

A Status Update on Hyppie - a Hypervisorized PXI for Physics Instrumentation under EPICS

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EPICS and Hyppie as a distributed control system

Beamlines at LNLS are moving to the concept of distributed control under EPICS. This has been done by reusing available code from the community and/or by programming hardware access in LabVIEW integrated to EPICS through **Hyppie**. It is a system to make a bridge between EPICS records and corresponding devices in a PXI chassis. Both EPICS/Linux and LabVIEW Real-Time run simultaneously in the same PXI controller, in a virtualization system with a common memory block shared as their communication interface. A number of new devices were introduced in the Hyppie suite and LNLS beamlines are experiencing a smooth transition to the new concept.

One machine, two operational systems

Real-Time Hypervisor for Linux uses virtualization technology to run both Red Hat-based Linux and NI LabVIEW Real-Time in parallel on multicore PXI controllers. I/O devices, RAM and CPU cores are partitioned between both OS.

A standard EPICS distribution is installed in Linux and any hardware driver is written in LabVIEW.



Hyppie - more hardware gets available to EPICS, faster

Hyppie is a system created by LNLS and NI Brazil to make a bridge between EPICS records and corresponding devices in the PXI chassis. Shared memory provided by Hypervisor is allocated by **Hyppie** as a map to deal with each piece of hardware, through commands, parameters and readouts.

EPICS IOCs running in the Linux side refer to the shared memory instead of any direct I/O access.

Hyppie already supports EPICS binary in/out, analog in/out,

scaler and motor records and area detector. Furthermore, the EPICS installation can have IOCs to normally access other remote devices on the network.

Main benefits LNLS got from Hyppie

- ease of programming (LabVIEW)
- use of libraries provided by the hardware vendors
- a wide array of PXI instrumentation modules
- a standard common to a variety of manufacturers
- reduction in the acquisition dead-time
- open source

Hyppie Updates

Asyn Driver:

- Asyn serial RS 232 and RS 485 are now available in Hyppie
- Solution for IOCs running in Linux to access the PXI serial boards used by RT
- All serial devices that ran in an additional computer in the beamlines were transferred to the PXI, with smooth adaptation, due to Asyn driver efficient structure



Camera Support:

- support for the IEEE-1394 (firewire) and GigE Vision standards
- large number of functions in the corresponding LabVIEW image processing library is available in the real-time side
- Linux side performs the writing to a storage system
- calculation on the beam image performed at a high rate



Scaler Record:

- NI CompactRIO Support
- FPGA-Controlled Acquisition
- AD Sampling at 100 kS/s
- AD Conversion and TTL Counting in One PV
- Synchronization of Different Signal Types
- Preset Scaler Compatible



Future Perspectives

- Asyn Hyppie accessing TCP / IP and GPIB
- Parameterized 2D/3D scanning using Hyppie to send parameters to a Galil motor controller
- On-the-fly scans with results in a Waveform Record



For information: please look for **TUPPC036** in the "ICALEPCS 2013 Proceedings" or visit the website:

<http://lnls.cnpem.br/sol/hyppie>