ADAPTATION OF CERN POWER CONVERTER CONTROLS FOR INTEGRATION INTO OTHER LABORATORIES USING EPICS AND TANGO

S. Page, J. Afonso, C. Ghabrous Larrea, J. Herttuainen, Q. King, B. Todd
CERN, Geneva, Switzerland

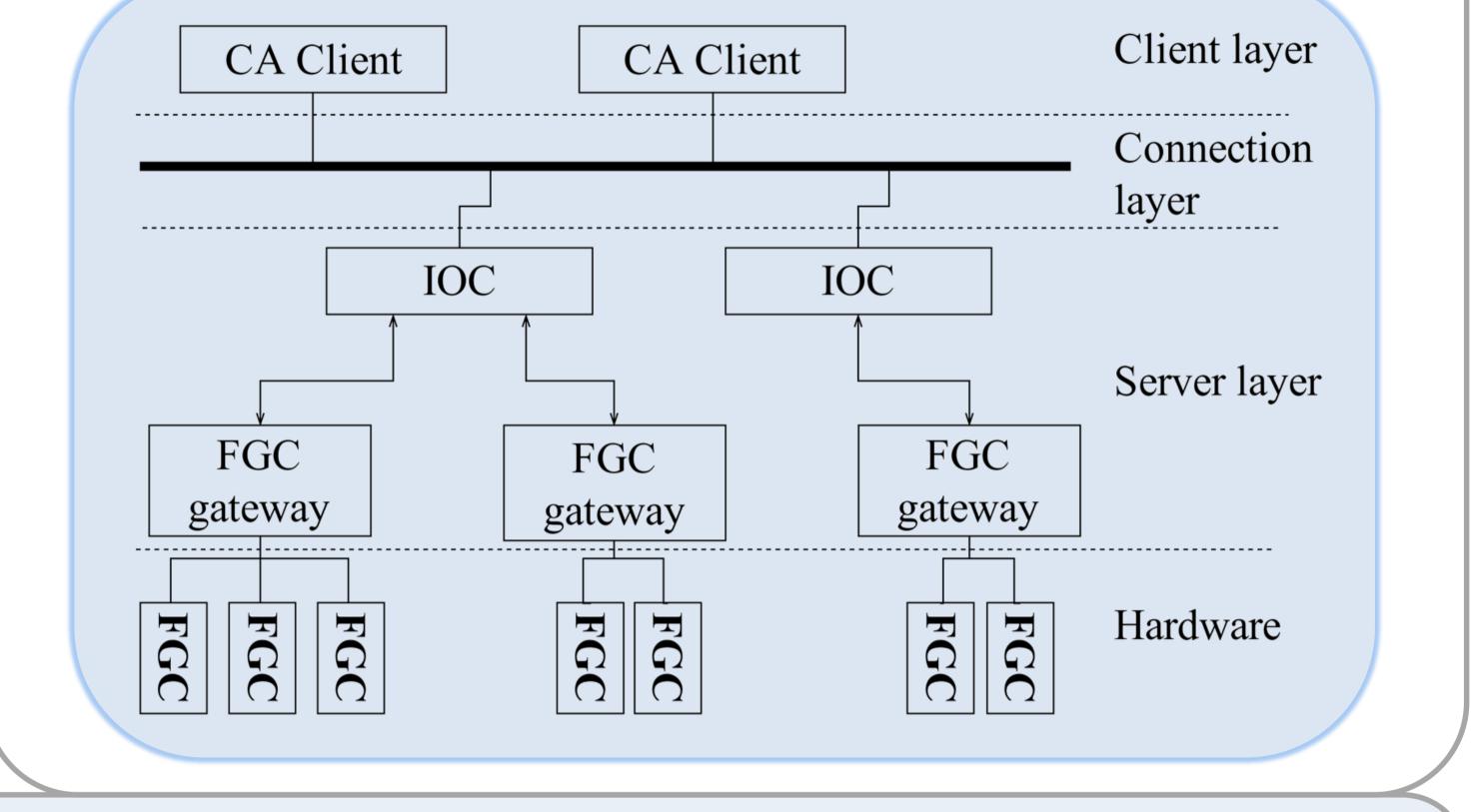ICALEPCS 2019
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Introduction

Modern power converters (power supplies) at CERN use proprietary controls hardware, which is integrated into the wider control system by software device servers developed specifically for the CERN environment, built using CERN libraries and communication protocols. There is a growing interest from other laboratories to make use of power converters that were originally developed for CERN and, consequently, a desire to allow for their efficient integration into control systems used at those laboratories, which are generally based upon the EPICS or TANGO frameworks.

The paper gives an overview of power converter equipment and software currently being provided to other laboratories through CERN's Knowledge and Technology Transfer programme and describes differences identified between CERN's control system model and that of EPICS.

EPICS on top of CERN Power Converter Controls

A reference EPICS IOC has been developed to ease the integration of CERN power converters and their controllers into other labs. It is offered as part of the FGC software package along with a suite of expert software applications.

Examples of CERN Power Converter Hardware Offered to Other Labs

FGC3
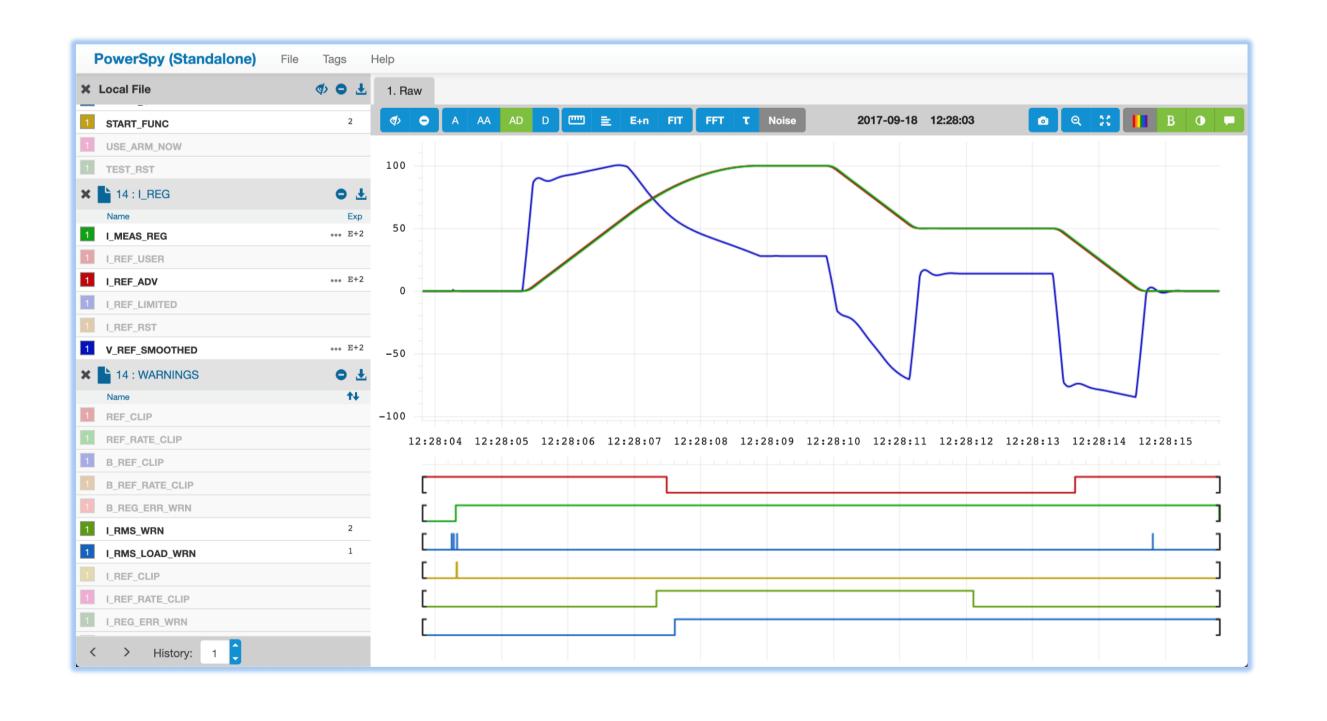
Embedded power converter function generator and controller

CUTE power converter

Switched-mode, ±12.5 A, ±15 V

MaxiDisCap power converter

Fast-pulsed, 320A, 900V, up to 10Hz

PowerSpy signal acquisition and analysis

Applications for Analysis and Diagnosis

In addition to power converters themselves and their controls hardware, a selection of supporting software and applications is supplied, including PowerSpy, an advanced web application developed at CERN. It allows power converter experts to acquire and analyse analogue and digital signals as well as tabular log data from FGCs and other sources. Common analysis features such as fast Fourier transforms and first-order time constant analysis are provided. A public standalone version of the application is available for testing online at https://cern.ch/service-powerspy

TANGO

The demand to use power converters originally developed for CERN at other labs is growing and so to support as broad a community as possible, a reference TANGO device server is currently in development at CERN and expected to be ready by the end of the year.

Future Prospects

CERN power converter controls are now in use at three other labs via knowledge transfer agreements. The EPICS reference implementation for FGCs and ongoing development of an equivalent for TANGO will ease their integration into control systems at a wider range of labs and several organisations have expressed interest. We look forward to establishing new collaborations and to further developing our offering to benefit a wider scientific community.