ESS Integrated Control System

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The Integrated Control System (ICS)

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)

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.

Generic IOs

▶ Fast real-time processing, FPGAs (MTCA.4) : use when strong demands for real-time IO (high cost)

▶ Real-time industrial-type I/O : EtherCAT Open Source SW Bus Master (Low cost, distributed, signals in the kHz range)

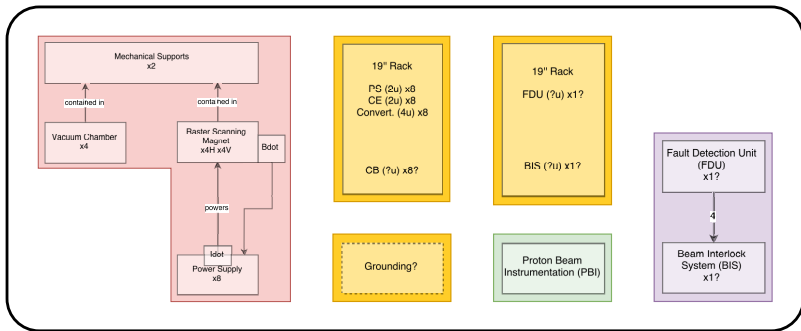▶ Process I/O with no tight syncronzation requirements : Siemens PLCs (Safety)

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
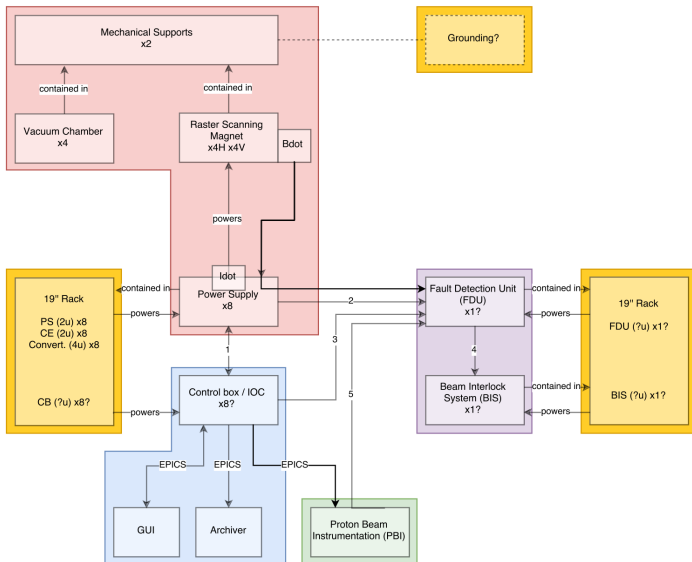
ESS EPICS Environment

IOC / User Interface / Archiver / Logbook / Channel Finder / Naming Service / Scripting Tools ....

Engineer / Operator / End Users

The Supplier shall provide the required interface to control the XXX remotely. The remote communication protocol shall be compliance with the ESS ICS Standard and the remote communication could be performed through Ethernet networks. The Ethernet interface provides the ability to use TCP socket connection and to fulfill the standard Ethernet attached devices requirements as follows:

- Ethernet-attached devices shall be compatible with a 1 Gb/s network
- Ethernet-attached devices shall operate at a minimum network speed of 100 Mb/s
- Ethernet-attached devices shall obtain their network address either through static address configuration or DHCP.
- Ethernet-attached devices shall include a Standard RJ-45 modular connector
- Cables should be wired by the Industry Standard Pin-out

Interface Description : e.g., 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

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

Tak!

Tack!

감사합니다!

Thank you!

Dankeschön!

¡Gracias!

☺