

iLCSoft

Status, Plans and Open Issues

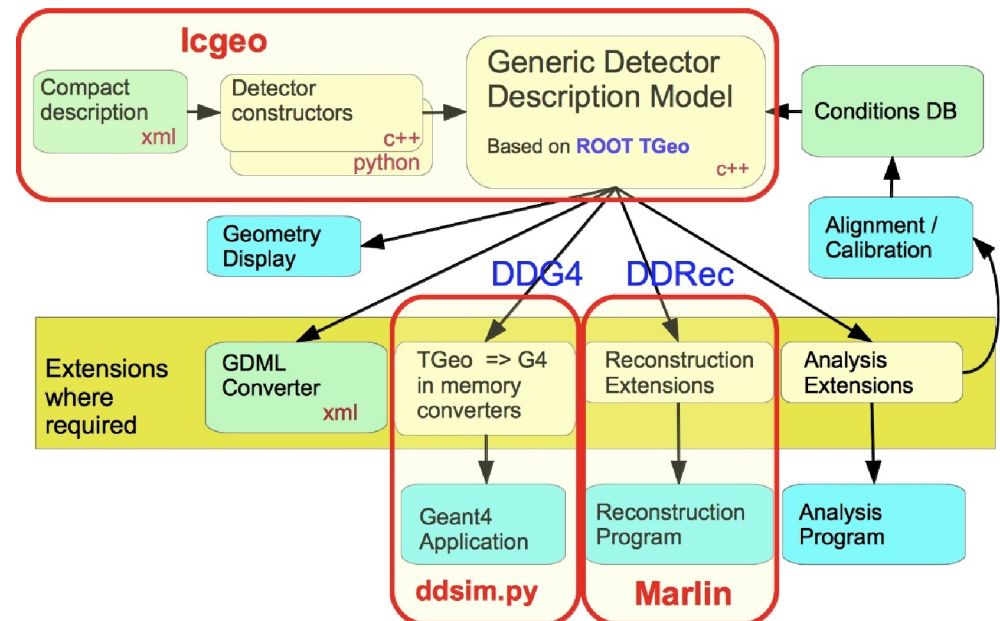
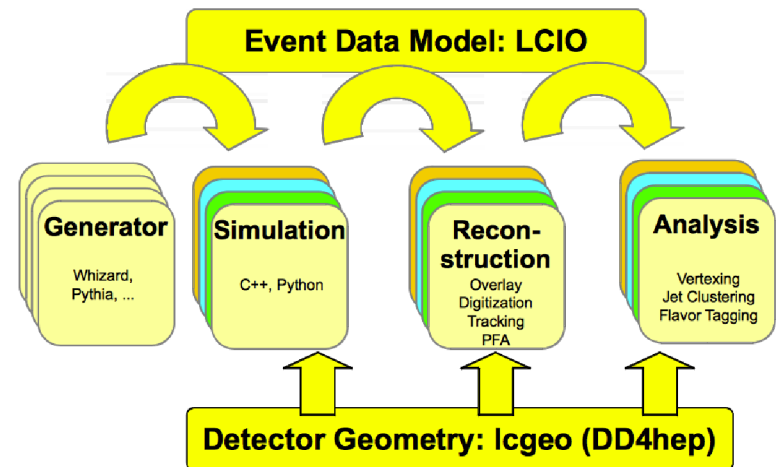
Frank Gaede, DESY
ECFA Linear Collider Meeting
Santander, Spain, May 30-Jun 5, 2016

Outline

- Introduction and goals for software workshop
- brief summary from ILD Software and Optimization Workshop in February
- iLCSoft
 - transition to c++11 and ROOT6
 - ilcsoft releases
 - migration to git

new DD4hep based LC software

- LC community moved to **common software tools**
 - **DD4hep** detector geometry description
 - **DDG4/ddsim** for simulation
 - **DDRec** as interface for reconstruction
 - new MarlinTrk tracking
 - PandoraPFA
 - ...
- iLCSoft now used by **ILD**, **CLICdp** and **SiD**



goals for this software meeting

- review the status of all aspects of LC software tools
 - core tools
 - simulation
 - tracking
 - PFA/calor
 - MC production
- focus in particular on issues that are relevant for all three detector concepts
- should have enough time for discussions in order to address open issues (slot on Wed. afternoon)

program Tuesday

iLCSoft Status and Plans	<i>Frank Gaede</i>
<i>Santo Mouro</i>	11:00 - 11:30
DD4hep/lcgeo/ddsim	<i>Andre Sailer</i>
<i>Santo Mouro</i>	11:30 - 12:00
Continuous Integration	<i>Marko Petric</i>
<i>Santo Mouro</i>	12:00 - 12:30
Diskussion: Moving iLCSoft to git	
<i>Santo Mouro</i>	12:30 - 13:00

core tools

Tau lepton final states separation study and the impact of varying ECal cell sizes	<i>Boruo Xu</i>
<i>Santo Mouro</i>	14:30 - 15:00
Status of Arbor PFA	<i>Vincent Boudry</i>
<i>Santo Mouro</i>	15:00 - 15:20
Software compensation	<i>Lan Tran Huong</i>
<i>Santo Mouro</i>	15:20 - 15:40
Restructuring of Calo Digitizers	<i>Daniel Jeans</i>
<i>Santo Mouro</i>	15:40 - 16:00

calorimeter
reconstruction

Status of MarlinTrk	<i>Frank Gaede</i>
<i>Santo Mouro</i>	16:30 - 16:50
CLICdp pattern recognition	<i>Daniel Hynds</i>
<i>Santo Mouro</i>	16:50 - 17:10
ILD VXD optimization studies	<i>Georgios Voutsinas</i>
<i>Santo Mouro</i>	17:10 - 17:30
Vertex charge reconstruction in ILD	<i>Mr. Sviatoslav Bilokin</i>
<i>Santo Mouro</i>	17:30 - 17:50

track
reconstruction

program Wednesday

iLCDirac status and plans	<i>Andre Sailer</i>
<i>Santo Mouro</i>	11:00 - 11:20
ILD MC production	<i>Akiya Miyamoto</i>
<i>Santo Mouro</i>	11:20 - 11:40
CLICdp simulation model	<i>Marko Petric</i>
<i>Santo Mouro</i>	11:40 - 12:00
ILD simulation model	<i>Dr. Shaojun (DESY) LU</i>
<i>Santo Mouro</i>	12:00 - 12:20
SiD Simulation model - tbc	<i>Aidan Robson</i>
<i>Santo Mouro</i>	12:20 - 12:40

simulation and MC
production

Status of LCFIPlus flavor tagging	<i>Dr. Taikan Suehara</i>
<i>Santo Mouro</i>	14:30 - 15:00
High Level Reconstruction tools and application to Higgs and SUSY analyses	<i>Dr. Masakazu Kurata</i>
<i>Santo Mouro</i>	15:00 - 15:30

high level
reconstruction

General Discussion and Overflow	
<i>Santo Mouro</i>	16:30 - 18:30

general discussion
and overflow

if needed ...

ILD Software and Optimization Workshop

- one week meeting at DESY (Feb 22-26)
- two days software expert meeting ILD and friends
 - addressed complete iLCSoft software chain
- one day software summary (focus ILD)
- two days of ILD optimization topics

- very useful workshop that triggered interesting discussions and activity for developments
 - will see some of this during this meeting

DD4hep, lcgeo, ddsim

- **DD4hep** is basically feature complete
- open issues identified:
 - MC-Truth link needed tests and validation
 - nice to have: being able to store the geometry in a ROOT file for faster loading at startup
- M.Frank: requires **ROOT6** and **C++11**
- **ddsim**: feature complete
- **lcgeo**: feature complete
 - individual models for ILD, CLIC and SiD are currently implemented and improves

talk by A.Sailer

talks by S.Lu, M.Petric, A.Robson
on simulation models

iLCDirac and Grid Productions

- iLCDirac supported by CERN group
 - works nicely for CLICdp and ILD (also SiD ?)
- Grid production general topics
 - allocation of enough Grid resource
 - should not be a problem (few % of LHC requirements)
 - nevertheless we need coordinate large MC production between detector concept groups CLIC, ILD and SiD
 - dropping of LFC file catalogue
 - iLCDirac catalogue provides everything needed
 - need one final cross cross check if all of DBD samples are available - still to be done

talks by A.Sailer
and A.Miyamoto

could come back to this in discussion
session on Wednesday

iLCSoft

- main topic discussed at workshop
 - moving to C++11 and ROOT6
- agreement:
 - move to v01-19 series of developers releases
 - using gcc4.8, c++11 and ROOT6 and DD4hep (no GEAR !?)
 - prepare v01-18 (series) of legacy release(s)
 - compatible w/ ROOT5, gcc4.4, Mokka
 - being able to re-reconstruct large sample of DBD data files

see later this talk

Tracking Tools

- Si-digitizer and TPC digitizers exist
 - need code for TPC module gaps → LCTPC
- track fitting code w/ DDKalTest/DDRec
 - observed some issues w/ pull distributions
 - material description and surface navigation
- ILD pattern recognition
 - needs to be made compatible w/ DD4hep
 - review FullLDCTracking
- V0 and KinkFinder
 - old code (2008/2010) needs review → currently not addressed
- Vertex charge reconstruction
 - improvements observed w/ CellsAutomatonMV

talk FG

talk S.Bilokin

Calorimeter Reconstruction

- Calo digitizers

talk D.Jeans

- need to be made compatible with DD4hep and restructured

- DDMarlinPandora

no talk
discuss Wed.

- need to bring/keep in synch w/ MarlinPandora

- Pandora calibration

- fully automatized procedure in iLCDirac → status ?

- Software compensation

talk L.Tran

- existing procedure improves low energy jets
- need integration in clustering algorithms

- Arbor PFA

talk V.Boudry

- alternative to Pandora - two implementations exist

High Level Reconstruction Tools

- many improvements in **FlavorTagging**
 - Adaptive Vertex Finding, Vertex Mass recovery, π^0 , ...
 - code needs to be implemented in LCFIPlus
 - requires finalization of PID tools
- improvements of **likelihood PID** (using dE, dX , shower shapes) are ongoing
 - aiming for a release in ~1-2 months

talk T.Suehara

talk

Other Topics

- pi0 reconstruction
 - new pi0 reconstruction developed
 - improved efficiencies for di-photons
- generator status
 - whizard 2.0 almost ready
- DST file format
 - need for review ?
 - try to align the output between concepts ?
- background simulation tools
 - need for creating pair-bg with reconstructable tracks

talk A.Miyamoto
in joint physics
session

discuss Wed ?

porting iLCSoft to C++11 (and ROOT6)

- had to disable setting of CXX_FLAGS in CMakeList.txt files of practically all iLCSoft packages
 - now set externally in ilcinstall (or manually by the user):

```
if( use_cpp11 ):  
    CMAKE_CXX_FLAGS = '-Wall -std=c++11'  
else:  
    CMAKE_CXX_FLAGS = '-Wall -ansi -pedantic -Wno-long-long'
```
- issues:
 - some packages (ROOT, Geant4, DD4hep,...) have their own configure flags for using c++11 → partially solved in ilcinstall
 - what about other CXX_FLAGS that individual packages want to set ?
 - some packages reset CXX_FLAGS others append ...
 - should try and find a common solution that is used in iLCSoft packages
 - could have canonical set of iLCSoft CMAKE_CXX_FLAGS defined in ilcutil and then use this in all packages
 - which ?

porting iLCSoft to C++11 (and ROOT6)

- after setting compiler flags only very minor code changes were needed in iLCSoft packages, e.g.
 - errors in float array initializer lists (narrowing from double to float)
- ROOT6 related porting issues
 - new library content files are created for dictionaries: `namespace_rdict.pcm`
 - these need to be installed in `./lib` directory for all packages that use dictionaries
 - ROOT C++-macros now have to follow the C++ syntax more strictly
 - nothing else observed
- for last two month we are regularly building iLCSoft with c++11 and ROOT6 (nightlies and HEAD installations)
 - using gcc4.8 provided by CERN SFT group
- used for recent tracking code validation
- no issues (related to c++11/ROOT6) so far observed → **it works**

iLCSoft releases

- so far we have made iLCSoft compatible w/ C++11
- but (almost) no C++11 features used yet
- → would like to start programming in C++11 => when ?
- could/should create one more release with current state
 - working w/ ROOT5/ansi and ROOT6/c++11before making the switch to mandatory c++11 (v01-17-10)
- when splitting into v01-19 (c++11) and v01-18 (ansi), we need to clearly identify packages that need to work in their HEAD versions in both worlds (MarlinReco, LCFIVertex,...)
 - these packages cannot use C++11 features in their code
 - also need to use GEAR for geometry

Moving to Git ?

Git vs. SVN

- have worked for ~10 years w/ SVN
 - most iLCSoft packages stored in desy svn
 - some packages already moved to git, e.g. PandoraPFA
- advantages of Git
 - distributed code repository (no master repo needed)
 - full history available locally
 - much faster branching merging and switching between versions
 - better version control
 - ...
- disadvantages of Git
 - quite steep learning curve
 - bewildering number of commands and workflows
 - no central repository !
 - ...

more and more
open source packages
use Git
→ in the long run we probably
have to do this as well
→ when ?

possible git services

- github
 - commercial service
 - free for open source projects
 - largest repo in open source community
 - every one can sign up for an account
- gitlab
 - git service provided by CERN-IT
 - need CERN account to access
 - can also do this w/ lightweight account ?
- stash
 - git service provided by DESY
 - need (special) DESY account
 - can be given to callaborators

possible migration to Git

- if we decide to move to Git we need to
- establish a migration procedure
- choose a Git service that everyone can use
- establish a canonical workflow, e.g.
 - one librarian per package (!)
 - developers develop in clone repos
 - create pull requests
 - merged by librarian
 - considerable overhead wrt. SVN !
- find the right time to do this
- ILD is planning a large MC production early next year
- how about CLIC and SiD ?

your thoughts ?