Software Overview

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

Contents

- Introduction
- Software Context Diagram
- Software Packages
- Summary of Recent Work
- Status and Plans
- Tasks and Timescales

Introduction (1)

Revisiting our requirements

- Step back and re-examine our software project
- Partly prompted by recent LVL1 software video meeting
- and increasing moves to more formal software process across TDAQ

History

- We started to write a Requirements Document about two years ago
- It was never completed – pressure to do something else soon
- We have not really looked at it again since
- Over the last two years our timescales and ambitions and view of the system have changed considerably
- A lot of recent software thought and work has been done semi-independently but we now need to integrate it all

Introduction (2)

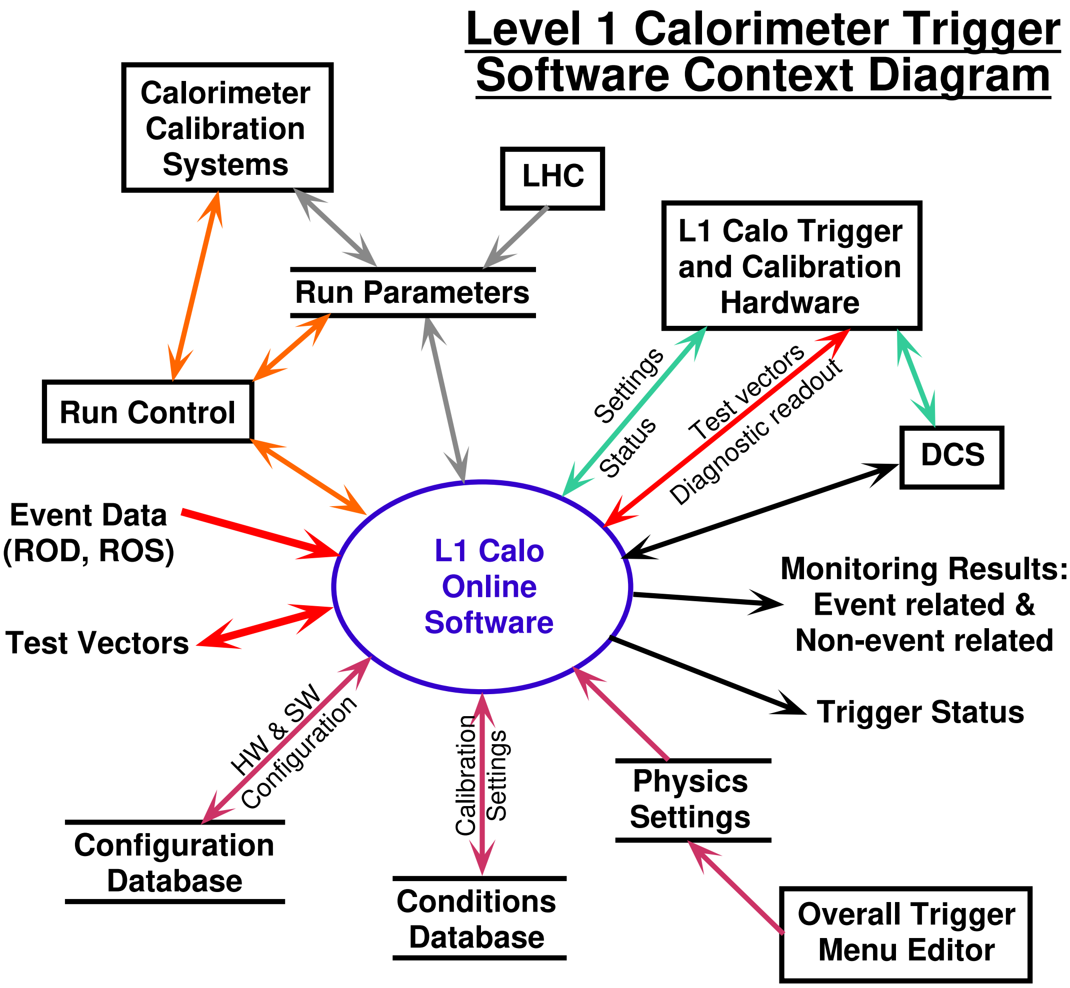
Recent UK Activity

- Some brainstorming sessions
- Produced a draft "Software Context Diagram" (for further discussion)
- Discussed a more formal division into software packages and their interdependencies – but without yet reaching a concensus
- Our discussions have been very useful in highlighting areas we still need to agree on

Intentions

- Discuss further and agree on a common view
- Check: are we still forgetting something?
- Update or rewrite the requirements document (requirements mapping roughly to Use Cases)
- Conduct a review of the requirements and software organisation

Software Context Diagram



Software Themes

L1Calo Online Software includes:

- Histogram collection and presentation, archive and reference
- Event collection (recording possible, but not planned)
- Event analysis
- Calculate and display status information
- Collection, monitoring, presentation and archiving of non-event information; periodic checking of hardware settings
- Calibration: derive settings, archive, retrieve, examine trends, set initial values
  - Internal
  - Calorimeters and LHC
- Generate test vectors
- Inject, readout, verify test vectors (Q: is this offered as a service, eg to LVL2, CTP)
- HDMC-style interactive module test
- Trigger menu processing [editing menu, generating files]
- Edit and display trigger hardware and software configuration
- Load and verify all hardware settings
- Edit and display run control parameters
- Process run control commands

Software Non-Themes

L1Calo Online Software excludes:

- Offline trigger simulation and reconstruction
- LVL1-LVL2-EF trigger performance (but does include LVL1 hardware performance)
- Physics analysis
- Firmware?

Notes

- The above "Themes" perhaps correspond more to use cases than to software packages or components
- Software packages/components which underlie all or many themes are not mentioned above, eg:
  - Hardware access library
  - ATLAS Online and Dataflow libraries
- Missing themes?
  - General user Gui ("supervisor") for integrating non Run Control actions?
  - Anything else?

Software Packages (1)

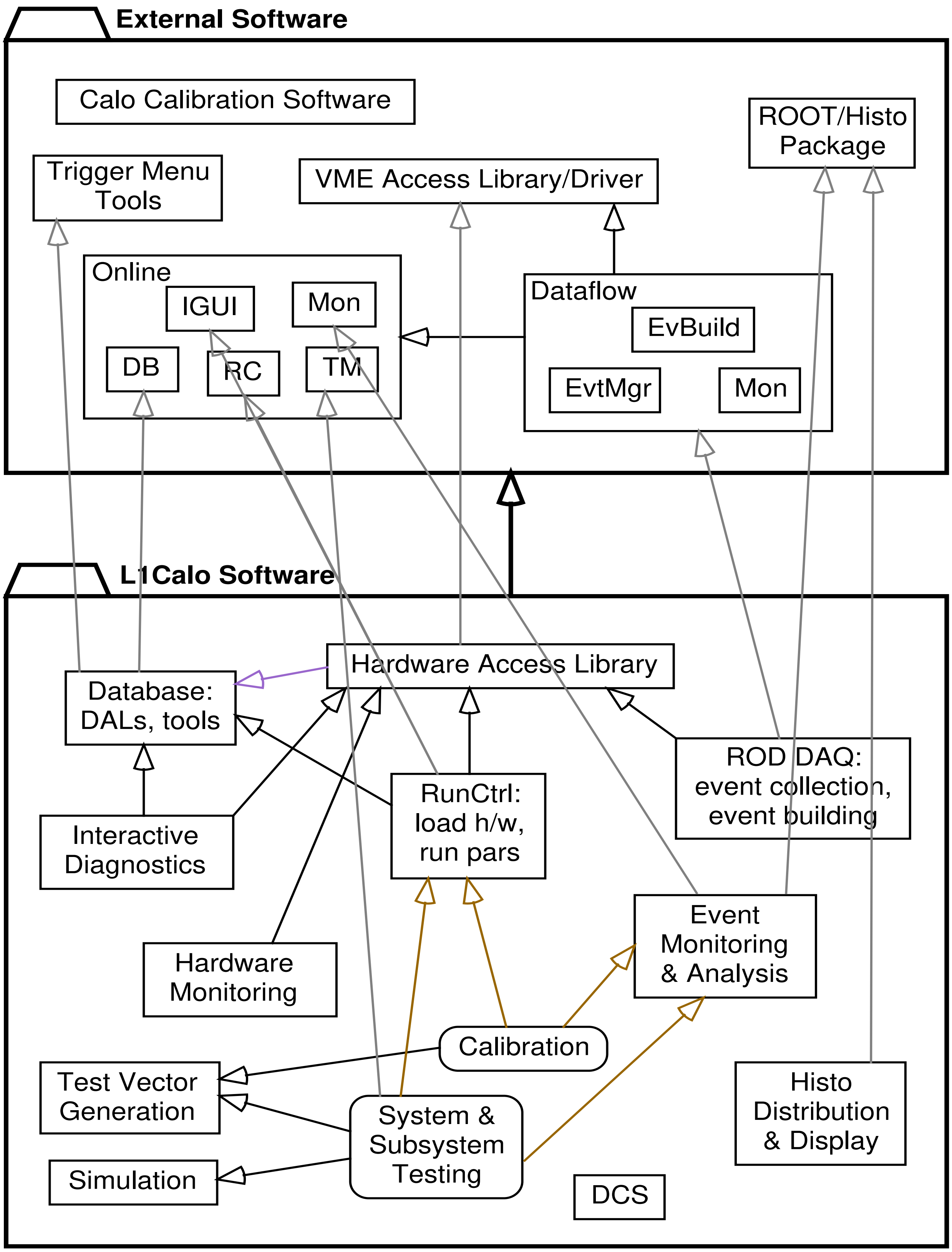
Overview of Packages

- We have in the past discussed the major areas (or packages) of our software work
- We have not tried to specify in detail their interdependencies and interfaces

One Suggested Package Diagram

- Start to use standard UML notation
- Show internal and external dependencies
- Recognise existing software – but also any required changes to it
- Need to accompany boxes on the diagram with explanation of the envisaged scope of each one
  `http://www.hep.ph.qmw.ac.uk/l1calo/sweb/meetings/2001/swpackages.txt`
- Following diagram is still based on a personal view

L1Calo software packages and external libraries



Software Packages (2)

Outline scope of packages

- **Hardware Access Library**:
  existing HDMC hardware Parts plus required changes: VME, Registers etc, more complex components, generic Module class.
  Module subclasses (but maybe in separate package?)
  Dependencies of this (and other packages) on the database needs to be discussed, ie migration of HDMC to use Online database??

- **Databases**:
  schema, data access libraries and tools for trigger menu, calibration data and L1Calo specific configuration

- **Run Control**:
  local controllers for each crate, IGUI panels for run parameters

- **Interactive Diagnostics**:
  GUI and other higher level aspects (eg scripting) of HDMC plus required extensions

Software Packages (3)

Outline scope of packages (continued)

- **ROD DAQ**:
  event collection from RODs; event building from multiple RODs and crates; send events for monitoring
- **Hardware Monitoring**:
  periodic monitoring of the hardware in the crate, via VME, by the local CPU (ie not monitoring of events from readout)
- **Event Monitoring**:
  monitor system by analysing events (from ROS or RODs); fill histograms etc for distributed display; customise DAQ event dump
- **Histogram Distribution and Display**:
  distributed display of histograms kept on each local CPU. (NB LVL2 are developing a package – depending on progress we might use this instead of what Tara developed for us?)
- **DCS**:
  SCADA level programming; use of DCS data in the DAQ (interface foreseen at the run controller level)

Software Packages (4)

Outline scope of packages (concluded)

- **Test Vector Generation**:
  create test vectors for single modules, subsystems and for the whole system
- **Simulation**:
  simulation of the hardware (more detailed than offline) eg propogating readout data or test vectors through the trigger processing chain
- **System and Subsystem Testing**:
  framework using test vectors and simulation to test the whole system or subsets of it. Perhaps some of the functionality is actually provided the dependent packages, eg run control, event monitoring etc??
- **Calibration**:
  procedures for all our calibrations. Overlap with testing. Again, functionality may actually be provided by other packages, eg special modes in the run control, etc??

Summary of Recent Work

Presentations at Mainz

- Simulation and Test package – Steve
- Readout – Bruce
- Proposed Changes to HDMC – Murrough
- ROD Tests – Bruce

Earlier and Ongoing Work

- HDMC: large body of software existing for some time, worked on by several people
- Test Vectors: work by Bill to be incorporated by Steve
- ROD Tests: various developments by Bruce
- Run Control: proposals on architecture and actions; some work on implementation
- Databases:
  - trigger menu: online test code adapted for use offline
  - calibration data: initial schema
- Existing and forthcoming draft documents

Status and Plans (1)

Short Term

- Finish and review Requirements Document
- Decide readout strategy for slice test
- Implement HDMC changes required by other packages
- Expand requirements and use cases for high priority items
- Finish and review other draft documents

Medium Term

- Concentrate efforts on autumn module tests (simulation and test packages)
- Prepare for larger scale tests (readout, run control, etc)
- Attend to areas we have largely ignored (monitoring, calibration, DCS)

Status and Plans (2)

Longer Term

- After slice tests (and joint beam tests?)...
- ...review the prototype software we have developed
- Discuss and agree changes for the final system

Personnel

- Bill Stokes has unfortunately had to retire early due to ill health
- Full(ish) time software effort in the UK consists of Bruce, Murrough and Steve; plus Gilles and Norman part time.
- Oliver should start in earnest about now...?
- Lack of effort evident everywhere, but especially in Stockholm/Mainz for the JEM

Tasks and Timescales (1)

Hardware Access Library (HDMC Parts)

Task	Months	When	Who
Urgent changes for DAQ support	1	Tests	ML+ON?
Other changes	2?	Slice	ON?
New Parts	2?	Tests	ON?
Module subclasses	2?	Tests	*
Documentation	1		
Large body of HDMC code already exists			

Interactive Diagnostics

Task	Months	When	Who
GUIs for new Part and Modules	2	Tests	ON?
Documentation	1		
Large body of HDMC code already exists			

Databases

Task	Months	When	Who
Documentation (req,design,user)	1		ML
Trigger Menu	1	Tests	ML
Calibration Data	1?	Slice	ML
HW and SW Configuration	1?	Slice	ML
Some documentation and initial implementation of trigger menu exists			

Run Control

Task	Months	When	Who
Documentation (req,design,user)	1	Slice	ML
Framework	1	Slice	ML
Run parameters (IGUI, IS)	1?	Slice	ML
Module actions	1?	Slice	ML
Some documentation and initial implementation of framework exists			

Tasks and Timescales (2)

ROD DAQ/Readout

Task	Months	When	Who
Documentation (req,design,user)	1	Slice	BB
Framework (private ROD DAQ)	2?	Slice	BB
PC ROS learning curve	1?	Slice	BB
Some HDMC adaptions and other developments exist			

Hardware and Event Monitoring

Task	Months	When	Who
Documentation (req,design,user)	1	Slice	
Hardware monitoring activities	2?	Slice	
Event dump	1?	Slice	
Event monitoring (standard)	1?	Slice	
Event monitoring (for test runs)	1?	Slice	
Event monitoring (for calibrations)	1?	Slice	
List of things to be monitored exists			

Calibration

Task	Months	When	Who
Documentation (req,design,user)	1	Slice	
Discussion with Calo groups	1?	Later	
Internal calibration procedures	2?	Slice	
External calibration procedures	1?	Later	
Some draft documentation exists			

Tasks and Timescales (3)

Histogram Distribution and Display

Task	Months	When	Who
Revive Taras code	1?	Slice	
Learn LVL2 alternative	1?	Slice	
Code from Tara exists			

DCS

Task	Months	When	Who
High level SCADA code	2?	Later	
Learn and use DAQ DCS connection	1?	Later	

Test Vectors, Simulation and Testing

Task	Months	When	Who
Documentation (req,design,user)	1	Tests	SJH
Test vector code for all modules	2?	Tests	SJH+
Simulation of all processor stages	2?	Tests	SJH+
Testing framework	1?	Tests	SJH
Some test vector code and initial implementation of framework exists			

Actually Testing the System

Task	Months	When	Who
Module tests (CMM,CMM,PPM,JEM,etc)	10?	Tests	*
Subsystem tests (PP,CP,JEP)	6?	Tests	*
Slice tests	6?	Slice	*
TDAQ integration tests	4?	Later	*
Some test vector code and initial implementation of framework exists			