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A IOC based on PXI and virtualization technology

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Summary

The Brazilian Synchrotron Light Laboratory (LNLS) has a 1.37 GeV machine open to scientific community since 1997. More recently, the control system of its beamlines, originally designed within a proprietary Delphi/Windows platform, is going through an upgrade to the open source EPICS/Linux platform used in many other synchrotrons. Within this upgrade strategy, the use of off-the-shelf hardware was also considered an alternative to the original in-house developed equipment, while keeping the EPICS/Linux compatibility. As a possible solution, a PXI chassis and its modules were made available to EPICS through the NI Real-Time Hypervisor virtualization system that allows running simultaneously EPICS/Linux and LabVIEW RT in the same PXI controller, sharing a common memory block for communication. A data exchange protocol was developed to implement motor, scaler and binary in/out EPICS records and channel access in the Linux layer, leaving the low-level hardware control to the LabView RT layer. The data exchange was done using optimized libraries of the virtualization system that allows a robust yet flexible operation of IOCs. This solution was tested to fully control an X-ray absorption spectroscopy beamline, showing a substantial reduction of counting deadtime, stability and software development time for integrating new hardware.

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