

Motion control status in ALBA

Exchange on Motion Control in Synchrotron Radiation Facilities May, 11th-12th 2011 - Soleil

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Outline

- Hardware numbers
- Alba approach
- Motor controller configuration management system
- Integration in the Sardana control system
- Conclusions



Motion numbers at ALBA

The main actuator at ALBA is the 2 phase stepper:

- ~500 axis distributed in 7 beamlines
- ~50 axis in 8 front ends
- ~50 axis in the accelerators

Around 50% of them have an associated encoder (incremental or ssi) and work in position closed loop

All driven with IcePAP controller

Apart from steppers, a handful of brushless DC motors driven with PMAC or ETEL controllers in specific equipment and few piezo actuators (Jena or PI controllers)



Approach

Single controller solution. IcePAP

Simplifies:

- Software interface
- Axis configuration and operation
- Hardware axis synchronization
- Hardware maintenance and spare management
- Cabling

Equipment manufacturers are provided with guidelines during design stages

We haven't found problems with equipment manufacturers failing to supply compatible hardware



Integration in complex setups

Apart from all the features mentioned in the previous presentation and standard in most controllers, these other features were very practical when integrating the motor controller in different setups:

- Easy forward of position information by means of encoder-like signals:
- To counter or other acquisition cards for continuous scans
- To external amplifiers (for non-standard motors)
- Easy interaction with PSS or other safety systems with "per axis" or "per rack" input disable signals
- Accepts external encoder-like signals as position source (slave mode): external boards can generate trajectories if the application demands it (RF cavities plungers)
- Immediate control of brakes and other subsystems through front panel available digital outputs that can be assigned to internal states (moving, stopped, acceleration, constant speed,...)

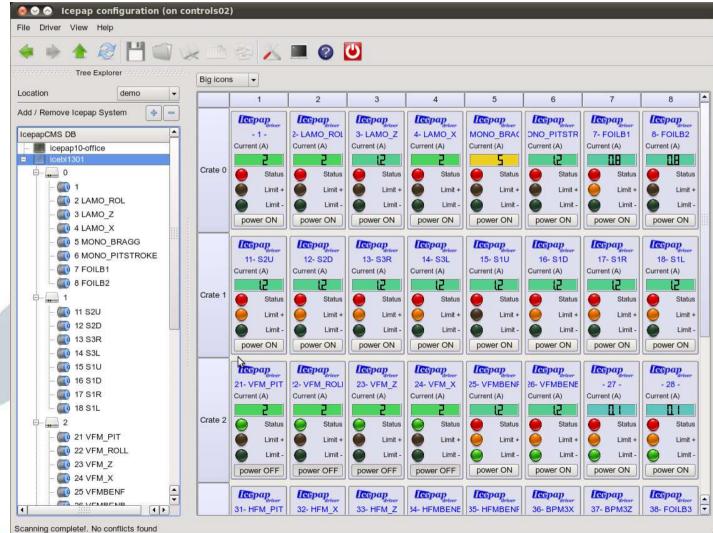


System configuration: IcepapCMS

A tool for managing axis configurations

Configurations stored in a DB Whole system view Browse by name Current / Power

/ Limits at a glance





IcepapCMS (ii) - preferences

DB Storage and user folders preferences

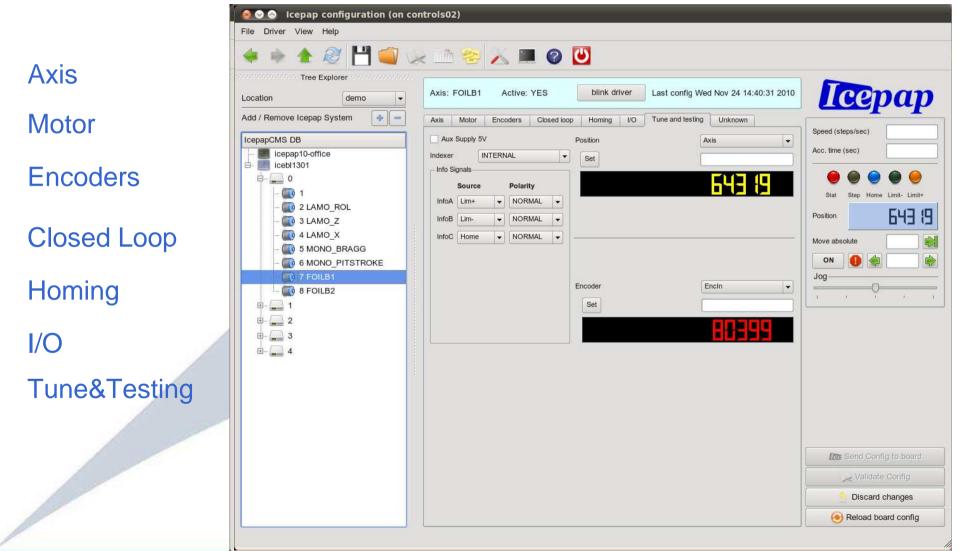
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-) Sqlite
-) MySql
-) Postgres
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-) Firmware folde
-) Configs folder
-) Templates
folder

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Firmware folder	/home/gcuni/.icepapcms/firmware	
Configs folder	/home/gcuni/.icepapcms/configs	
Templates folder	/home/gcuni/.icepapcms/templates	
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IcepapCMS (iii) - config

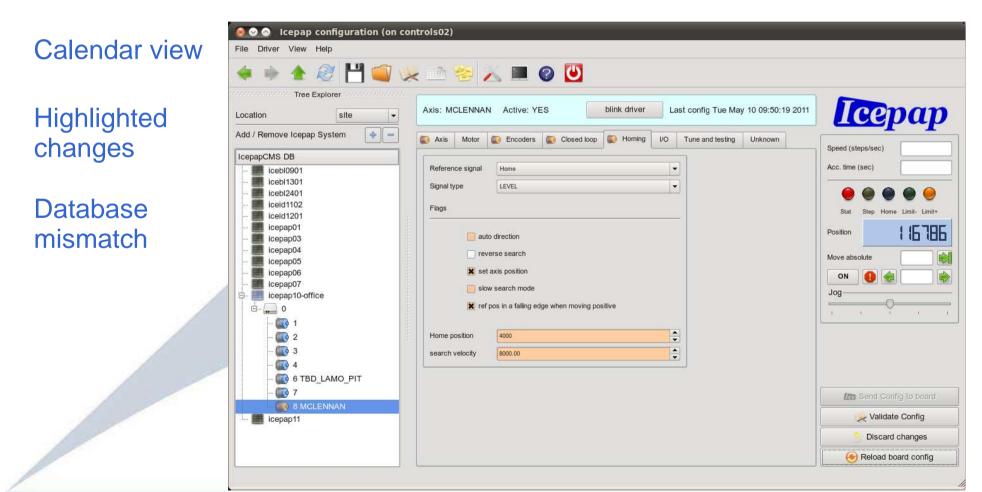
IcepapCMS configuration tabs





IcepapCMS (iv) - history

Retrieve historical values





IcepapCMS (v) - templates

Template management (first draft)

IcepaCMS Templates Catalog (on controls02) Filter column: Description -X Auto close Select Template Description 200steps x10 gear, 0.18stepandle B stands for double shaft. No info for E. SG stands for geared stage and affects ANSTEPs ALBA DI FSH, ALBA DI SCRH, ALBA DI SCRV Oriental Motors PK267JA Oriental Motors PK267JA Bipolar series 6 leads 1.4A, 6.7V, 4.8Ohm, 14.2mH, 200steps ALBA FE XBPM, ALBA FE FLUORESCENCE SCREEN Oriental Motors PK268M-E2.0B Bipolar series 8 leads 1.4A, 6.3V, 4.5Ohm, 19.2mH, 400steps M stands for extended resolution XAS D. Phytron VSS 25:200.1.2 Phytron VSS 25.200.1.2 1.2A/ph 0.95Ohm/ph 0.4mH/ph 200steps HT: 12 mNm, Rotor Inertia: 0.002 kg/cm2 XAS E, F, G. Phytron VSS 32.200.1.2 HT: 45 mNm, Rotor Inertia: 0.01 kg/cm2 ALBA ID MPW80 TAPER Phytron ZSH 87/2.200.6.5-12-H500 Bipolar parallel 4 leads. H500 encoder 500 lines Phytron ZSH 87/2.200.6.5-12-H500 6.5A, 0.5Ohm/win(0.25Ohm), 1.5mH/win (1.5mH), 200 steps The 12 seems to be the shaft diameter ALBA ID MPW80 GAP Phytron ZSH 87/2.200.6.5-12-H500-KEB Phytron ZSH 87/2.200.6.5-12-H50... Bipolar parallel 4 leads, H550 encoder 500 lines, KEB brake. 6.5A, 0.5Ohm/whin (0.25Ohm), 1.5mH/win (1.5mH) 200 steps ALBA ID IVU21 Phytron ZSH 88/2.200.8 Phytron ZSH 88/2.200.8 Bipolar parallel 4 leads 8A, 0.20hm/win (0.10hm), 1.15mH/win (1.15mH), 200steps Phytron ZSH 88/3.200.8 Bipolar parallel 4 leads 8A, 0.29Ohm/win (0.14Ohm) Kaliber SCRH SLO-SYN KML061-F02 SLO-SYN KML061F02 Bipolar 4 leads 1.05A, 5.19V, 4.94Ohms 30.1mH, 200steps UNKNOWN 1.2A

Browse template

Filter by motor name or description

Apply all config values

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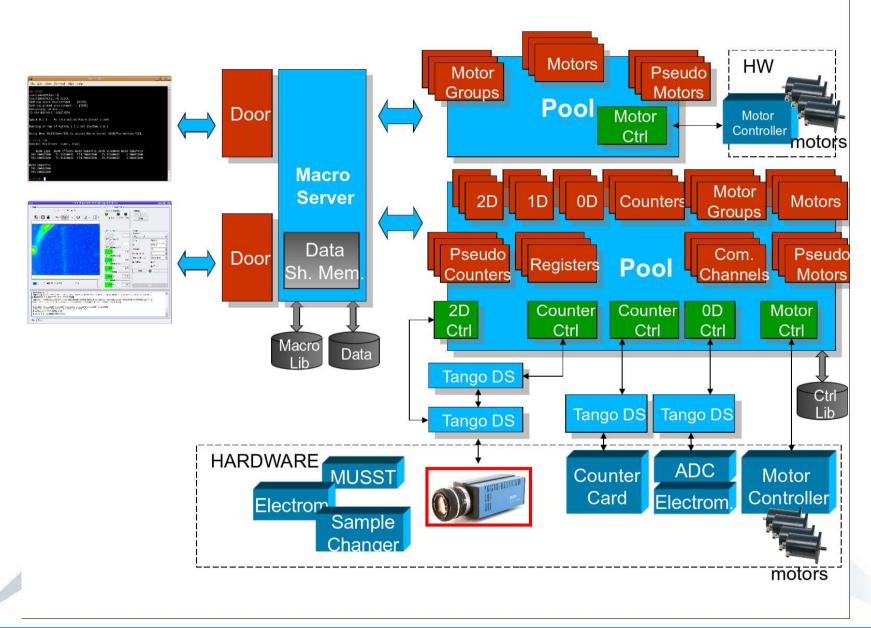
IcepapCMS (vi) - interaction

Console within IcepapCMS

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Sardana (i) - architecture



LBA



Sardana (ii) - tools

Using a common tango interface, we can provide standard tools to operate any kind of motor. QtWidgets Standard scans **Equipment-specific** macros like homing

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Sardana (iii) - controllers

Specific motor controllers (software)

- Icepap (eth)
- Pmac (eth)
- PI-E516 piezo (serial/gpib)
- Tango Attribute with threshold (e.g. DAC)

They provide same Tango interface: Position, Limit_switches, Abort()...
Plus any particular dynamic attribute: Icepap: StopCode, EncoderPosition...
Pmac: PhasingSearchError, IntegrationMode...



Conclusions

- Though it might look restrictive, a single controller approach simplifies our daily logistics and operation
- Firmware modification to add extra features possibility is a plus
- A single hardware access point to all the axis simplifies the task of higher software layers
- Centralized configuration management helped us a lot during the installation phase



Thank you for your attention.

Questions?