

STANDARDISATION OF THE PSI ACCELERATOR CONTROLSYSTEMS

D.Anicic, T.Korhonen, A.C.Mezger, D.Vermeulen

Paul Scherrer Institute, Villigen, Switzerland

Abstract

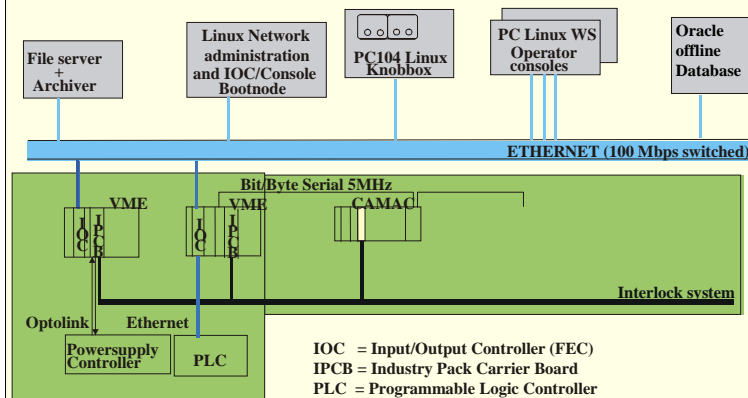
At the Paul Scherrer Institute several accelerator facilities are run from the central control room. Two control systems are used for the machine operations: the SLS (Swiss Light Source) based on EPICS and the high intensity proton accelerators facility based on ACS, an in house developed Accelerator Control System. PROSCAN, the biomedical proton facility uses the latter system (ACS), too. The decision to standardize the hardware equipment as much as possible has already been taken a few years ago and is widely taking place. However the effort to maintain and continuously develop two control systems is unnecessarily consuming precious human resources. Therefore the proposal has been made to implement EPICS at the proton facilities besides ACS. The two systems will run concurrently until hardware transition towards VME has been completed, building this way a migration path towards EPICS, enhanced with many ACS features. Here we present the steps that we will have to undertake and the difficulties we will have to overcome to successfully migrate the control systems towards a common standardized system.

ACS features

ACS is a control system with a similar basic architecture as EPICS and was developed over more than 15 years with 4-5 people following the technical trends:

- PowerPC's in VME with many VME modules and a CAMAC Highway.
- Message based UDP communication from high level application to IOC (hardware data is considered as a real-time database).
- IOC data as well as Backend data generated from Oracle Database.
- Naming Convention with Device, Attribute, Conversion device: QXA1 attribute: SOL, IST, STA, LL, HL conversion: 1 for DAC values, 2 for engineering units, 3 for physical units
- Name discovery by Applications: Application can request device names, attributes with wild cards.
- Data increment function implemented at IOC level.
- Gateways based on RPC for logging retrieval and device IO for LABVIEW and for VB Applications on MS-Windows.
- PLC connectivity.
- High level status bit interpretation
 Example : QXA1.STA on PSAF05
 = " f101'x Bitfeld 0000000000000001111000100000001 Level : 1
 Bit : 0 Strom Ein Soll SONS JA
 Bit : 1 Strom Aus Soll SOFS NEIN
 Bit : 8 Strom Ein Ist SONI JA
 Bit : 9 Strom Aus Ist SOFI NEIN
 Bit : 10 Kombi Lokal Ist LOKI NEIN
 Bit : 11 limite(n) LIM NOK
 Bit : 12 Vergleich SOLA/IST COMP OK
 Bit : 13 SG Status INT OK
 Bit : 14 Device Status EXT OK
 Bit : 15 Vergleich SOL/SOLA COMS OK
 ==>getDigLv12 : eingeschaltet
 ==>getDigLv12 : IST ausser Limit
- Implementation of latest MEDM with bit interpretation as text and as animated gifs (Vacuum, ...). The connectivity offered in the file medmCdev.c is used for this.

Layout of the Conctrlsystem for the Cyclotrons



IOC = Input/Output Controller (FEC)
 IPCB = Industry Pack Carrier Board
 PLC = Programmable Logic Controller

EPICS@SLS shortcomings

EPICS is a widely used control system, however to be integrated at the cyclotrons some things have to be done:

- CAMAC (CERN) highway driver and CAMAC homemade modules not implemented. Replacement by VME is necessary for the standardization at PSI.
- Buffered IO, but with the possibility of the PROC attribute for immediate record execution.
- Channel Access records, not generated through database. This will be done starting from the existing Oracle data.
- Channel Access naming convention adapted to the previous existing names: QXA1:SOL:1, QXA1:SOL:2, QXA3:SOL:3
- Device incrementing will be defined through EPICS records.
- Name discovery by Applications: Application can request device names, attributes with wild cards. This will have to be added.
- Status bit interpretation: at this point not yet known how to integrate this.
- Existing RPC-Gateways will be adapted for compatibility reasons.

requirements

add-ons

EPICS Integration path

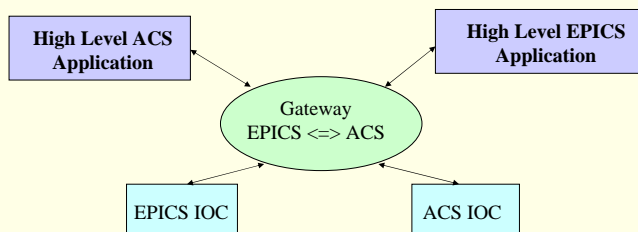
Phase 1:

Hardware:

- Smooth replacement of CAMAC by VME (probably 5 years program).

Software

- Mixed Control system with ACS IOC's and EPICS IOC's (different crates)
- High level Applications using a gateway for accessing ACS and EPICS devices.



- Enhance EPICS with the mentioned ACS features required by the applications.
- Generate CA Records from the ORACLE Database

Phase 2:

- Modify Applications to use EPICS with the necessary features.
- Gateway will phase out when hardware is replaced and applications modified.
- The add-ons will be part of the PSI EPICS standard.