SOLARIS Control System Standard for New Accelerator, Front End and Beamline Componets

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Owner:	Tadeusz Szymocha; tadeusz.szymocha@uj.edu.pl
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Approved by:	Tadeusz Szymocha
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Revision history

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Authors:
Tadeusz Szymocha
Ireneusz Zadworny
Michał Piekarski

1. Introduction

This document is intended to describe SOLARIS Control System standard for a Contractor. It contains the most crucial elements of the TANGO Controls based control system present at the SOLARIS for remote controlling of the hardware delivered by the Contractor.

Basics standards are listed in Appendices CS1 (Motion Control Standard), NAME1 (Naming Convention). Summary of Responsibility matrix are listed in Appendix CS2 (Responsibility matrix). **All exceptions should be agreed with SOLARIS CSiIT group.**

2. IT infrastructure

Delivery of IT infrastructure is on SOLARIS side.

The Contractor is expected to provide guidelines for the IT infrastructure - component location, 2D and 3D models, number of Ethernet interfaces needed to control the equipment foreseen in the project.

3. Control System

The control system for all elements will be based on the Tango Controls system (http://www.tango-controls.org/). If PLC control is required, its integration with Tango Controls system is necessary (preparing proper Device Server).

The software shall be deployed on virtual machines for server-side software and workstations for operator layer.

3.1 Tango Software

3.1.1 Compatibility requirements

Solaris uses TANGO control system for equipment integration and operator layer. Tango version 9.2 should be used.

· The preferred programming language is Python (version 2.7+ and 3.5+)

· The preferred GUI library is Taurus.

· The preferred experiment control tool is Sardana.

3.1.2 Source code

All software shall be provided with the source code and stored in the SOLARIS software repository.

The preferred source code formatting style is PEP8.

The SOLARIS shall be given rights to modify and redistribute free of charge the source code of the software provided. The software should be provided to SOLARIS with e.g. GPL, LGPL, MIT, etc. license.

Tango Controls Device Servers must have unit tests written with test context (a part of PyTango, Python binding to Tango Controls system).

3.1.3 Documentation

Software shall be documented (user and developer guides). Documentation shall contain:

- For device servers: description of all properties, attributes, commands and devices states. The description should explain purpose, data types and allowed values.
- For GUIs: description of all on screen controls and all command line options when applicable

The in-line functional documentation should be prepared in Sphinx-compatible format.

3.2 Remote control standard

In order to allow the integration of the controller with TANGO Controls system existing in SOLARIS, the controller delivered by the Contractor should fulfill the following specification:

a) The controller should have an Ethernet interface supporting TCP/IP or UDP standards for remote controlling.
b) Firmware and drivers should support communication with Linux operating system, distribution CentOS 7 or be independent from the operating system platform.

c) It should be compatible with the TANGO control system (v 9.2). Preferable, it should already be supported by the Tango Community.

d) The equipment should be delivered with full documentation, including the complete list of commands for remote control of the unit along with the programming manual.

e) The control logic of all devices as well as possible dependencies between them (e.g. logic of safe operation) must be documented.

f) The controller should have power supply IEC 60320 type plug

g) The mounting should be a 19'' rack based.

h) For the motion controller, the platform is decided to be IcePAP provided by the ESRF.

i) For the motion control absolute encoders are preferred.

3.3 Other local controllers

There could be dozens of small local controllers in the system (temperature, pressure, etc.). As a general, preferred are ones with the Ethernet connection, supported by the Tango Community, compatible with the Linux and with provisioned market support.

3.4 Motorisation

The standard for motorization handling at the SOLARIS is to use stepper motors controlled by the IcePAP system. The stepper motors must be approved by Solaris for compatibility with the motor controllers. Motors should be integrated into the Tango control system with the Sardana package.

All motors shall be installed outside vacuum chambers. The encoders type applied for required movable elements is one of the quality criteria.

It is not allowed to use such configuration that encoders on the motors' shaft is used as reference encoders for the required close-loop operation axis.