

Status of CALICE software

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CALICE collaboration

- **CALICE collaboration**: 336 physicists/engineers from 57 institutes and 17 countries coming from the 4 regions (Africa, America, Asia and Europe)
- Purpose: R&D program of **CA**lorimeters (ECAL and HCAL) for a future **L**inear **C**ollider **E**xperiment (and not only)
- Last collaboration meeting: last week in **Casablanca** (Morocco)

Test beam campaings

- DESY 2006: AHCAL
- CERN 2007: Si-W ECAL + AHCAL + TCMT
- FNAL 2008: Si-W ECAL + AHCAL + TCMT
- FNAL 2009: Si-W ECAL + AHCAL + TCMT,
scintillator ECAL + AHCAL + TCMT
- CERN 2010: W-HCAL (ongoing)
- FNAL 2010: DHCAL (in preparation)

CALICE data flow

- At the test beam:
 - data taken in binary format (**.bin**)
 - based on DAQ software written and maintained by **Paul Dauncey** (UK)
 - support offered even after funding cuts (many thanks)
- After data taking:
 - scripts to save the raw data on the grid,
replicated at both CALICE and LYON (IN2P3s) sites
 - currently, around 30 TBytes on tape
 - thanks to **Dmitri Ozerov** (DESY) for continuous support
 - scripts to run the **conversion** of files in binary format to **LCIO** format
 - converted files saved also on the grid, available for whole collaboration
- Reconstruction:
 - done on **converted** files (i.e. LCIO format)
 - implies **calibration**, i.e. amplitude of calorimeter hits is converted from ADC counts to MIPs
 - ROOT files with distributions of basic quantities created already during reconstruction
 - done centrally, in jobs submitted to the grid (involving centres from all over Europe)
- Analysis: done on **reconstructed** files

- Slow control information and calibration constants saved in a MySQL data base hosted at DESY
- Two data basis available: **flccaldb01** and **flccaldb02** (for reading and writing)
- Access granted based on IP-ranges - set by **DESY D4** group (IT safety); thanks for the fast and efficient reaction to requests
- Part of the information written to the data base during conversion, the rest being provided by experts
- Some calibration constants need several iterations \Rightarrow once finalised, corresponding folders in the data base are tagged
- Maintainer of the data base at DESY: **Nils Feege**, AHCAL group (thank you)
- Note: Official reconstruction uses only tagged folders

CALICE software in general

What?

- CALICE software developed within [ILC software framework](#) (Marlin et co.)
 - ↳ **C++** programming language
 - ↳ **cmake** for generation of platform independent Makefiles
 - ↳ **doxygen** based documentation

Who?

Si-W ECAL	Kaloyan Krastev
Scintillator ECAL	Katsu Koterra
AHCAL	Shaojun Lu
LCIO converter	Roman Pöschl
DAQ software	Paul Dauncey
Tracking	Paul Dauncey
TCMT	Kurt Francis
Mokka	Gabriel Muşat
Grid	Shaojun Lu

- Also contributions from users (no dedicated full-time software developers)

CALICE software packages

- CALICE software grouped in packages, maintained in [SVN](#)

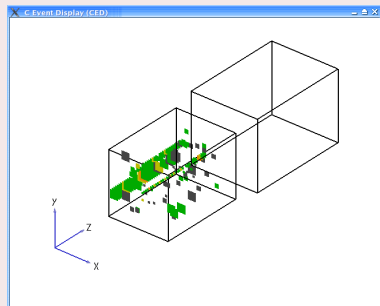
<code>calice_userlib</code>	general purpose classes, used in all other packages
<code>calice_reco</code>	reconstruction code (for Si-W ECAL, AHCAL and TCMT)
<code>calice_sim</code>	digitisation code
<code>calice_lcioconv</code>	conversion from binary to LCIO format
<code>calice_torso</code>	contains <i>HelloWorldProcessor</i> , as star up for new users
<code>calice_run</code>	bash scripts for automatic generation of steering files (for reconstruction, noise extraction and digitisation)

- External package: `RootTreeWriter`, developed by [J. Samson](#) (DESY); convenient way to create ROOT trees for simple analysis

CALICE event displays

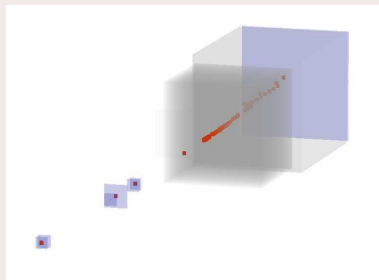
CED event display

- Based on CED (ILC package)
- Developed by Benjamin Lutz, Nils Feege (DESY)
- See usage example [here](#)



DRUID

- Based on ROOT's TEve class
- Developed by Manqi Ruan (LLR, France)
- For more details, see [DRUID home page](#)




Software testing

- Software tested (if it compiles and gives the right results) before every release
→ but mistakes can always happen
- Better solution: automatic testing with **ctest**
 - tool which comes for free with *cmake*
 - can be used to automate updating (from SVN), configuring, building, testing, memory checking
 - and for submitting results to a **CDash** dashboard system
- Use of cdash server installed by the ILC software group
(thanks to **Steve Aplin**)
- Recently **Jack Hansom** (summer student), under Shaojun's supervision, has written tests for `calice_userlib`, `calice_reco` and `calice_sim`

Software testing - continued

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CALICE Dashboard

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Nightly



Site	Build Name	Update		Configure		Build			Test			Build Time		
		Files	Min	Error	Warn	Min	Error	Warn	Min	NotRun	Fail		Pass	Min
flc11	Linux-i686-reco	1	0	0	0	0	0	1	3					2010-09-01T00:30:15 CEST
flc11	Linux-i686-sim	1	0	0	0	0	0	0	1.1					2010-09-01T00:33:20 CEST
flc11	Linux-i686-test			0	0	0	0	0	0	0	0	1	0	2010-09-01T00:36:03 CEST
flc11	Linux-i686-userlib	1	0.2	0	0	0	0	0	1.1					2010-09-01T00:34:52 CEST
Totals	4 Builds	3	0.2	0	0	0	0	1	5.2	0	0	1	0	

No Continuous Builds

No Experimental Builds

No Coverage

No Dynamic Analysis

CDash 1.6.4 © 2010 [Kitware Inc.](#)
[\[report problems\]](#)

CALICE software documentation

- Doxygen based documentation inside classes \Rightarrow see example [here](#)
- More general information on [CALICE software web pages](#):
 - how to install and compile ILC and CALICE packages
 - software versions, software news (for each release)
 - mailing list
 - contact persons
 - bug reports
 - FAQ

Collaboration with ILC software group

- CALICE software based on ILC software \Rightarrow profit a lot from existing framework and ongoing developments
- Recent issue: treatment of conditions data in LCCD; consensus found between efficient, (back) compatible software and usage of existing CALICE data base
- Thanks to [Frank Gaede](#), [Steve Aplin](#), [Jan Engels](#) for help with LCIO, LCCD, cmake...

EUDET funding did allow establishing a network for collaboration

Next steps

- **Integration** of technological prototypes into CALICE software
 - integration means usage of LCIO format, of common CALICE data base, etc
 - DHCAL (US) will start to take data soon (October 2010)
 - SDHCAL (France) to take data in 2011
 - DAQ development taken over by our French colleagues (previously done by the UK group)
- Development of reconstruction software for the scintillator ECAL (Satoru Uozumi)
 - slow pace due to reduced manpower
 - will use the framework of the AHCAL reconstruction