Sardana Status Report

by Áureo Freites (MAXIV), Teresa Núñez (DESY), Michał Piekarski (Solaris), **Zbigniew Reszela** and CTGENSOFT Team (ALBA)
on behalf of the **Sardana Community**

Tango Status Update Meeting 2020, 17-18.11.2020

Outline

- Sardana Suite – quick reminder

- Last year roadmap achieved in 100 % and more...
  - Sardana v3
  - Migration status
  - Tango issues
  - Community events

- Next year roadmap

Next year roadmap

- Documentation Camp (after Tango Meeting)
- Jul19 release:
  - Improved integration of 1D and 2D detectors (SEP2)
  - QtSpock widget (based on qtconsole) (#1109) - thanks to Tim from DESY!
  - MacroServer hangs fixed (#1023, #1102) - thanks to Jan from DESY!
  - Many other improvements ...
- Python 3 support (#1089) (MacroServer ASAP!)
- Sardana Workshop @ ICALEPCS2019
- Plugins register (SEP16)

Tango Meeting 2019, 3-5.06.2019   Sardana Status   Zbigniew RESZELA et al.

Sardana Suite overview

Sardana Suite overview
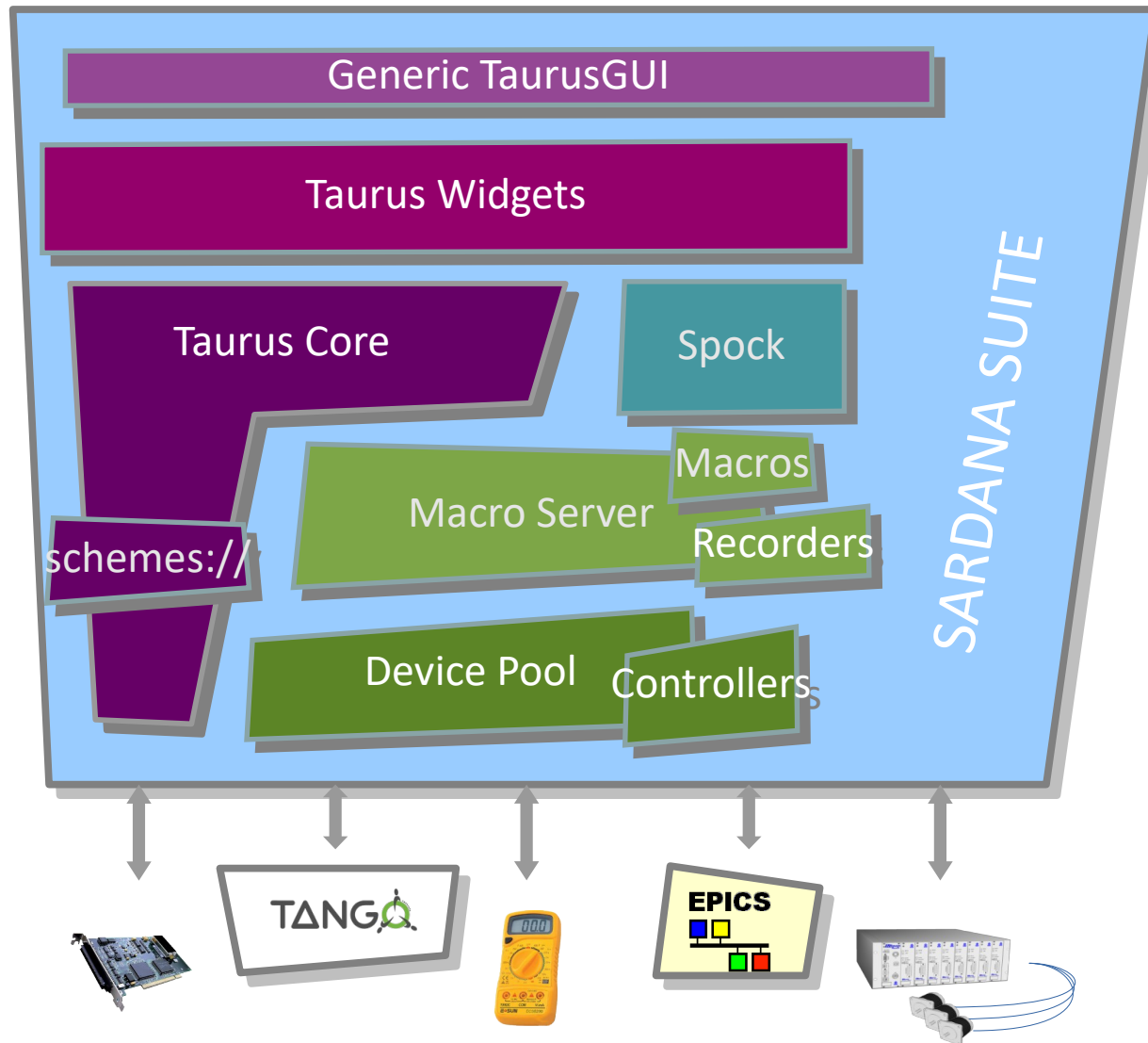
- *Scientific SCADA Suite*
  - Control equipment
  - Data acquisition & Motion control
  - Experiment automation
  - Rich GUI interfaces

- Suite = Sardana & Taurus projects

- Built with the Tango framework

- Extendable with plugins

- Configure, don't program!

Sardana v3

Sardana v3

- Code migrated to Python3 (no support to Python2)

- Added new features, more on them in next slides...

- Removed deprecated API - #1315

- Added user comprehensive Release Notes
  - All new features are documented

- Release process led by Áureo Freitas (MAXIV) – many thanks!

New showscan online widget

- Completely rewritten in pyqtgraph (no qwt in Python3)

- Single plot or multiplot view

- Can be embedded in TaurusGUI, launched from Spock or as a standalone application

- Thanks to Tiago Coutinho (ALBA)!
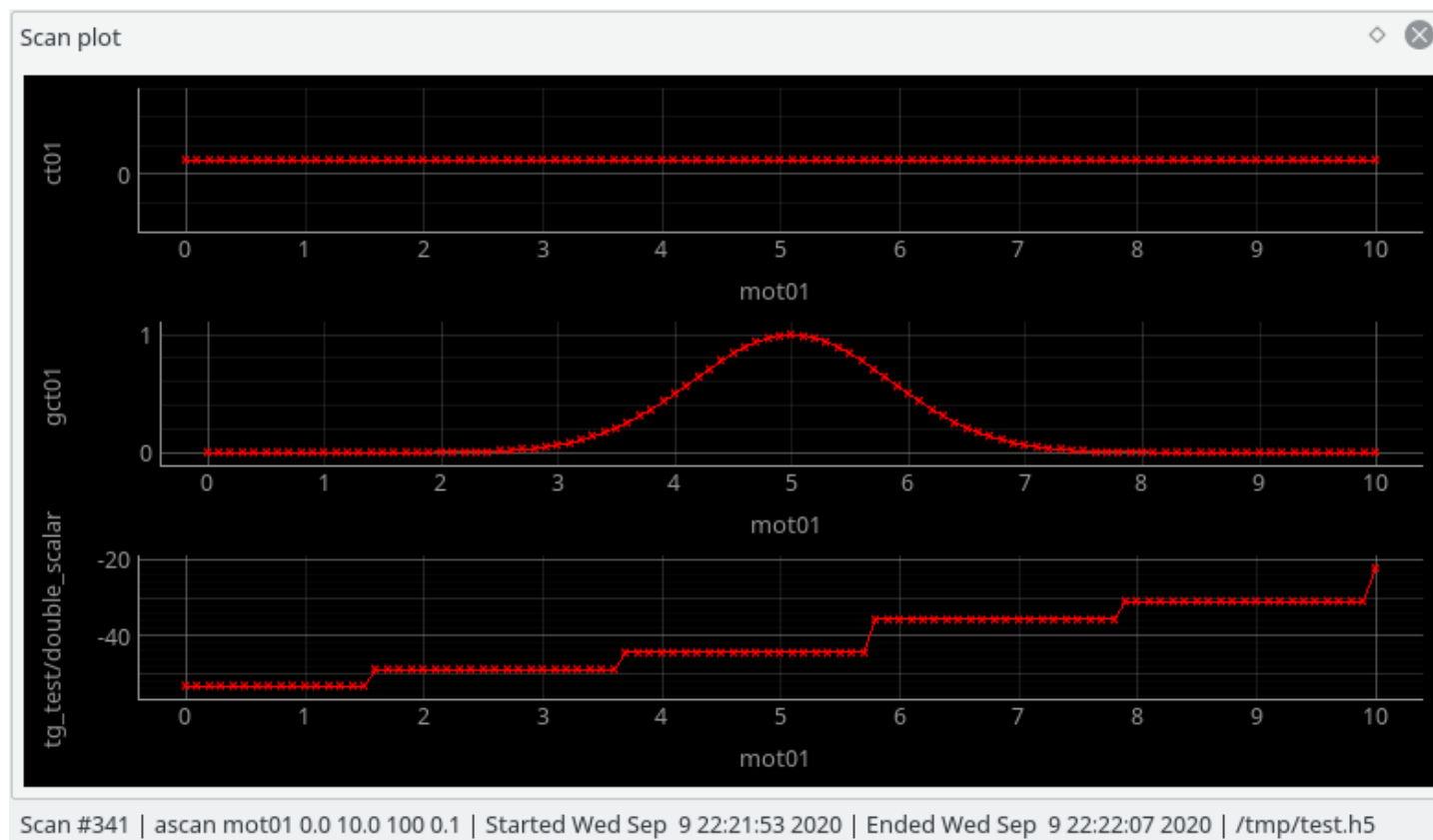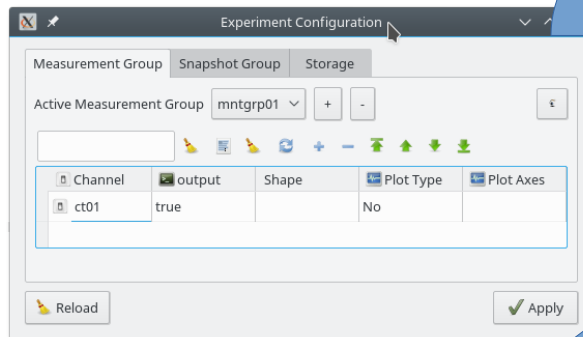

showscan online widget (multiplot view)

Experiment configuration programmatic API and macros

Before:
- Most of the experiment configuration was only available from the **expconf** widget

After:
- Programmatic API available for macro developers
- Experiment configuration macros use this API
- Thanks to Roberto Homs and Daniel Roldan (ALBA) and Daniel Schick (MBI)!

Experiment configuration widget (expconf)

Event-based synchronization

Event-based synchronization

```
Door_1 [19]: defmeas mntgrp02 ct01 twod01
Created mntgrp02

Door_1 [20]: set_meas mntgrp02

Door_1 [21]: lsmeas
  Active        Name    Timer Experim. channels
------- ---------- ------- ----------------------
  *      mntgrp02    ct01 ct01, twod01
         mntgrp04    ct01 ct01, ct02, ct03, ct04

      [22]: get_meas_conf
ActiveMntGrp = mntgrp02
  Channel    Enabled    PlotType    PlotAxes
--------- --------- ---------- ----------
    ct01       True        No         n/a
  twod01       True        No         n/a

Door_1 [23]: set_meas_conf enabled False twod01
ActiveMntGrp = mntgrp02

Door_1 [24]: defsnap mot01 mot02

      [25]: lssnap
    ap item                              Snap item full name
--------- -------------------------------------------------
    mot01    tango://pc255.cells.es:10000/motor/motctr104/1
    mot02    tango://pc255.cells.es:10000/motor/motctr104/2

Door_1 [26]: newfile /tmp/test.h5
ScanDir is      : /tmp
ScanFile set to : test.h5
Next scan is    : #1
```
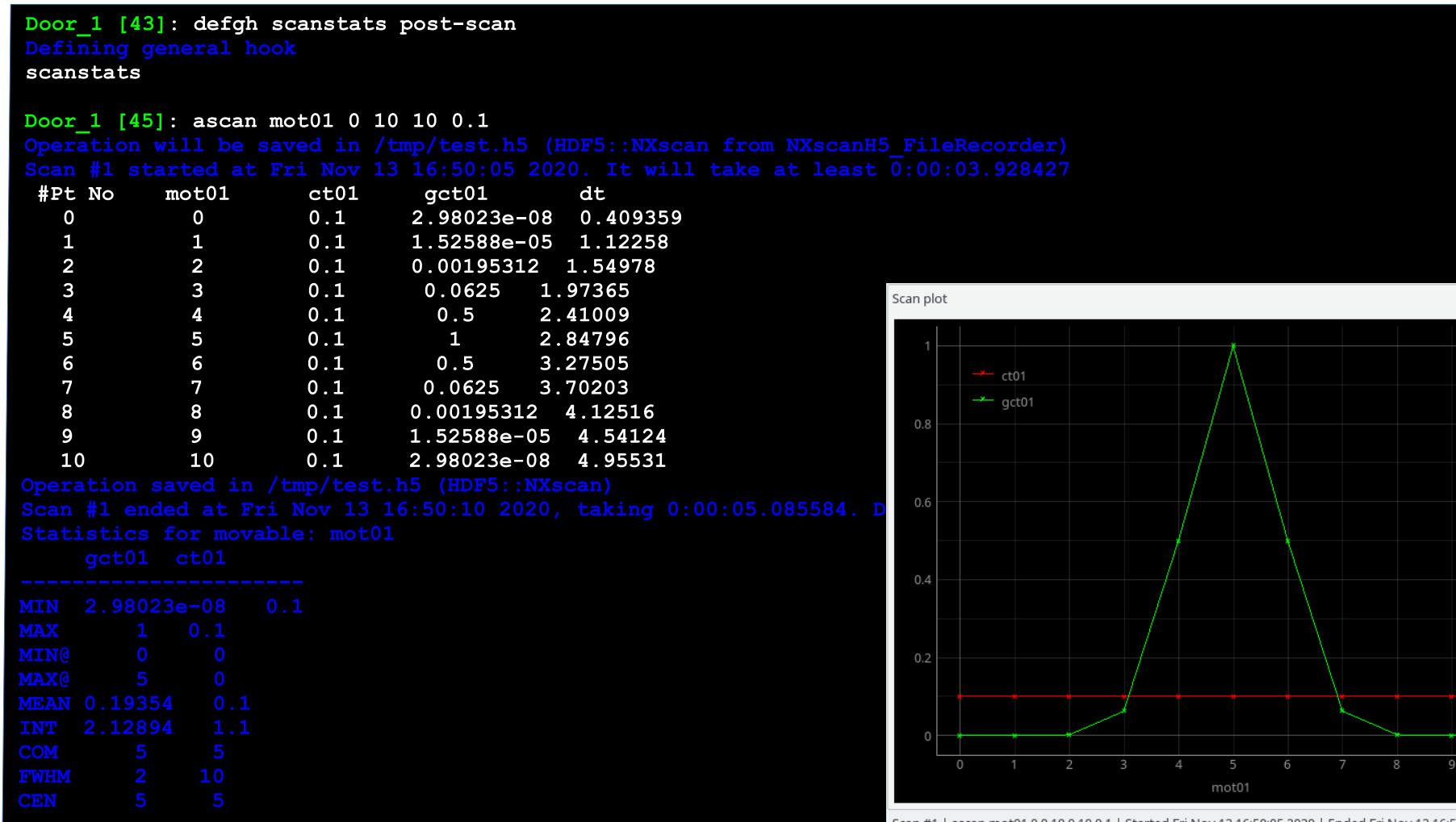
Execution of experiment configuration macros in Spock

Automatic scan statistics calculation

- Scan statistics calculation (max, mean, FWHM, etc.) can be optionally enabled using General Hooks
- Results stored in `ScanStats` environment variable and used by other macros e.g `pic`, `cen`
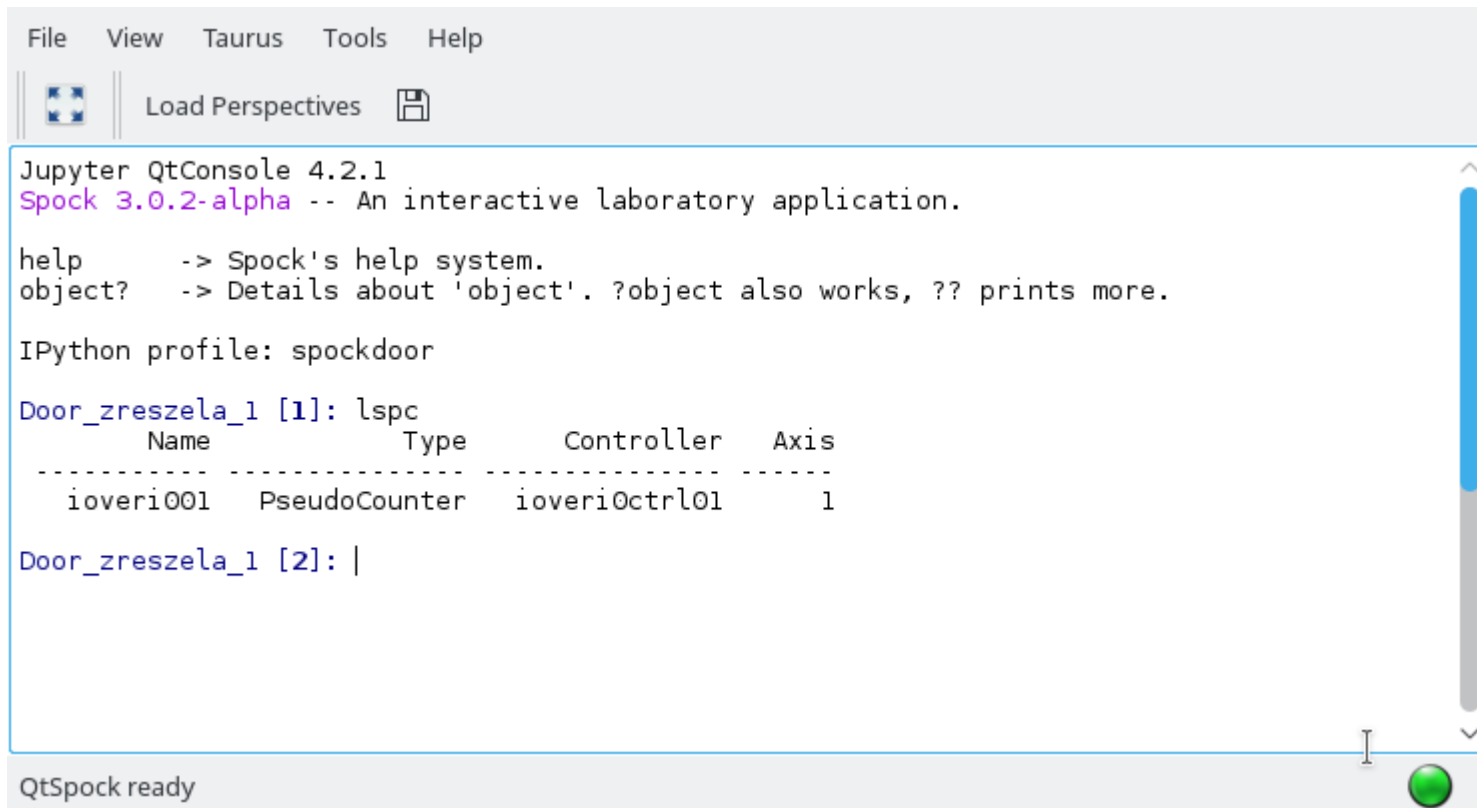- Thanks to Daniel Schick (MBI)!

```
Door_1 [43]: defgh scanstats post-scan
Defining general hook
scanstats

Door_1 [45]: ascan mot01 0 10 10 0.1
Operation will be saved in /tmp/test.h5 (HDF5::NXscan from NXscanH5_FileRecorder)
Scan #1 started at Fri Nov 13 16:50:05 2020. It will take at least 0:00:03.928427
 #Pt No      mot01       ct01       gct01        dt
    0          0         0.1      2.98023e-08  0.409359
    1          1         0.1      1.52588e-05  1.12258
    2          2         0.1      0.00195312   1.54978
    3          3         0.1       0.0625      1.97365
    4          4         0.1        0.5        2.41009
    5          5         0.1         1         2.84796
    6          6         0.1        0.5        3.27505
    7          7         0.1       0.0625      3.70203
    8          8         0.1      0.00195312   4.12516
    9          9         0.1      1.52588e-05  4.54124
   10         10         0.1      2.98023e-08  4.95531
Operation saved in /tmp/test.h5 (HDF5::NXscan)
Scan #1 ended at Fri Nov 13 16:50:10 2020, taking 0:00:05.085584. D
Statistics for movable: mot01
      gct01    ct01
----------------------
MIN  2.98023e-08   0.1
MAX       1      0.1
MIN@      0        0
MAX@      5        0
MEAN 0.19354    0.1
INT  2.12894    1.1
COM       5        5
FWHM      2       10
CEN       5        5
```

Scan execution with statistics calculation enabled in Spock

Scan plot

ct01
gct01

Scan #1 | ascan mot01 0.0 10.0 10 0.1 | Started Fri Nov 13 16:50:05 2020 | Ended Fri Nov 13 16:50:10 2020 | /t

Online scan plotting

QtSpock widget

- ## Allows to embed Spock (CLI) in a Qt based GUI

- ## Based on qtconsole (Spock runs in ipython kernel)

- ## Thanks to Tim Schoft (DESY)!

QtSpock embedded in TaurusGUI

PoolChannelTV widget new functionalities

Before:
- Only PoolMotor TaurusValue was rich in features

After:
- With PoolChannel TarusValue you can:
  - Configure and control DAQ of a channel
  - Consult channel's DAQ results
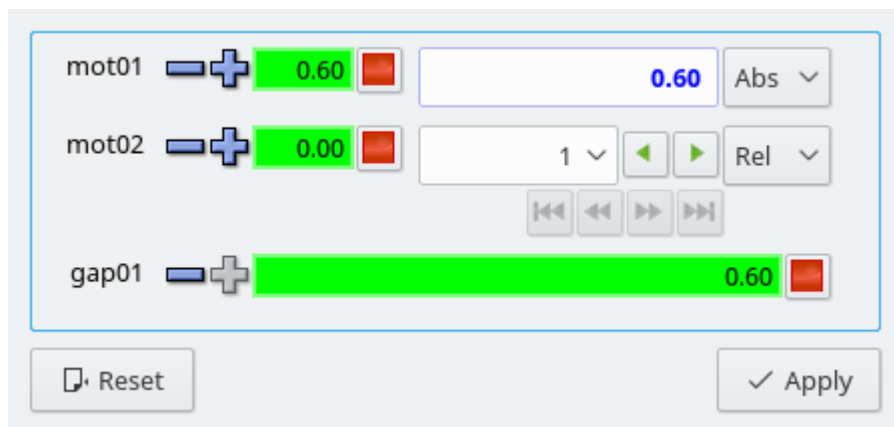
TaurusForm with PoolMotorTV widgets (normal, expert and compact)

TaurusForm with PoolChannelTV widgets (CT, 1D, 2D, 0D and PseudoCounter)

Migration to Sardana v3

Sardana v3 migration at different sites

	Done	Plan	Comments
ALBA	• Most of the generic plugins and tools • 4/8 beamlines (in operation) • New beamlines	• 4 beamlines (in operation) • Machine & Laboratories • Gradually upgrade rest of the CS to Tango 9	General migration: • Tango 7/8 → Tango 9 • Taurus 3 → Taurus 4 • OpenSUSE 11/12 → Debian 9 • TANGO_HOST to FQDN DNS alias
DESY	• Generic plugins and tools • Debian10 packages (+ patches) • Installed and tested in development environment	• 1 beamline during X-mas shutdown • Next beamlines afterwards	
ESRF	• 20 instances of MacroServer are used for the Machine CS in Python 3		• Use conda environment (Python 3.7) • Migrated to 3.0.2a (before cleanup of deprecation warnings)
IPANEMA	• Development and production environments		• Issues with migrating MacroServer environment
MAXIV	• 2 beamlines, 1 more should be ready soon	• Rest of the beamlines	• Run Sardana with Singularity on CentOS 7.7 due to the dependency issues.
MBI	• All plugins migrated to Python 3 • 4/7 setups (one running at PETRA IV) are using Sardana v3	• 3 setups to be migrated at the beginning of next year	Plan to migrate: • Linux Mint 20 → Debian 10 • Tango 9.2.5 0 → Tango 9.3.4 to solve API_EventTimeout with multiple NIC
SOLARIS	• Installed in development environment and being tested (CentOS 7.5) • Estimating scope of migration	• 4 beamlines to migrate • Soon a decision: either migration in the X-mas shutdown or in the summer one	

Sardana v3 migration at different sites

	Done	Plan	Comments
ALBA	• Most of the generic plugins and tools • 4/8 beamlines (in operation) • New beamlines	• 4 beamlines (in operation) • Machine & Laboratories • Gradually upgrade rest of the CS to Tango 9	General migration: • Tango 7/8 → Tango 9 • Taurus 3 → Taurus 4 • OpenSUSE 11/12 → Debian 9 • TANGO_HOST to FQDN DNS alias
DESY	• Generic plugins and tools • Debian10 packages (+ patches) • Installed and tested in development environment	• 1 beamline during X-mas shutdown • Next beamlines afterwards	
ESRF The European Synchrotron	• 20 instances of MacroServer are used for the Machine CS in Python 3		• Use conda environment (Python 3.7) • Migrated to 3.0.2a (before cleanup of deprecation warnings)
IPANEMA	• Development and production environments		• Issues with migrating MacroServer environment
MAXIV LABORATORY	• 2 beamlines, 1 more should be ready soon	• Rest of the beamlines	• Run Sardana with Singularity on CentOS 7.7 due to the dependency issues.
MBI Max Born Institute	• All plugins migrated to Python 3 • 4/7 setups (one running at PETRA IV) are using Sardana v3	• 3 setups to be migrated at the beginning of next year	Plan to migrate: • Linux Mint 20 → Debian 10 • Tango 9.2.5 0 → Tango 9.3.4 to solve API_EventTimeout with multiple NIC
SOLARIS NATIONAL SYNCHROTRON RADIATION CENTRE	• Installed in development environment and being tested (CentOS 7.5) • Estimating scope of migration	• 4 beamlines to migrate • Soon a decision: either migration in the X-mas shutdown or in the summer one	

Tango issues found when migrating to Python 3 and Tango 9

PyTango

ᛘ Add EnsureOmniThread and is_omni_thread ✓   💬 5
#327 by ajoubertza was merged on Feb 19

⊙ DS crashes when unsubscribing from events in __del__   💬 40
#292 opened on Jul 19, 2019 by reszelaz

⊙ DS hangs when concurrently subscribing to events and destructing DeviceProxy   💬 15
#315 opened on Oct 31, 2019 by reszelaz

*Many thanks to: Anton Joubert (SARAO), Tim Schooft, Jan Kotanski (DESY),
Michal Liszcz (S2Innovation), Reynald Bourtembourg (ESRF),
Tiago Coutinho, Jairo Moldes (ALBA)!*

cppTango

⊙ Unsubscribe in push_event leads to API_EventTimeout `high priority`   💬 8
#686 opened on Feb 15 by reszelaz

Many thanks to: Reynald Bourtembourg (ESRF), Michal Liszcz (S2Innovation)!

JTango

⊘ Heartbeat errors when using network alias for TANGO_HOST   ⑂ 1   💬 33
#90 by reszelaz was closed on Sep 24

*Many thanks to: Gwenaëlle Abeillé (Soleil), Pascal Verdier,
Reynald Bourtembourg (ESRF), Sergi Rubio (ALBA)!*

Other news

Sardana plugins catalogue

- Implementation: Markdown tables in GitHub repository
  - Easy search
  - Watchers notification
  - Adding plugins by PR
- Categories:
  - Hardware: 54 projects
  - Instrument: 0 projects
  - System: 4 projects
  - Software: 3 projects
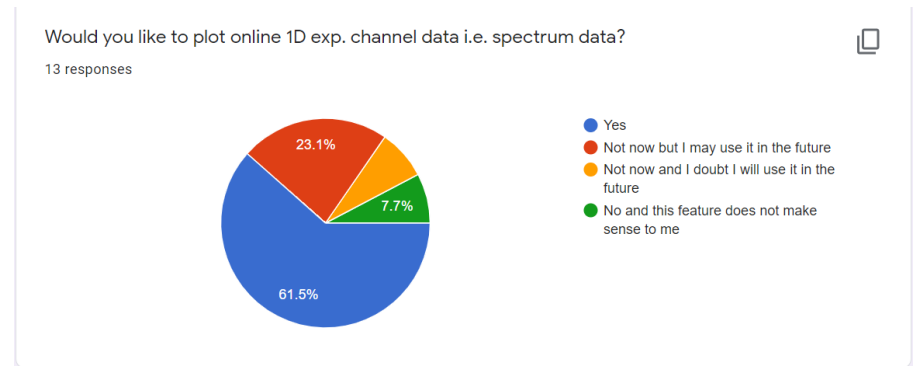- Many thanks for adding your plugins! Keep doing that!
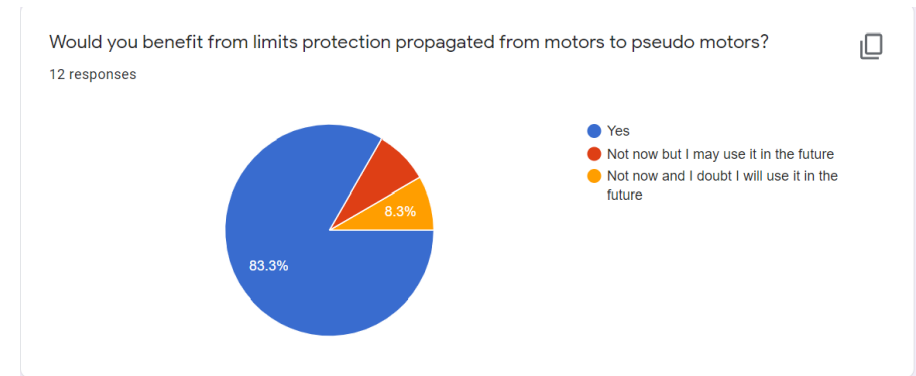- https://github.com/sardana-org/sardana-plugins

Sardana plugins for specific hardware

Below you will find a table with Sardana plugins for specific hardware like for example motion controllers, detectors, etc.

Name	Description	Link(s) to project
AdLink	AdLink DAQ cards e.g. 2005	sardana-adlink
AgilisAGAP	Agilis Conex AGAP mirror mount	AgilisAGAPMotorController
AgilisAGP	Agilis Conex AGP rotational mount	AgilisAGPMotorController
ALBA Em Electrometer	Low current electrometer	sardana-albaem
AmptekOneD	AmptekPX5 Multi-channel analyzer as oned	AmptekOneDCtrl
AmptekPX5	AmptekPX5 Multi-channel analyzer	AmptekPX5
CaenFastPS	Caen FastPS power supply	CaenFastPSMotorController
DGG2	DGG2 timer	DGG2Ctrl
EigerDectris	Eiger Dectris	EigerDectris
EigerPSI	Eiger PSI	EigerPSI
EpicsMotor	Epics Motor	EpicsMotorController

Users questionnaire

- Problem:
  - Backlog of issues > 300
  - Developers need user point of view to better prioritize work
- Implementation:
  - > 100 questions (~1h) with if/else paths (Google Form)
  - Recommended to fill with the controls engineer help
- Desired results:
  - Heatmap of existing features
  - Votes on existing feature requests
  - Comments
- Current status:
  - One answer per sub-system e.g. beamline
  - So far 23 answers but we are expecting approx. 40

Would you benefit from limits protection propagated from motors to pseudo motors?
12 responses

- Yes
- Not now but I may use it in the future
- Not now and I doubt I will use it in the future

83.3%
8.3%

Would you like to plot online 1D exp. channel data i.e. spectrum data?
13 responses

- Yes
- Not now but I may use it in the future
- Not now and I doubt I will use it in the future
- No and this feature does not make sense to me

61.5%
23.1%
7.7%

Community Events

Documentation Camp 2019 (DESY)

Workshop ICALEPCS2019 (New York)

Monthly follow-up meetings
https://github.com/sardana-org/sardana-followup

Next year roadmap

Next year roadmap

- Virtual Bug Squashing Party (after analyzing questionnaire answers and prioritizing backlog)

- Jan20 and Jul20 releases:
  - SEP19 – Refactor plugin system
  - Common configuration format (become less dependent on the Tango DB for configuration parameters)

Questions?

Acknowledgements: