EXTENDING WINCC OA FOR USE AS ACCELERATOR CONTROL SYSTEM CORE

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ABSTRACT

The accelerator control system for the MedAustron light-ion medical particle accelerator has been designed under the guidance of CERN in the scope of an EBG MedAustron/CERN collaboration agreement. The core is based on the SIMATIC WinCC OA SCADA tool. Its open API and modular architecture permitted CERN & MedAustron to extend the product with features that go beyond traditional supervisory control and that are vital for directly operating a particle accelerator. Several extensions have been introduced to make WinCC OA fit for accelerator control: (1) near real-time data visualization, (2) external application launch and monitoring, (3) accelerator settings snapshot and consistent restore, (4) generic panel, navigation supporting role based permission handling, (5) native integration with interactive 3D engineering visualization, (6) integration with National Instruments based front-end controllers. The major drawback identified is the lack of support of callbacks from C++ extensions. This prevents asynchronous functions, multithreaded implementations and real-time behaviour. We are therefore striving for a search for the user community to trigger the implementation of this function.

INTRODUCTION

MedAustron is an ion therapy and research centre presently under construction in Wr. Neustadt, Austria. The facility features multiple ion sources, a Linac, a synchrotron and five beam lines including a proton-gantry. The whole accelerator chain is designed for protons, carbon-ions and other light ions. MedAustron chose the commercial SCADA tool SIMATIC WinCC OA from ETM professional control as core operating system for controlling the particle accelerator. The tool has been designed following an open, distributed system architecture to accommodate traditional supervisory control and data acquisition tasks. It offers the possibility to extend the system for tasks that go beyond those traditional tasks.

CONTROL SYSTEM

The MedAustron control system is based on an industrial oriented 4-tier architecture:

- (1) presentation tier with WinCC OA user interface managers, for example the PVSS Navigator and operator panels;
- (2) processing tier containing the WinCC OA core system (event-managers, data-managers, control-managers, etc.) that acts as a main communication backbone to the front-end controllers;
- (3) equipment tier that consists of all front-end controllers (FEC) that provide a unified interface to the processing tier through OPC or Simatic S7 over TCP to communicate to the WinCC OA core system. Measurement from the FECs are published through MAPS (MedAustron publisher subscriber) that is a protocol based on National Instruments STM, Configuration data that may not be changed during operation is stored in the FECs from a web-server and can be downloaded through FTP during commissioning;
- (4) front-end tier with all front-end devices.

DATA ACQUISITION AND VISUALIZATION

Visualization and correlation of measurement data is a key requirement during accelerator hardware and beam commissioning. The near real-time visualization of measurements taken by the front end controllers is realized by the Qt based plot EWO (External Widget Object). This EWO can be placed in a WinCC OA panel and is configurable via WinCC OA scripts to subscribe to the required measurements.

REFERENCES


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From the “green-field” to start of commissioning in two years from 03/2011 to 03/2013.