Slow Controls Planning

DAQ meeting in LHC-B week

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Outline

- Why am I talking about Controls now?
- Requirements for the LHC-B Control System
- Some words about EPICS
- Our Plans

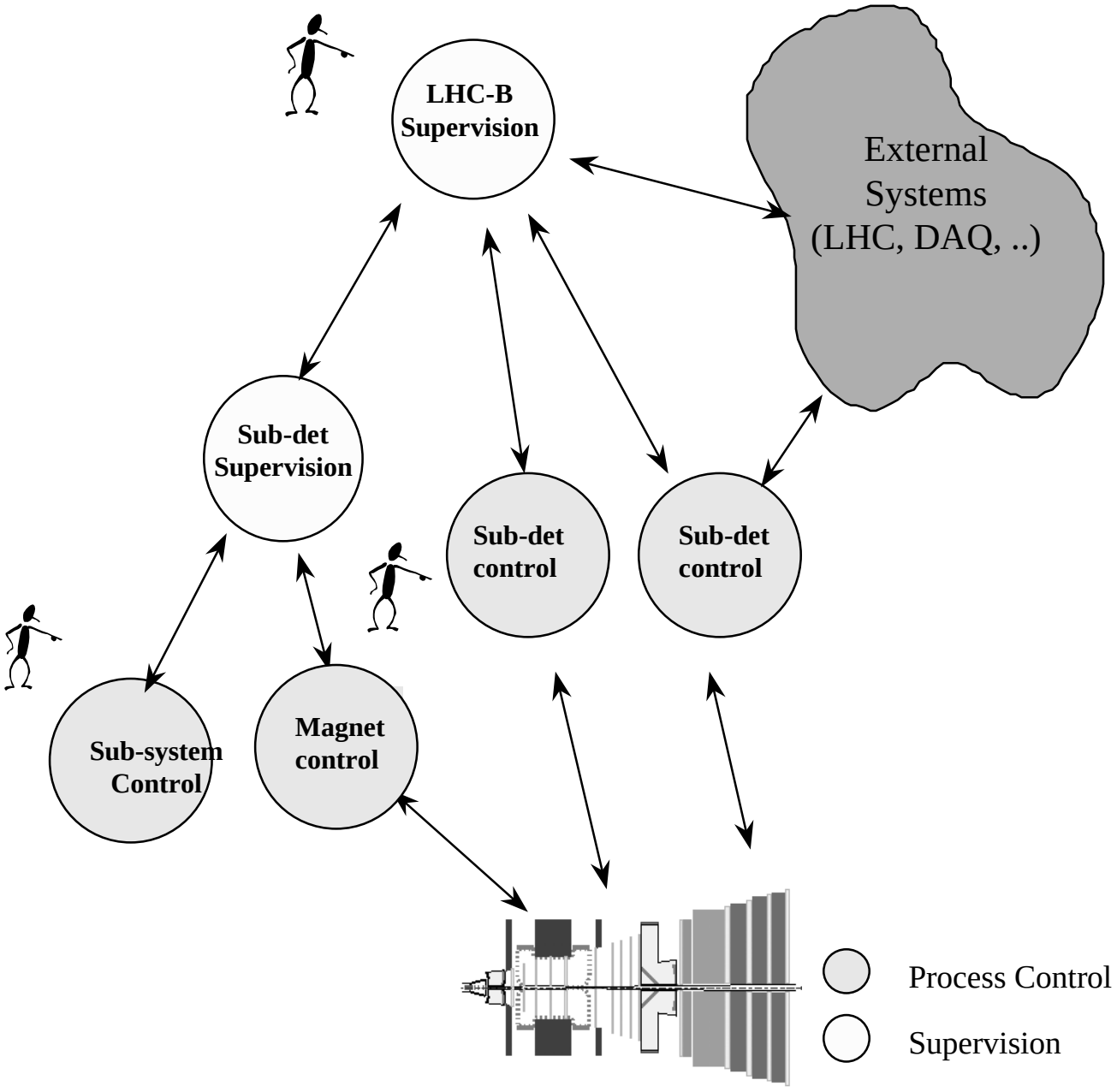
Why am I talking about Controls now?

- Common project for all LHC experiments
  - Support from the ECP/CO group.
  - It seems reasonable to start collaborating from now.
- Other LHC collaborations are **taking decisions** now:
  - They want to equip test beams with the *"definite"* system.
  - They are in favour of EPICS.
  - They are requesting a long term commitment from ECP/CO.

Current ideas about the Control System

- **Function:** Control, monitor and supervise all the detector components and the infrastructure of the experiment.
  Does not include the physics data acquisition.
- Scope of the system
  - Wider than the traditional *Slow Control* (including *Run Control?*)
  - All levels: from the hardware to the interaction with the operator
- A supervisory hierarchy of loosely coupled sub-systems
- Natural integration with other systems (Safety, DAQ, Data monitoring, etc..)

Control hierarchy



Some General Requirements

- The control system should integrate smoothly with other systems at the experiment. Examples:
  - Sharing the network & computing infrastructure with DAQ
  - Same user interface (GUI, status display, etc..)
  - Interconnected configuration databases.
- Well defined and flexible architecture is needed.
  - Built out of well defined functional components (building blocks).
  - Sharing building blocks ==> helps integration.
  - Technology evolution is done by changing components.

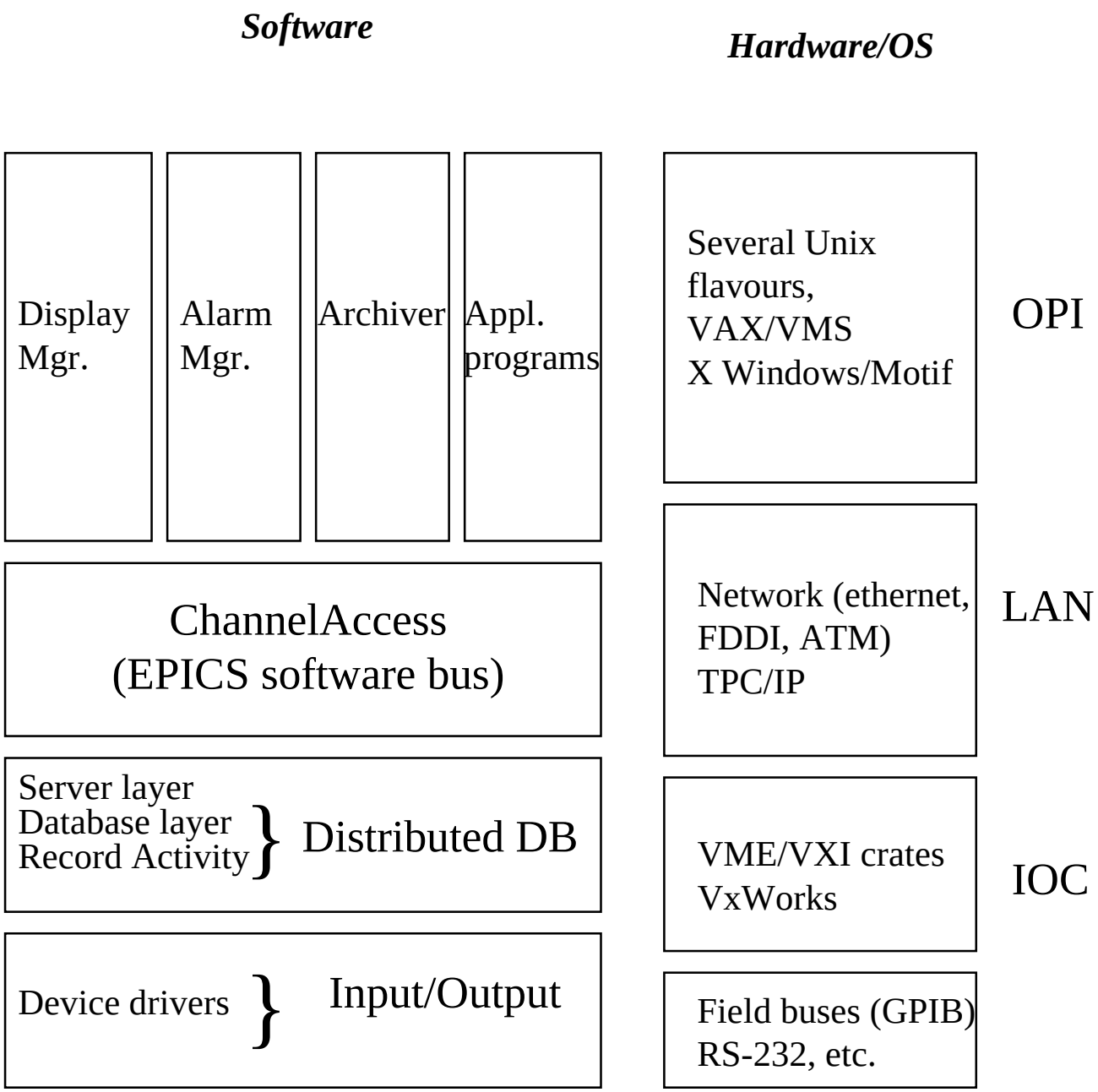
What’s EPICS

- An architecture for building scaleable control systems.
- Collection of code and documentation (software toolkit)
- Collaboration

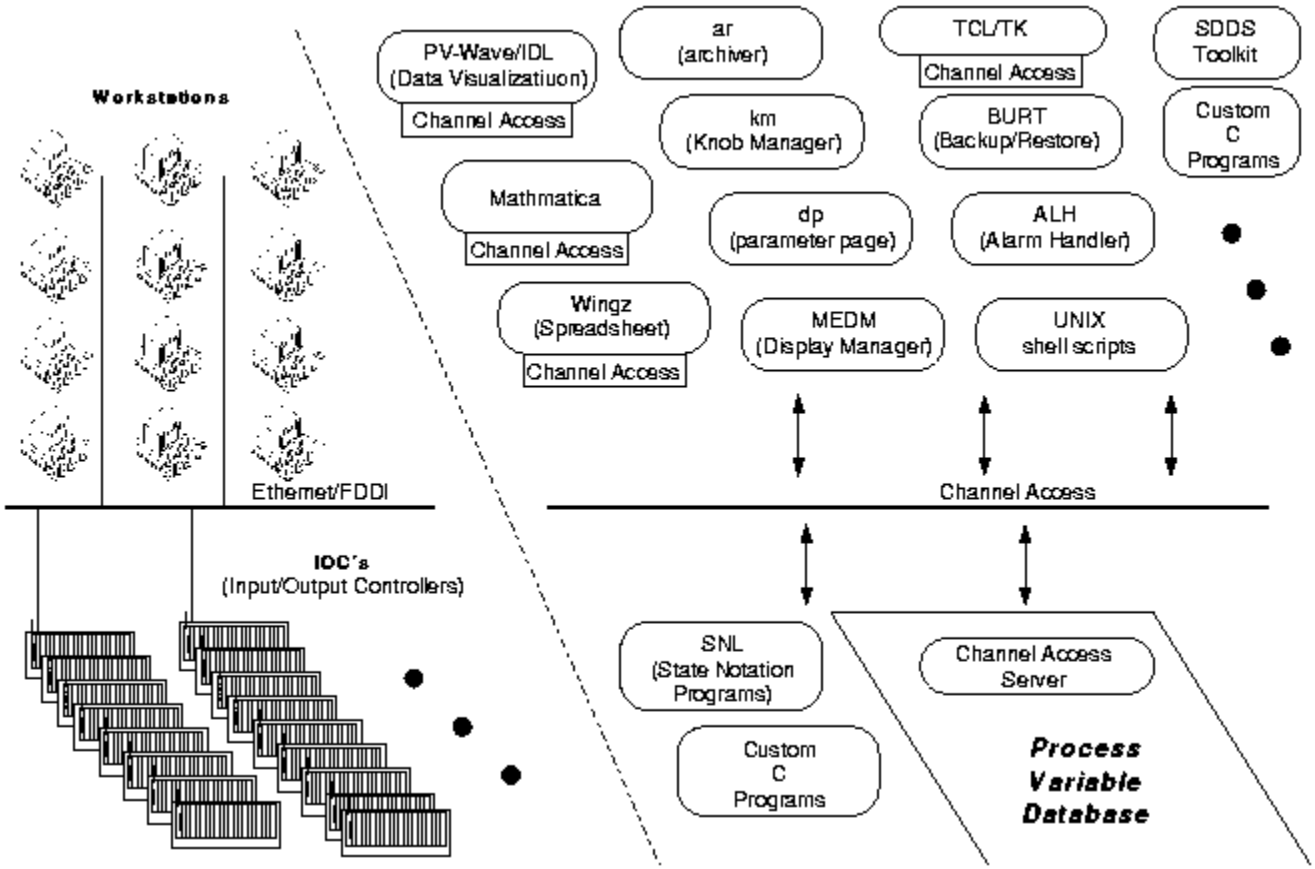
EPICS Collaboration

- Primarily the work at Los Alamos & Argonne.
- Groups at CEBAF, LBL and DESY have joined.
- There are 44 EPICS sites in total:
  - Accelerators
  - Detectors
  - Telescopes
  - Commercial

EPICS Architecture



EPICS Architecture (2)



EPICS Architecture (3)

- The kernel of the Architecture is the *Channel Access* (EPICS software Bus).
- The fundamental entity is a record in the distributed database. It has a name, value, other attributes, etc.
  - 25 different record types (Input, Output, Algorithms)
  - The user can link several records to create complex control functions. (Programming)
- The IOC (VME processor) initializes with a local configuration text file.
- The Channel Access is asynchronous.
- A change in a value of a record may trigger an event to be send to the client application.

EPICS Software toolkit

- Tools for configuration and edition. Utility tools.
  - Alarmer, Archiver, ...
- EPICS is free of charge
  (Other tools in kit are not always free)
- Distribution via source code.
  - Guaranteed flexibility.
  - Bugs can be fix quickly.
  - **Expertise in-house needed**.
  - Many flavours...
- Some documentation and training exists. It lacks consistency.

Some issues about the suitability of EPICS for LHC-B

- With the existing EPICS products we could build the system we need. If there is reasonable support from CERN.
- Is the **architecture** right?
  - Record (channel) as basic entity.
  - Supervisory hierarchy.
  - Central configuration database.
- Is the **technology** right?
  - Will it be available in 2005?
  - What about C++? Corba? Object databases?
  - Web interface?

Some issues about the suitability of EPICS (2)

- How integrates with the other systems?
  - Safety system
  - Data acquisition system
  - Data quality/monitoring system
- Is EPICS a turn-key system? If not: How much manpower is needed?
- Can we decide TODAY what should be the LHC-B control system in 2005?

Plans

- EPICS should be evaluated.
  - ECP/CO has already started an evaluation.
  - ATLAS & CMS plans to use it in test beam.
  - An EPICS course was organized (LHC-B was represented).
  - **We should follow closely this activity**.
- ECP/CO should soon nominate a “link-man” for LHC-B.
- We have started to put together our User Requirements.
  - ATLAS & CMS have produced URD drafts.
  - After the evaluation is done we should confront our Requirements with EPICS.

Plans (2)

- Field-buses and hardware interface standards
  - We should understand them.
  - Better if we use CERN wide standards.
  - Guidelines should be provided to sub-detector groups.
- We do not plan to use EPICS neither the “final” Control System for our test beam activities.