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Software architecture of FGC4, CERN's next-generation power converter control platform

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The Function Generator/Controller is CERN's flagship controls platform for electrical power converters. Despite a proven track record, the current generation (FGC3) begins to show its age through performance limitations and component obsolescence. The requirements for its successor are ambitious: 100 kHz regulation rate (a 10-fold increase); reuse of a CERN-developed hardware platform (Distributed IO Tier), improving synergy between CERN departments; and a software stack based on Linux with modern programming environments. The solution must fit CERN's accelerator control system, but also be fully usable at other institutions that use EPICS or TANGO through the Knowledge Transfer programme.

The paper discusses the software architecture, shaped by the need to separate real-time control processes from the Linux OS, which is achieved by dedicating separate CPU cores to each. Integration of CERN converter control libraries (CCLIBS) allows profiting from years of accumulated experience in the power converter domain. Results of performance characterization under different control scenarios are also presented, as well as lessons learned during integration in a test-bench environment.

Funding Agency

Footnotes

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Yes

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