L1Calo Software Status

Murrough Landon – 6 June 2001

`http://www.hep.ph.qmw.ac.uk/~landon/talks`

Overview

- Hardware Platforms
- Software Status and Plans
- Packages and Tools
- Documentation and QA

Hardware Platforms

Previous Strategy

- LynxOS on 68K based single board computers

Future Strategy

- Long term: in ATLAS, use whatever is the ATLAS standard
- Short-Medium term: Linux on Intel PC platforms:
- VME access via single board computers in the VME crate (decided against Bit3 type interfaces)
- ROS, monitoring etc on desktop Linux PCs
- Old SBCs may still be used as “bus servers”

Old Kit – in 6 Institutes

- 5 MVME167 boards
- 2 CES RIO2s
- 1 Eltec VME PC

New Kit

- 2 existing Concurrent VME PCs (VP PSE/Pxx)
- 3 more Concurrent boards on order (VP CP1/Pxx?)
- “home brew” 9U CPU being built by Heidelberg

System Architecture

Crates

- Calo trigger entirely based in USA15 (FE electronics is calorimeter responsibility)
- Several different types of (mostly) 9U crates: PreProcessor, Cluster Processor, Jet/Energy Processor, RODs, TTC crate. Plus calorimeter Receiver crates.
- Some contain only RODs, some only trigger modules, some (PPr) a mixture.
- Each crate will have a local CPU.
- Expect that **each** crate will have its own run controller.

Slice Test Setup

- About six 9U and 6U crates in total
- Controlled by Online software
- (Hopefully) PC based ROS with many Slinks

Run Control

- Proposed run control hierarchy to handle all identified synchronisation issues
- Final ATLAS hierarchy similar, but with more crates
- Provisional set of actions for each type of module for each state transition.

L1 Calo Trigger: Slice Test DAQ Setup

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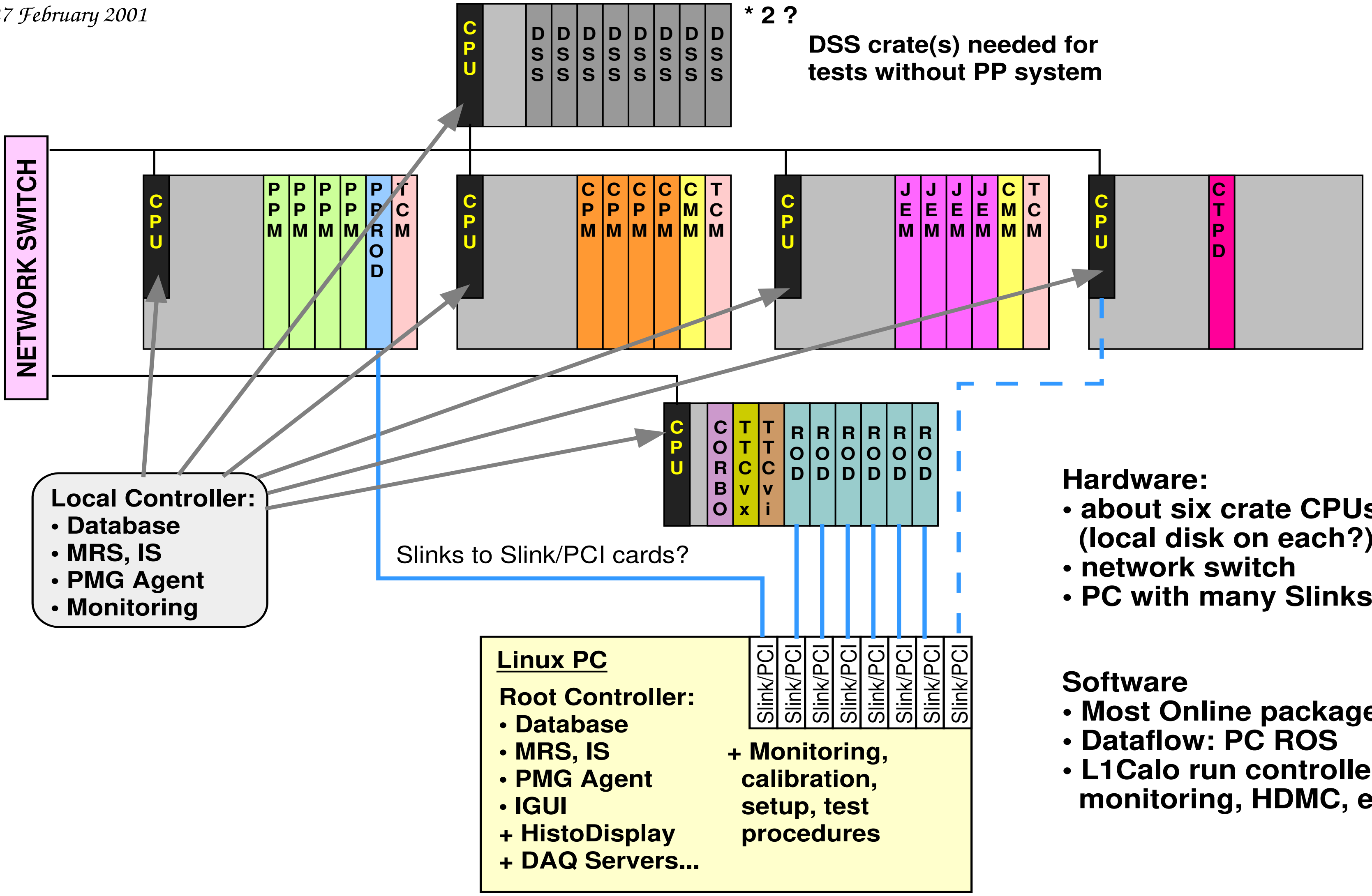
27 February 2001



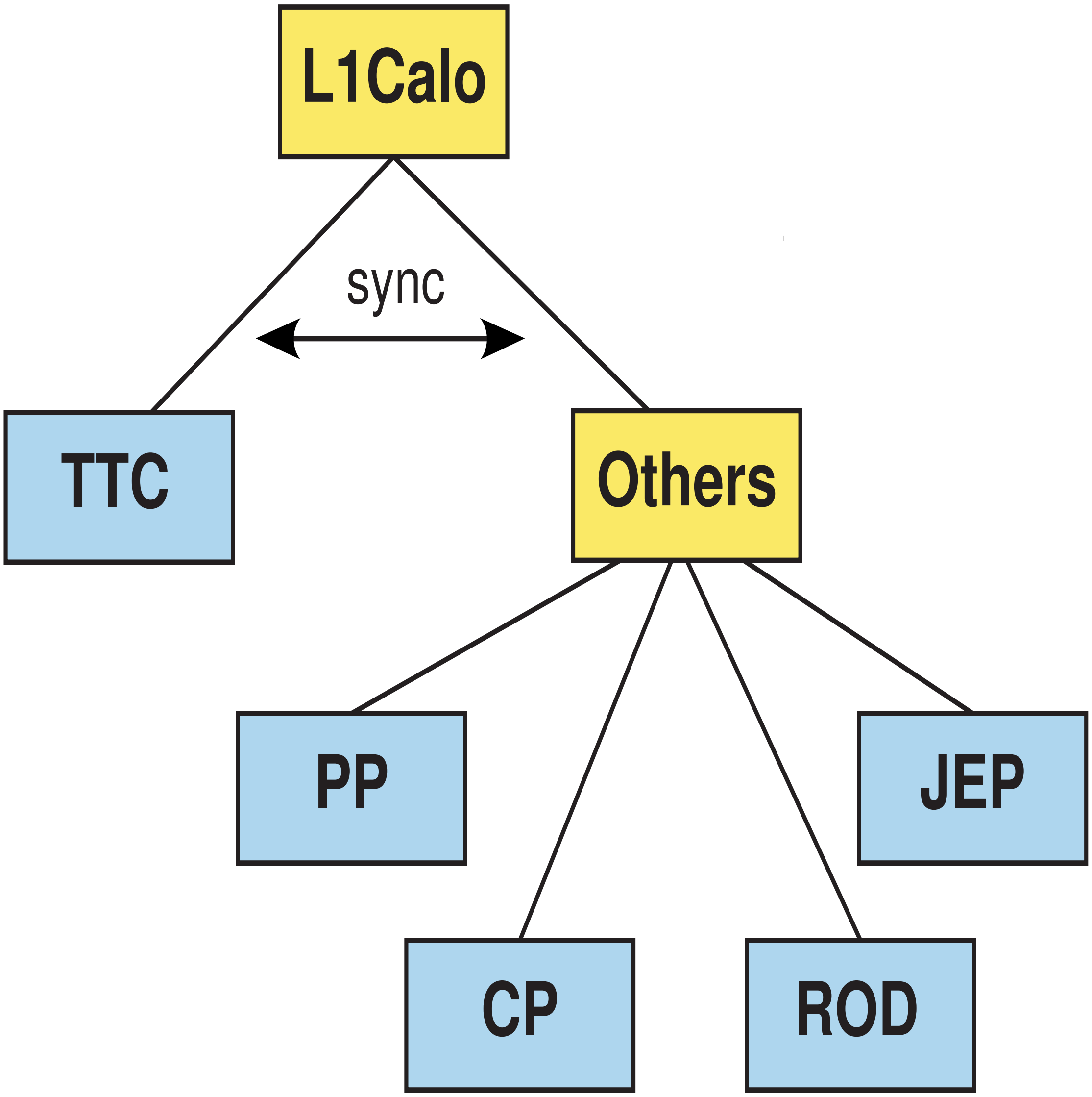
Hardware:

- about six crate CPUs (local disk on each?)
- network switch
- PC with many Slinks

Software

- Most Online packages
- Dataflow: PC ROS
- L1Calo run controllers, monitoring, HDMC, etc

Run Controller Hierarchy for L1Calo Slice Tests



Final system probably similar, but with more than one instance of PP, CP, JEP and ROD crates

Software Summary

Prehistory

- Demonstrator programme used a C based DAQ system created from various CERN and OPAL components.
- It also used a C++ and Tcl/Tk based suite of diagnostic software.

Recent Strategy

- New diagnostic package, HDMC, was developed by Heidelberg to overcome some deficiencies of the old package. HDMC is all C++, using Qt as the graphics toolkit.
- Aim has been to build new DAQ related software using ATLAS DAQ group packages, ie Backend/Online and Dataflow.

Recent Reality

- Uncertainties over the direction of “ROD crate DAQ” have delayed related aspects of our work.
- Changes in scope and timescales of new prototype (slice test) hardware has meant continual revisions of what we think we can do in time.
- More effort has gone into software/system aspects of hardware design than into software itself.
- Even with regular meetings, with roughly one person working on software per institute, effective communication continues to be a challenge.
- There has been some waste of time and effort...

Existing Software (1)

HDMC Status

- is a flexible tool for hardware diagnostics
- detailed graphics interface based on Qt
- uses/maintains private configuration databases
- paradigm for describing modules, their registers and memories and their VME access in a Part hierarchy
- provides IO, histogramming, etc for simple DAQ
- fairly easy to add new Parts
- simple scripting and link to standard script languages

HDMC Plans

- Further developments required if components of HDMC to be used as a hardware access layer in run control and DAQ code
- Integration with Online Configuration database?

Existing Software (2)

Distributed Histogramming

- Need for this identified a long time ago
- ROOT based package from CDF adapted for our use
- But there may now be an offering from the HLT/DAQ group?

Test Software

- Various test packages, eg for ROD and DSS tests

Miscellaneous

- Ports of some parts of our old DAQ software were made to Linux for possible use pending ROD crate DAQ or PC ROS solutions becoming available.

Software under Development (1)

General Aims

- Provide software to operate the slice tests!
- This should not only test the prototype hardware but itself be a prototype of the final software.

Run Control

- Started framework for run controllers for the various different crates in the slice test
- Aim to design it with the final system in mind
- Draft document discussing it exists, but not in any formal QA format

Database

- Software to test initial ideas on DAQ configuration database schema and data access libraries.
- NB coordination across level 1 is required for the trigger menu.

Software under Development (2)

Simulation/Testing

- Framework for organising testing and simulation of modules and larger components of the system under development.

Readout

- HDMC extensions to provide facilities for home grown or parts of a future ROD crate DAQ have been developed
- Integration/overlap with run control needs further thought.

Offline Simulation

- Work has started on L1Calo trigger simulation in ATHENA.
- Should aim for reuse of some of this software if possible.

Software not under Development!

Calibration

- Some thought but no work on calibration software.
- More discussion required with calorimeter groups.

Monitoring

- On the agenda, but again little done so far?

DCS

- Some work at the device/CAN level. Nothing at SCADA level.

Experience of Packages and Tools

Online Software

- Various versions tried and copious feedback given
- Tests made of all core packages and some others
- Serious use started of database tools and run control system
- General impression is very positive

ROS and ROD crate DAQ

- Would like to have had experience of this...
- ...one or two small packages were released privately

CASE Tools

- Some use made of Together: bit slow and flaky
- Code development: individual use of KDevelop, Code-Crusader. May try commercial CodeWarrior for Linux?

Documentation and QA

Software website

- L1Calo Software website recently revamped
  `http://www.hep.ph.qmw.ac.uk/l1calo/sweb`
- Kept in CVS to allow easier updates by widely scattered software developers (but none so far!)
- Software coordination across level 1 will require good web links

Draft Documents

- Several draft documents now exist on various aspects of L1Calo slice test related software development
  `www.hep.ph.qmw.ac.uk/l1calo/sweb/documents/doclist.html`
- Use EDMS for finished work, but still useful to have a private repository of draft or less formal notes?

Quality Assurance

- We have not got into this properly yet...
- ...I think we would have benefitted if we had
- But difficult to generate enthusiasm for it