





GUI strategy at SOLARIS: status & future plans

TAURUS Workshop, 2023.03.14 Michał Fałowski SOLARIS National Synchrotron Radiation Centre

NSRC SOLARIS institute

- Synchrotron radiation research + cryomicroscopy.
- Synchrotron accelerator, linear accelerator, 2 diagnostic beamlines, 5 scientific beamlines and 2 microscopes fully operational.

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- 1 beamline during commissioning (CS already working).
- 2 beamlines under construction/development.



Control System in NSRC SOLARIS

- Accelerators and beamlines for control system use PLC (BMS, MPS, PSS) and TANGO (high level, mostly python, sometimes C++).
 - OS: CentOS 6, 7 (mainly), 8, Windows 10 + some embedded custom Linux and 1 Fedora (old one).
 - Python versions: 2.7 (GUIs), 3.6 (devices and GUIs), 3.7 (some web).
 - Tango versions: 9.3.5 (mainly), 9.2.5 (few systems left), 9.1 (embedded) and some 8 (e.g. old archiving).
 - Taurus versions: 3,7 (virtual env), 4.1 (accelerators), 4.4 (virtual env), 4.5 (beamlines) and 4.7 (for Py3.6 and PyQt5).
 - Additionally, some projects use Vue.js, Tango GQL and Taranta (for authentication).
 - Archiving: hdb++ + MySQL InnoDB
- Cryomicroscopes are fully independent and are based on manufacturer software.



Control System in NSRC SOLARIS - numbers

- Around 4000 Tango Devices.
- Around 600 Tango Classes.
- Around 800 Servers instances.
- 9 tango hosts.
- Over 100 hosts.
- 20 workstations.



GUIs in SOLARIS

- Most of the GUIs are based on Taurus.
- We have few web applications (Vue + TGQL + custom web archive reader based on PyTA).
- 1 QTango GUI.
- There are some pure PyQt (with custom Tango communication) and MATLAB GUIs, mostly written by
 operators and scientists.
- Most of the software for research is provided by manufacturers and is Windows based.



GUIs in SOLARIS - spectrum

- Over 100 applications in repository.
- The range of applications is very wide:
 - Simple forms with few buttons and labels.
 - Panels to control single devices from power supplies, ion pumps, to Undulators and Cavities.
 - Complicated GUIs to operate entire machine (e.g. RF section, beam injection), setup beamlines and execute sample scans (also based on Taurus GUI).
 - Synoptics (JDraw and svgsynoptic2) of simple sections to entire beamlines.
- Many additional trends and forms on workstations (also based on Taurus GUI).
- Few operators and scientists' GUIs.
- Some GUIs have over 150 attributes connected.
- ATK panels are run from Jive (in some cases to many clients can kill servers).



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GUIs in SOLARIS - standards

- In every new GUI logic should be moved to server side (e.g. facadedevice, Sardana controllers) and, if possible, also in maintained GUIs.
- Every new GUI should not use older versions than Py3.6 and Taurus 4.7 (unless Qwt or synoptic is needed).
- Taurus is preferred over other frameworks.
- svgsynoptic2 is obligatory for new synoptics.
- Web applications should use Vue.js.
- GUIs and web apps for similar purposes should have similar view and project structure (e.g. beamline operation GUIs are in one project where all configs are stored).
- Synoptics for beamlines and fronted uses same layout, symbols, colours, panels and logic.







Front End	Status		BL Components Status
Open FE Close FE	VAC MEDIA PLC	PSS	Close Valves after experiment
Heat Absorber Open Close			Prepare Valves for STXM experiment
Safety Shutters Open Close		PSS info	Prepare Valves for 8 poles experiment
YAG Screen Extract Insert	Info Reset		Prepare Valves for PEEM experiment
OPEN EXTRACTED ON OCLOSED INSERTED OFF	OK 🛑 ALARM		

BL-04ID | DEMETER

Current 356.24 mA	Energy 1.50 GeV	Storage Ring Status: Beam Delivered Operation Mode: User Operation
Lifetime	l∙t product	Next Injection:
15.26 h	5.44 A * h	8:00 am, 3:00 pm and 9:00 pm during User Operation mode

2023-03-11 20:14:00



OPEN EXTRACTED ON	DISABLED
OCLOSED INSERTED OFF	UNKNOWN
STANDBY BYPASS	FAULT
RUNNING MOVING	ALARM
INITIALIZATION	NO TANGO DEVIC

Symbola		
Ion Pump	Cooling Device	 Thermocouple
Pressure Gauge	O	Temperature sensor
Valve	C Flowmeter	Diagnostic Screen
	Pressureswitch	Interlock
	Conductometer	No Interlock



















SOLARIS NATIONAL SYNCHROTRON RADIATION CENTRE	Interlo	Tuesday, Ma	Tuesday, March 14th 2023, 8:19 am			
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			SHG1 WATRF RESET	SHG1 WATRF SGDCAB11 RF ARCDR1 RESET		
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GUIs in SOLARIS - team

- Most of the GUIs are created and maintained by CS team.
- 9 CS employees (7 full-time).
- Almost everyone in CS team takes care of at least a few GUIs (who also takes care of part of the infrastructure, devices etc.).
- Operators and scientists can also create GUI (there are already some advanced GUIs made by operators).
- At the request of operators, we can install additional software (mostly python libraries).
- We try to train willing people about TANGO and version control (to use git and our internal GitLab).



GUIs in SOLARIS - organizational aspects

- There are still many old GUIs with many custom views and logic inside the code.
- So many applications make it hard to keep them maintained while there is so high personnel rotation.
- There is no one able to keep track on all GUIs, so review is also limited.
- That is one of the reasons why new logic should be moved to server side, as this would allow to more complete code review.
- But sometimes duplication of functionalities are still occurring.
- GUIs are harder to update, mostly because they depend on more libraries and there are no backward compatibilities more often.



GUIs in SOLARIS – feedback

- So many needs requires independence in creating simpler GUIs by operators and scientists.
- Web applications are warmly received but needs more care and advertisement.
- UX/UI experience is lacking which causes sometimes complaints and disagreements on looks.
- Crashing and load time is the biggest reason for hindering the work.



GUIs in SOLARIS – TAURUS issues

- <u>https://gitlab.com/taurus-org/taurus/-/issues/654</u> TAURUS not react to Periodic Events.
- <u>https://gitlab.com/taurus-org/taurus_pyqtgraph/-/issues/112</u> Taurus GUI is not restoring trend curves cfg.
- <u>https://gitlab.com/taurus-org/taurus_pyqtgraph/-/issues/104</u> Disappearing Y2 axis.
- Very, very, very long startup if there are many attributes connected.
- Crashing with segmentation fault.
- New Taurus not compatible with older config (or no migration scripts at the startup).
- Problem with taurus designer (missing dependency but without information).



GUIs in SOLARIS – future plans

- Migrate most of the GUIs to at least Taurus 4.7 (next Sardana update requires Taurus >= 5), Python 3.6 and PyQt 5.
- Try to move all trends to PyQtGraph.
- Try to migrate all trends to new Taurus.
- Create more web apps.
- Try to introduce Taranta to other users (again).
- Standardize way to deploy custom operators' GUIs to entire system.



Thank You!

