EUROPEAN SPALLATION SOURCE

ESS ICS Presentation; focus on the FC and EMU

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https://www.europeanspallationsource.se
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The Integrated Control System (ICS)

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ICS Scope

- Conventional facilities control integration : power distribution, cooling water, etc
- The accelerator control system
- The Neutron target control system
- EPICS layer for the neutron instruments (in cooperation with the colleagues from science directorate)
- Global systems : control network and servers, timing and event systems, and protection & safety systems

Combination of

- On-site developments
- In-kind contributions (up to 50% of total value)

EPICS Environment

There is no generic EPICS environment, and each lab has its own environment historically. Historically, many labs use more than one EPICS release and drivers should be built for all EPICS releases in parallel

Loadable Driver Module (LDM) at PSI

- Build drivers for multiple releases of EPICS, and load drivers dynamically from startup script.
- is used to run PSI machine since 2005, which is the first presentation in the community.

ESS EPICS Environment

- has been evolved from LDM in cooperation with Dirk Zimoch at PSI.
- provides a collection of scripts to develop, build, and deploy an EPICS IOC.
- provides customized solutions to run different configurations at the same time and in the same machine, to test next releases of IOCs independently, and to switch the old and new versions of an IOC easily and quickly.

Hardware Strategy

Generic IOs

- Fast real-time processing, FPGAs (MTCA.4) : use when strong demands for real-time IO (high cost), FMC and RTM cards
- Real-time industrial-type I/O : EtherCAT on IOC (Low cost, distributed, moderate speed -e.g. up to 100 kSPS A/D conversion)
- Process I/O with no tight syncronzation requirements : Siemens PLCs (Safety)

Specific IOs

- Timing / Event System : Micro-Research Finland
- Motion Control : DeltaTau Geobrick and EtherCAT Open source SW Bus mater with Beckhoff HW
- Serial & Network-based devices : Ethernet or RS-242/485 serial ports

Digital Front-End Platform

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- MTCA.4 AMC with a FPGA, CPU and modular interfaces
- In-kind contribution from Switzerland; PSI and the company IOxOS SA
- Based on an existing architecture (IFC 1210)
  - FPGA and a CPU connected with PCI Express
  - FMC carrier (FMC: I/O card directly connected to a FPGA)
  - Deployed, base board for the SwissFEL @ PSI
  - Refresh components (newer models) and change form factor to MTCA.4

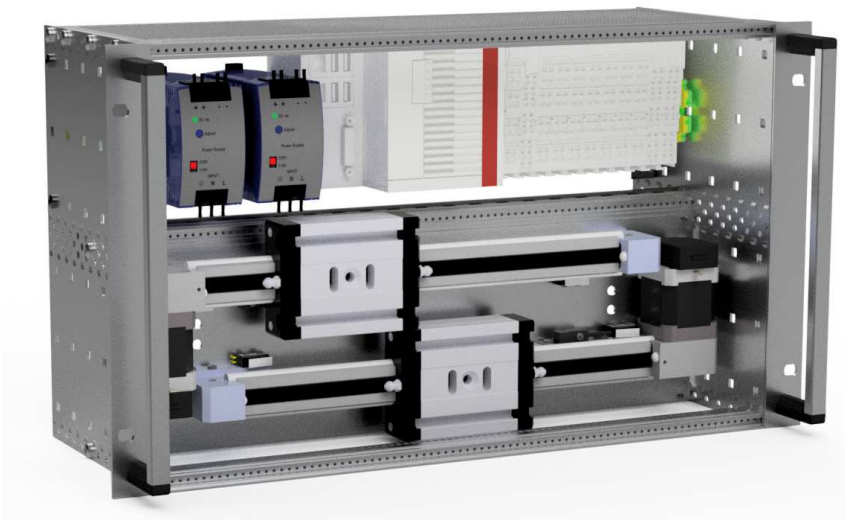
Starter Kit for Beam Diagnostics ?

- ELMA VME crate, Type 39 Horizontal, 4 U, 84 HP
- IOXOS IFC1210-A0
- MRF VME-EVG-230 / MRF VME-EVR-230RF
- D-tAcq ACQ420FMC-4-**2000**-16 / D-tAQ ACQ420 TERM01 board / D-tAcq BNC to PTB flying lead

Motion Control - MPS integation

MCU 1013 - Single Axis MPS version

- CPU, couplier, linear stage, INC encoder, redundant switches
- Motion control with an Open Source EtherCAT master, which is being developed by ICS and the motion group at ESS
- Based on the open source EtherCAT technology
- The Open Source EtherCAT master (www.etherlab.org) can run on Linux
- No software licences



Interface Description iff FW in FE, BE, or Both

Example : Status and Queues

A series of status and queues of the unit or any of its components shall be introduced in order to allow the operator to monitor and manipulate the various events. In addition, a series of generic status shall be defined. For example, the following information shall be defined:

- Model (and company) name
- HW Serial Number
- Operation Status
- Remote or Local Status
- Front Panel Lock
- Heartbeat
- Error Status
- Firmware Version
- Firmware Update date
- Communication related Settings

Questions

In mathematics the art of proposing a question must be held of higher value than solving it.

Georg Cantor

It is not enough for me to ask the question; I want to know how to answer the one question that seems to encompass everything I face: What am I here for?

Abraham Joshua-Heschel

Computers are useless. They can only give you answers.

Pablo Picasso

¡Gracias!

Tack!

감사합니다!

Thank you!

Dankeschön!

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