Macros and GUIs shared between Beamlines
  - * Shared know how:
    Simple for Users move from BL to another
    Hardware & software reused between Beamlines and Machine when possible.
- **Timing** system naturally distributed from the Machine to the Beamlines
- Standard **Motion** controls (among 700 axes in all Beamlines and Machine

Install Sardana in 3 min



Obtaining and installing

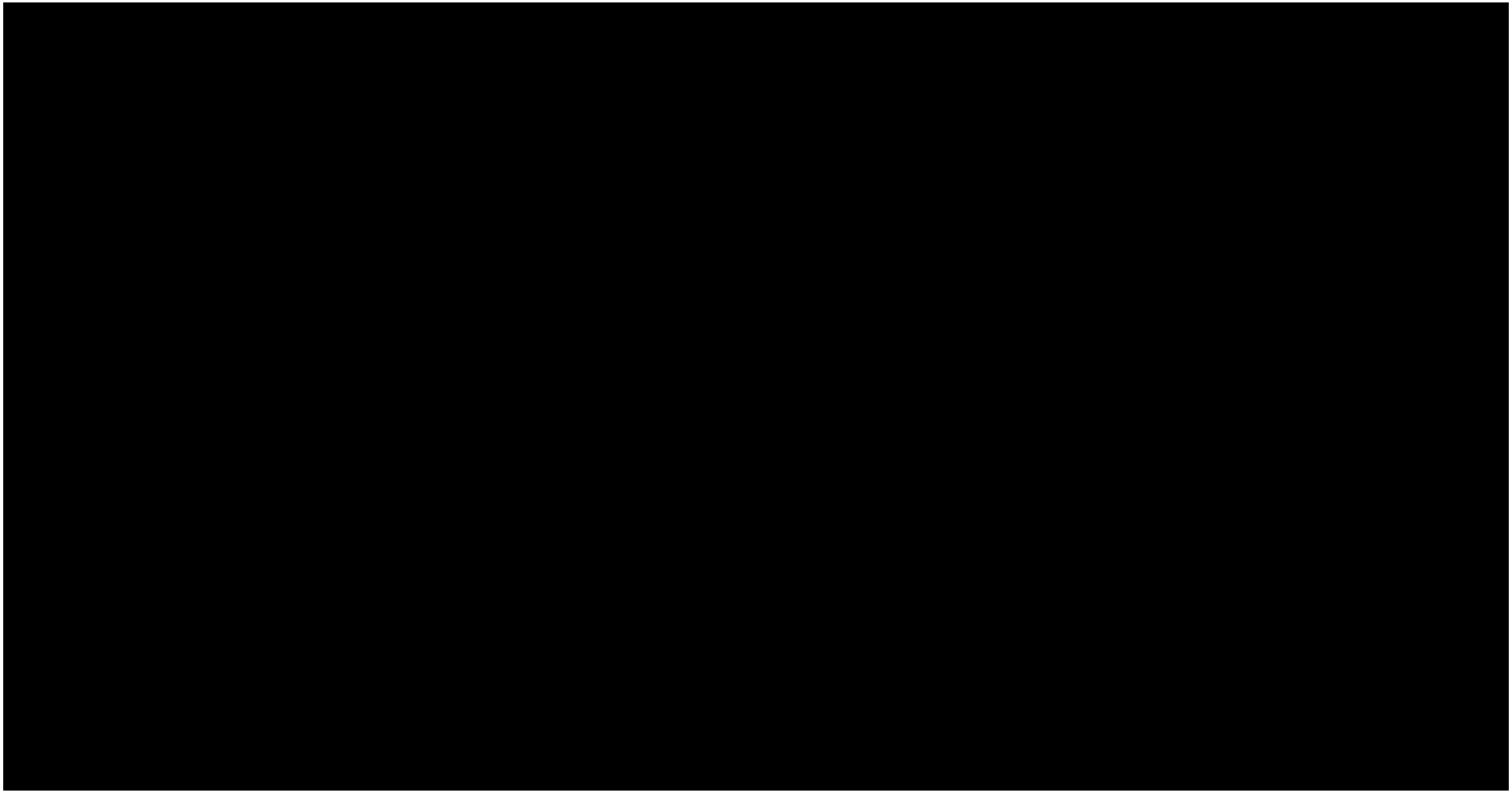
- Sardana is redistributed as the official Debian package (thanks to Frédéric Picca from the Soleil Synchrotron!)
  ```
  $> apt-get install python-sardana
  ```

- Sardana is hosted on PyPI
  ```
  $> pip install taurus
  $> pip install sardana
  ```

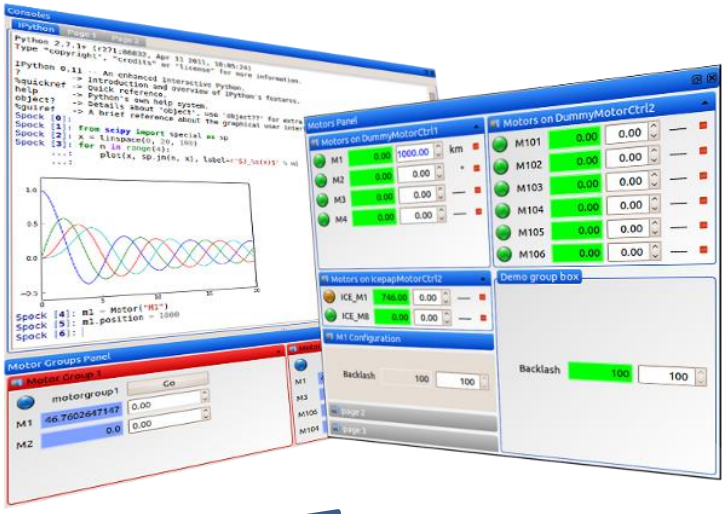
- Sardana code is hosted on the Sourceforge platform
  ```
  $> git clone
  git://git.code.sf.net/p/sardana/sardana.git
  python setup.py install
  ```

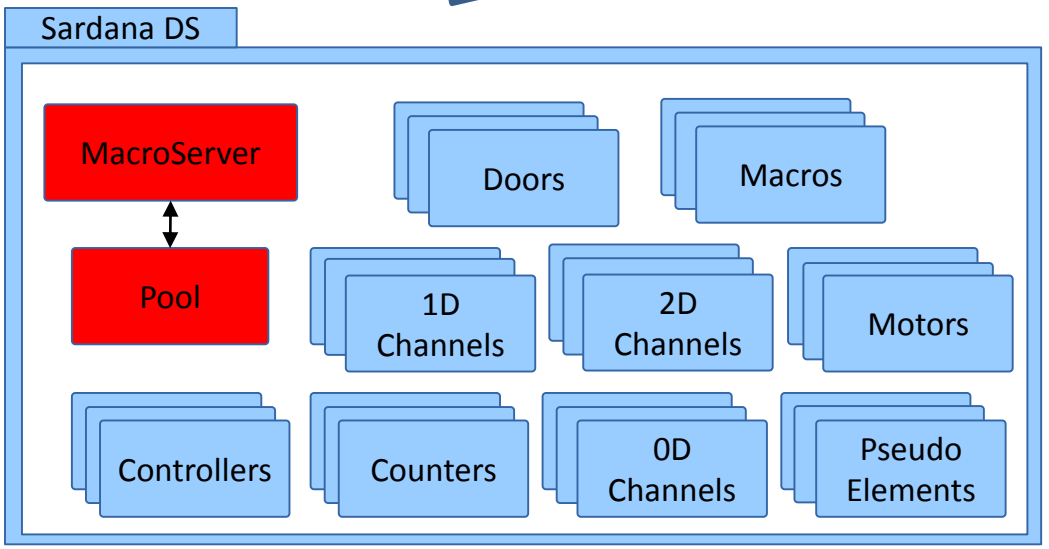
  More details on **http://www.sardana-controls.org/en/latest/users/getting_started/installing.html**

Sardana demo

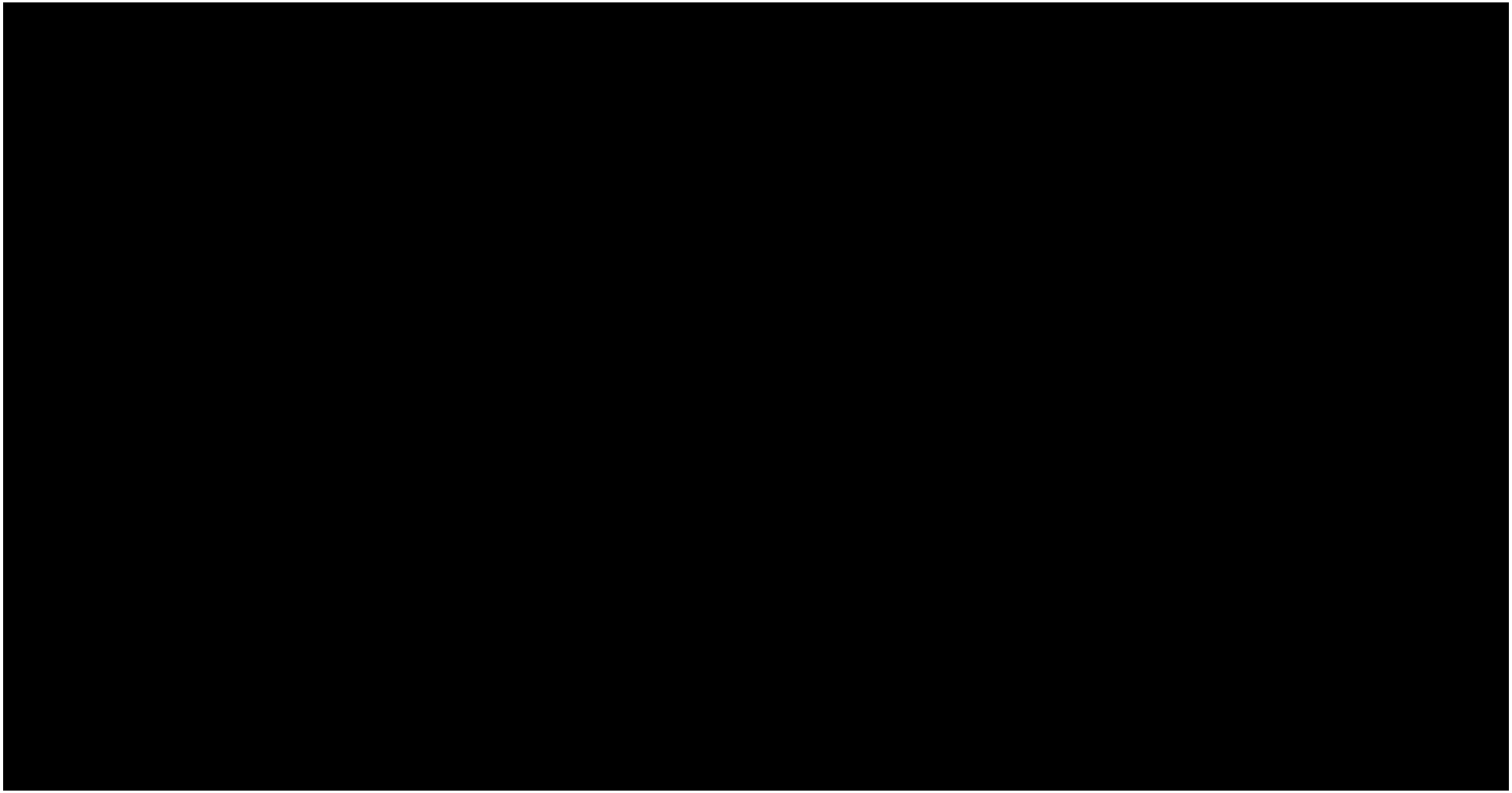


Inside Sardana

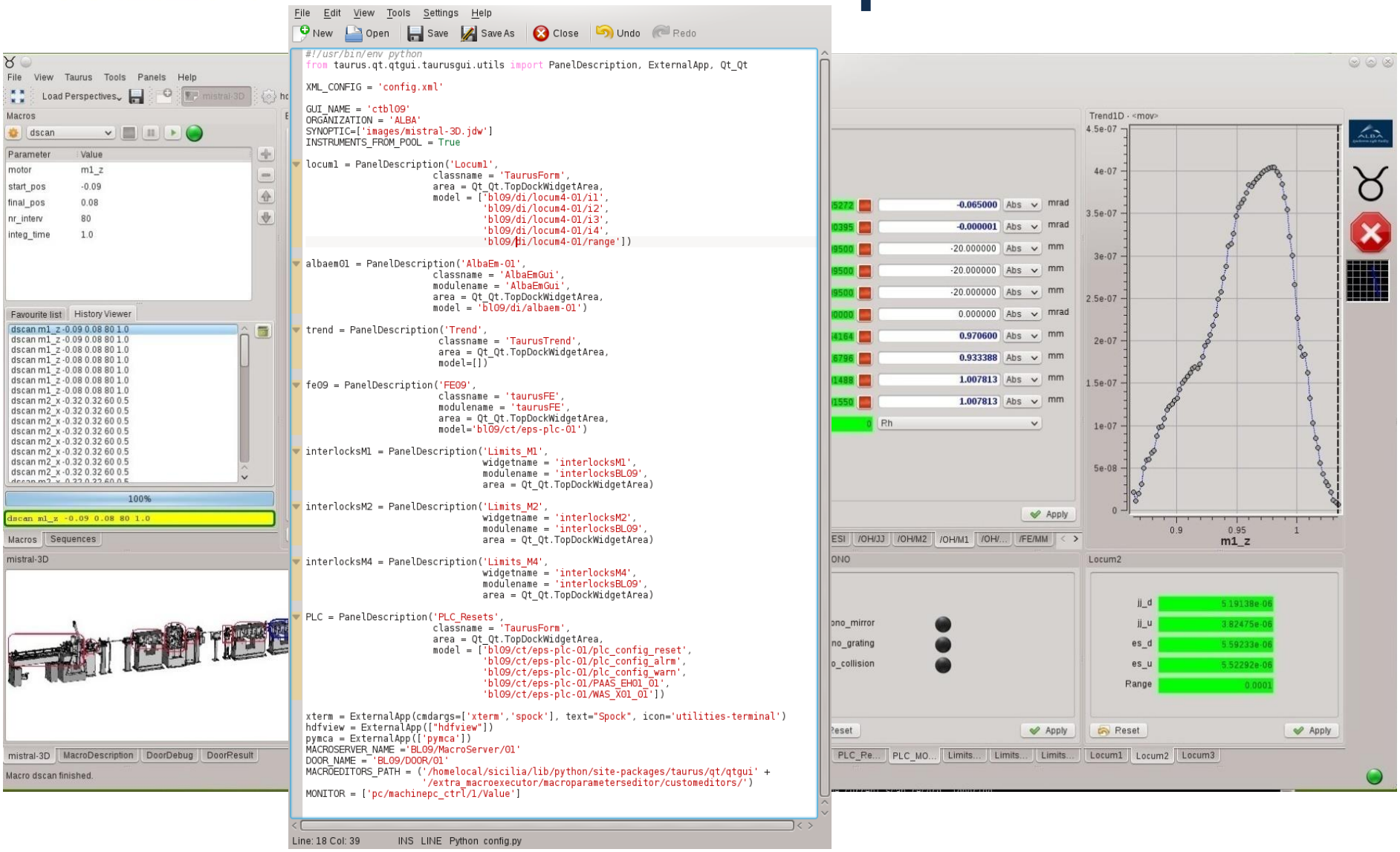




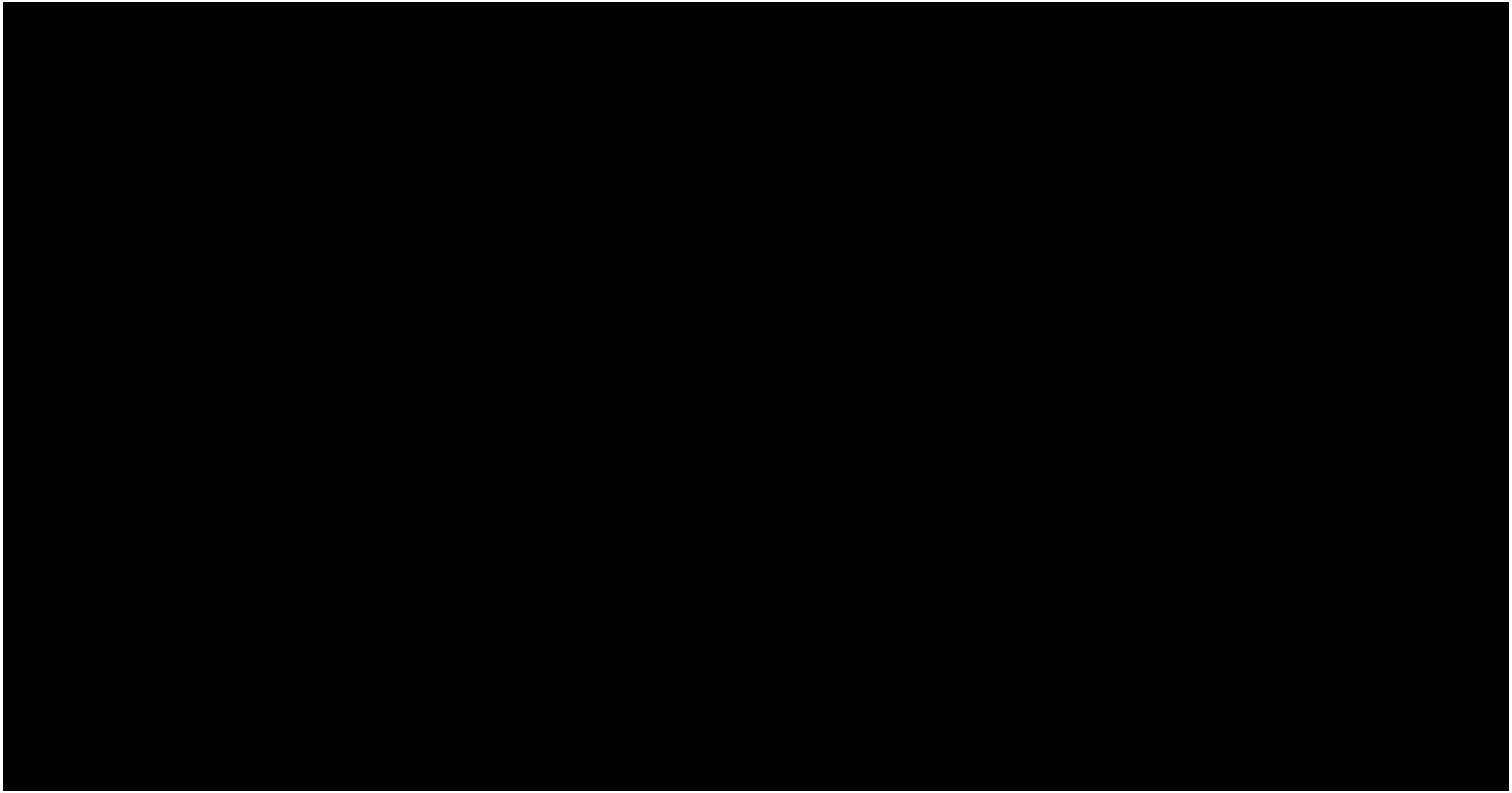
Taurus demo



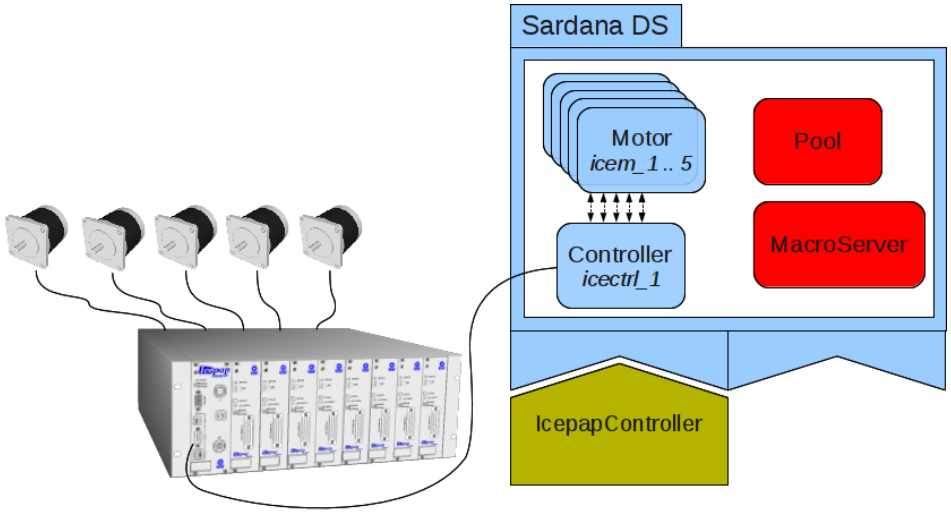
Taurus GUI example: CTBL09



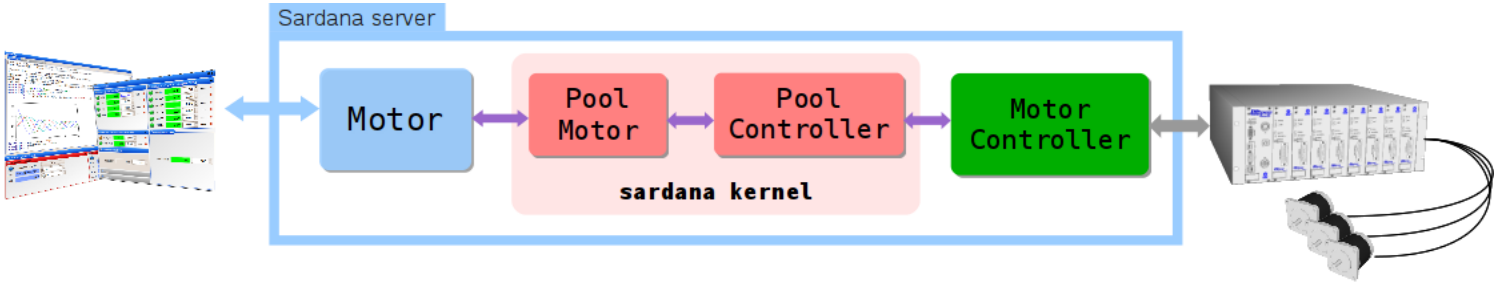
Plug in new hardware



How to write controllers

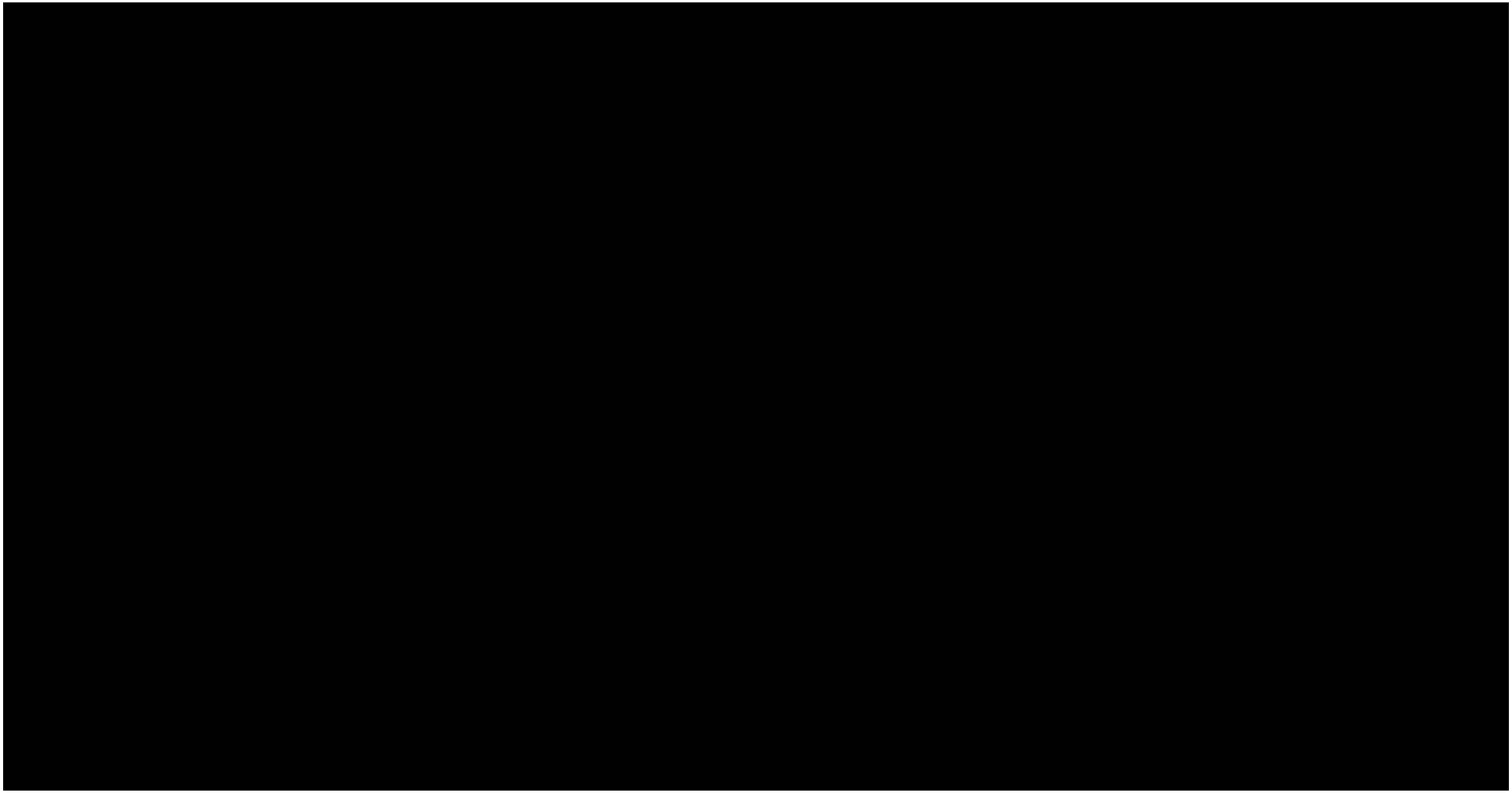


Motor Device
States: ON, MOVING, ALARM, FAULT
Commands: Stop, Abort
Attributes: Position, Offset, Velocity, Acceleration…

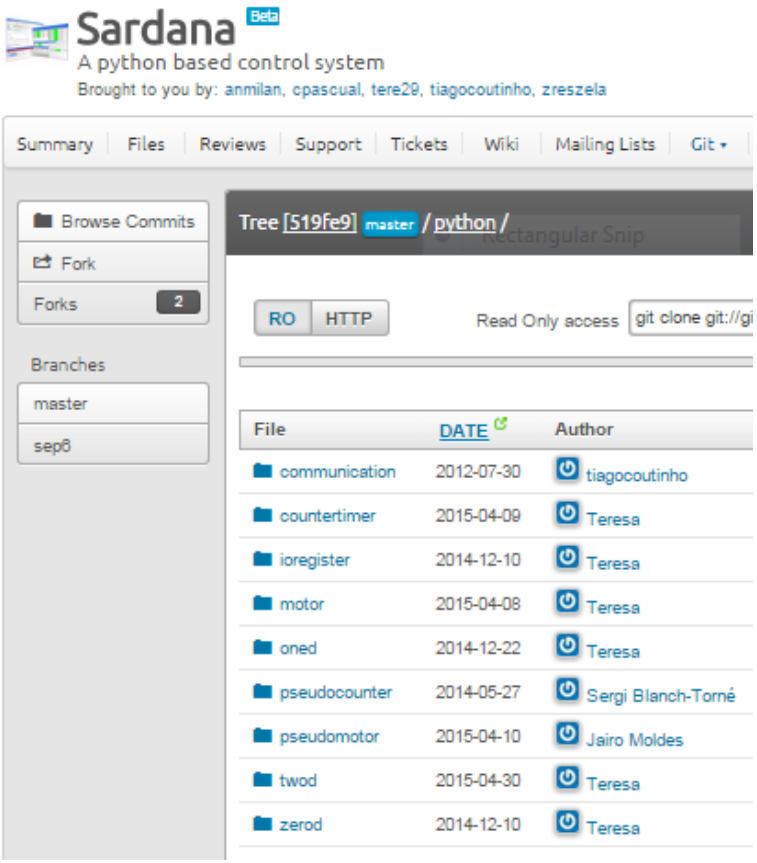


http://www.sardana-controls.org/en/latest/devel/howto_controller
http://sourceforge.net/p/sardana/wiki/Howto-CreateControllers

Use 3rd party contributions



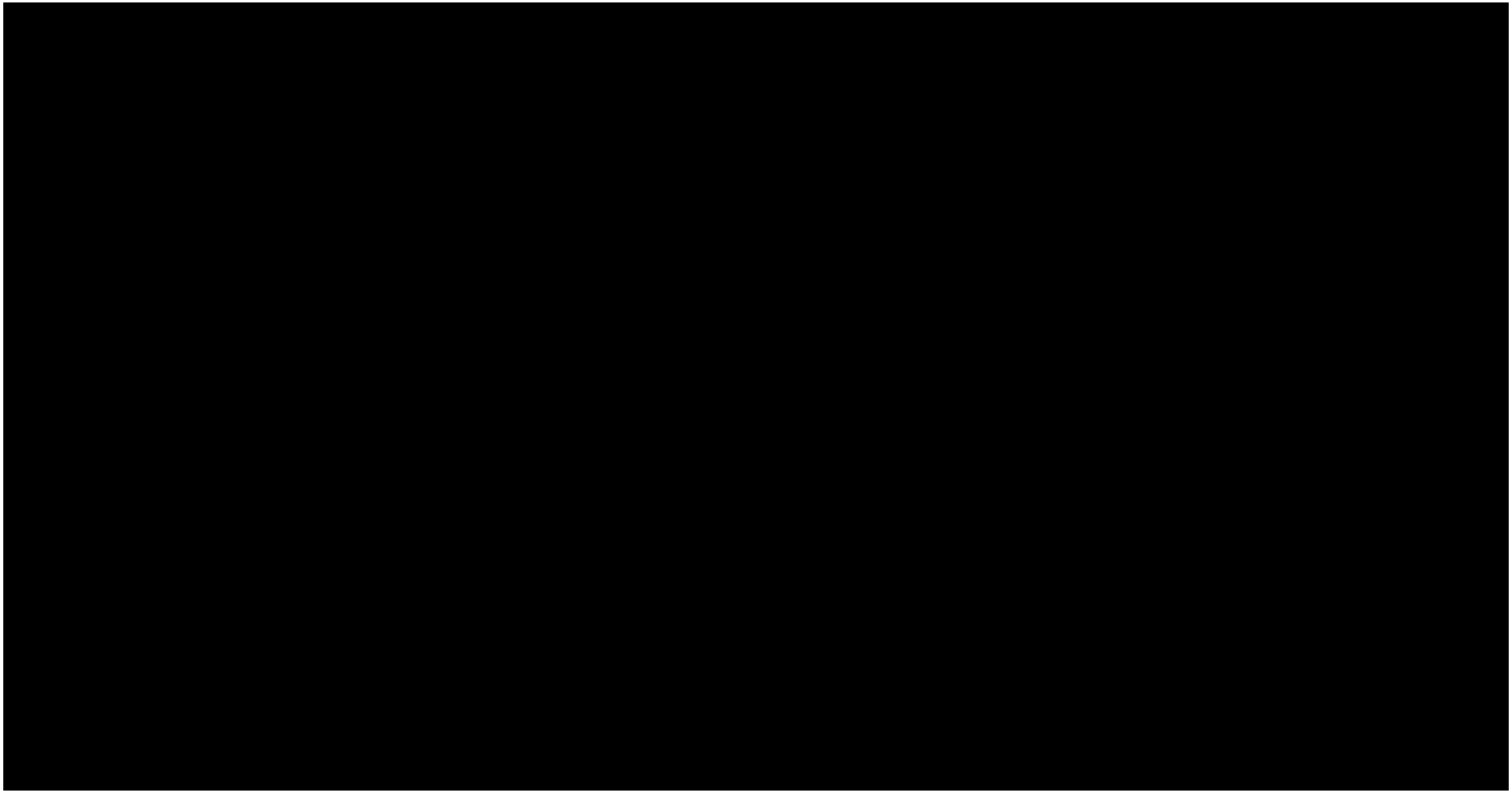
Sardana 3rd party plugins



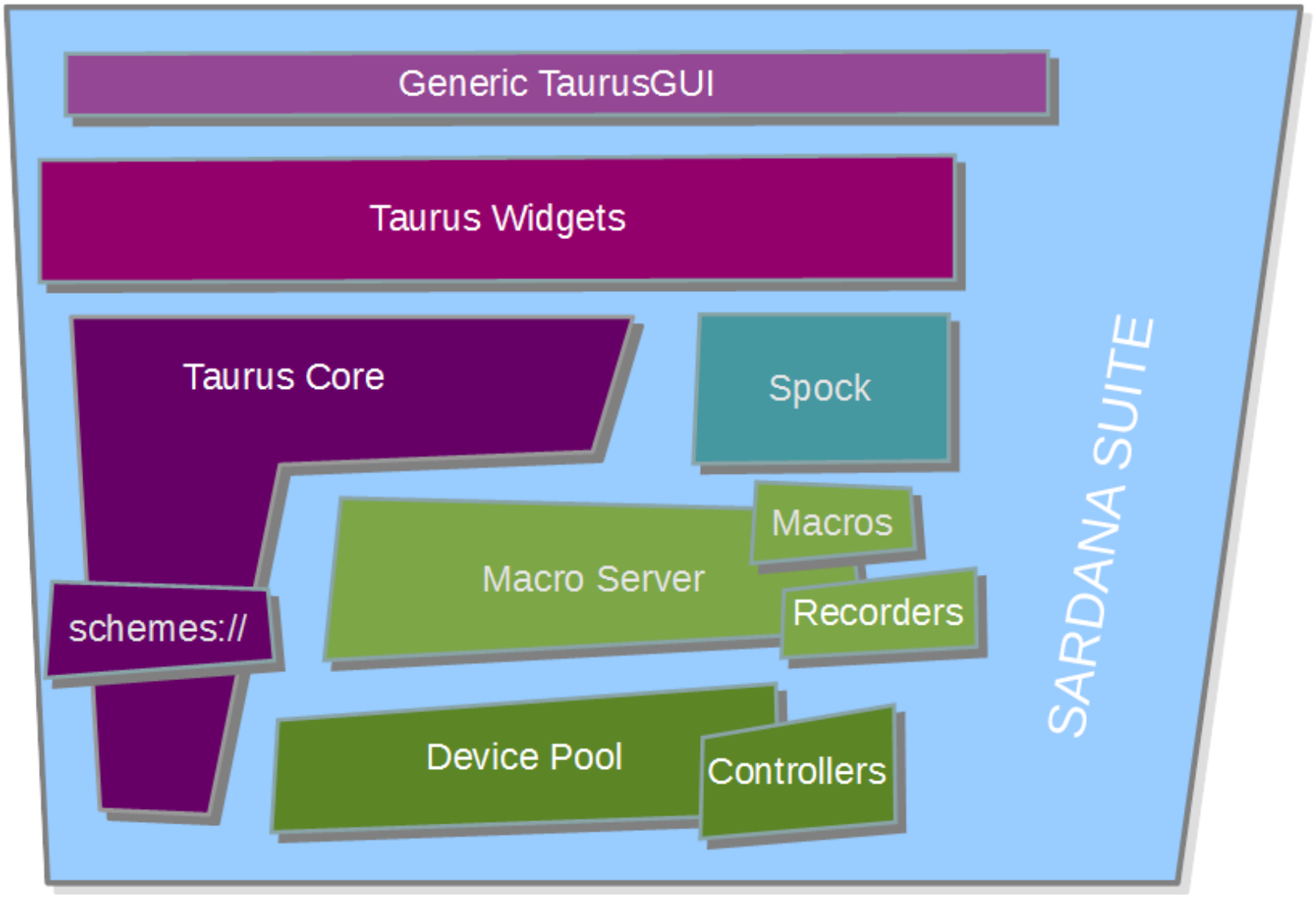
File	Date	Author	Commit
ALBA_BL04_MSPD	2015-04-10	Marc Rosanes	[4beeee] Add macro for continuous madscan
ALBA_BL09	2014-06-25	marc rosanes	[f100f0] Syntax error in last line of BL09_macros.py
ALBA_BL13_XALOC	2014-06-25	Teresa	[dbe918] Typo bug
ALBA_BL22_CLAESS	2015-01-12	Roberto J. Homs Puron	[36ae3d] Include qExafs macro
ALBA_BL24_CIRCE	2012-11-07	anmilan	[7ff2f4] Added macros for BL24 CIRCE.
ALBA_BL29	2014-09-26	Sicilia Developer Controls	[5d10ed] - BL29keithley.py: keitley names once again cha...
ALBA_GENERAL	2015-04-08	Roberto J. Homs Puron	[45c754] Include a timeout in the photon shutter macros
ALBA_LIMA	2014-12-19	Daniel Roldán Ballesteros	[242707] Fix syntax
ALBA_LTP	2012-07-30	tiagocoutinho	[d89d17] restructure
ALBA_MACH	2012-07-30	tiagocoutinho	[d89d17] restructure
DESY_P01	unknown		
DESY_P03	2014-09-24	Teresa	[14c0e7] P03 macros
DESY_P06	2014-11-25	Teresa	[d41f45] Adding maia macros
DESY_general	5 days ago	Teresa	[ea054b] New version
albaemmacros.py	2013-06-19	zreszela	[0ee825] migration to python pool sardana (changing impo...
icepap.py	2014-02-24	droldan	[230e73] Implement intelligent to reset Icepap:
niposition.py	2012-07-30	tiagocoutinho	[d89d17] restructure
sardana-macros-code	2013-06-25	droldanb	[689142]
starter.py	2012-10-26	gjover	[188396] Starter macro added to start/stop device servers.

git clone git://git.code.sf.net/p/sardana/controllers.git sardana-controllers.git
git clone git://git.code.sf.net/p/sardana/macros.git sardana-macros.git

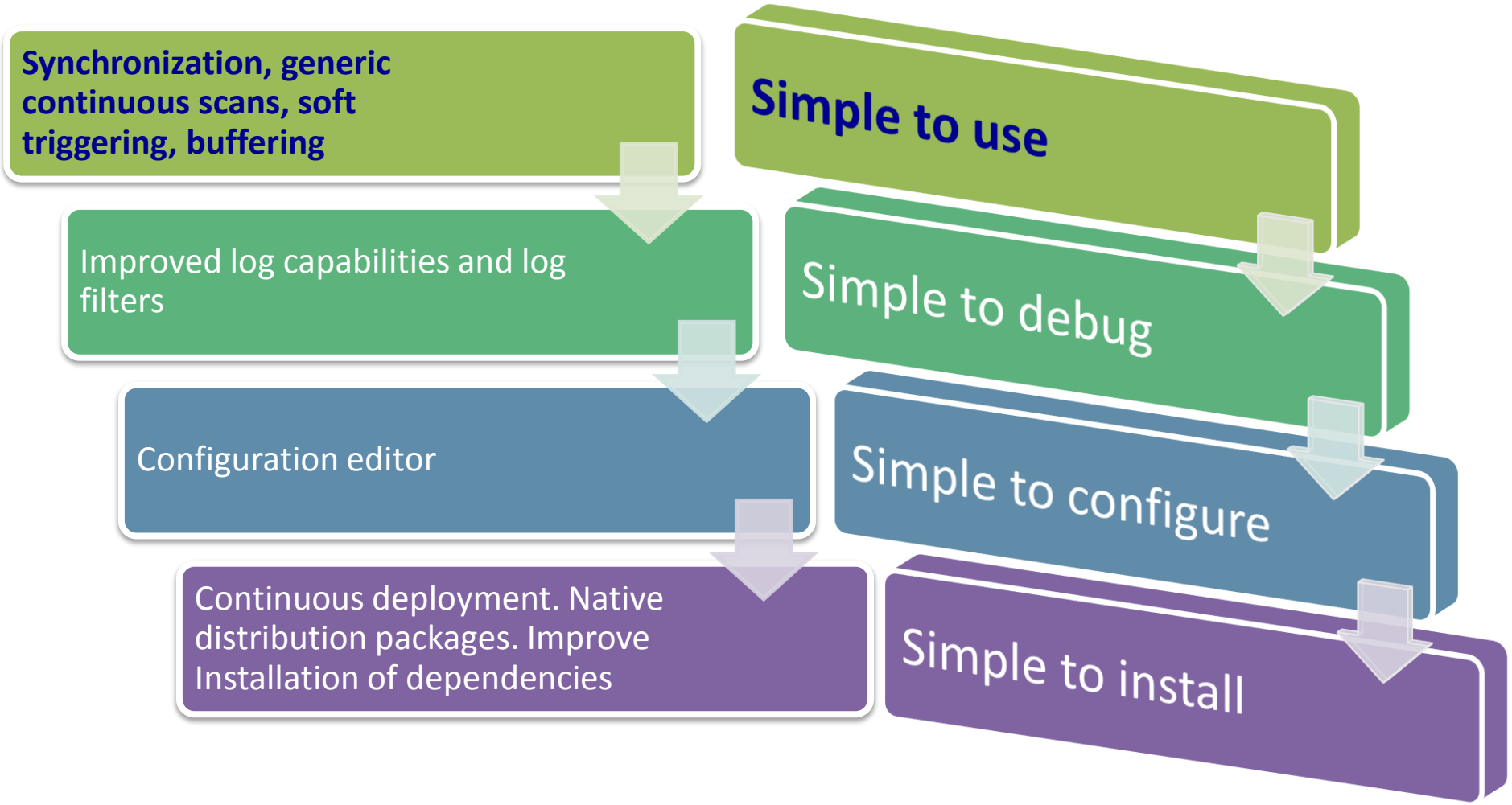
Let's use it…



Sardana Suite



Roadmap


Synchronization, generic continuous scans, soft triggering, buffering
Simple to use
Improved log capabilities and log filters
Simple to debug
Configuration editor
Simple to configure
Continuous deployment. Native distribution packages. Improve Installation of dependencies
Simple to install

THANK YOU

ALBA Studios ☺