

Status of the software development for the FAIR accelerator control system

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Introduction

The FAIR accelerator control system is currently being developed and the first prototype will be tested at CRYRING. The core parts are developed in close collaboration with CERN, Geneva, and the current focus lies on their enhancement in order to fully support the demanding requirements for FAIR. Significant progress could be achieved in the basic major frameworks: LSA for settings generation, CMW/RDA for communication and FESA for front-end software. Besides these activities, work started to support the upcoming commissioning of CRYRING. This report summarizes the developments during the year 2013.

FESA Framework

Software for the Front-End equipment control computer will be developed using the FESA (Front-End Software Architecture) framework [1], which was originally established by CERN. In a collaboration between CERN and GSI a complete redesign of the framework has started a couple of years ago. The new version, FESA-3, is now completed to be used in a productive environment. The classes for the test-operation of the proton linac ion source were developed with FESA-3 at GSI.

The new FESA-3 framework provides site-specific extensions to adapt and enhance the framework to the needs of the contributing institutes. As part of the adaptation, a set of GSI specific properties was defined and a preliminary connection to the future GSI timing system was integrated.

Not part of FESA, but tightly integrated, is the CERN network communication CMW/RDA (Common MiddleWare / Remote Device Access) framework. The framework, originally based on CORBA, is reworked using ZeroMQ for internal communication. GSI joined the development in 2013 to collaborate in all main parts. The new version is now stable and ready to be integrated in FESA-3.

LSA Framework

As basis for the settings management framework for the FAIR accelerator control system, the CERN LSA (LHC Software Architecture) framework [2] is used. Since 2007, a collaboration with CERN has been set up and the framework is being enhanced to support FAIR operations.

This year, the splitting of the framework components into generic functionality and institute specific parts was finalized in cooperation with CERN. A major refactoring of the framework took place during the long shutdown (LS1

at CERN) to achieve a clean and state of the art framework, following modern software architecture principles. Institute specific components were refactored according to these changes.

Concepts for enhancing the LSA framework to support flexible beam operations for FAIR have been worked out and first development started. This will enable the framework to support scheduling of parallel beams and the coherent calculation of machine settings throughout the facility.

To aid the machine modeling for CRYRING [3] and for future machines, tool development started to allow more efficient modification of the accelerator models present in LSA for new accelerators.

Other Activities

In addition to framework developments, first application development has started to support the upcoming commissioning of CRYRING in 2014. A new Device Control program is being developed as part of the new FAIR accelerator control system for device diagnosis and exploitation.

A small packaged version of the FAIR control system was developed that will be used at CEA Saclay for commissioning and test operation of the FAIR proton source. It includes FESA classes for controlling the equipment as well as an application to control and monitor the proton source. This application will be the basis for a general source control program for FAIR.

The names of the existing GSI devices were enhanced to achieve a common naming schema for GSI and FAIR devices. These changes were implemented in the present control system as a precondition for integration with the future FAIR control system.

Outlook

For 2014, the main focus of the control system software development will be the commissioning and operation of the CRYRING, which will be used as test bed for the new control system for FAIR.

References

- [1] A. Guerrero et al., "CERN Front-End Software Architecture for Accelerator Controls", ICALPCS'03
- [2] G. Kruk et al., "LHC Software Architecture LSA – Evolution Toward LHC Beam Commissioning", ICALPCS'07
- [3] D. Ondreka et. al, "Project Status of the New Setting Generation System for GSI and FAIR", this report