ilcsoft

introduction

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Core
- Mokka - Geant4 simulation
- LCIO - EDM/persistency
- Marlin - application framework
- Gear - geometry toolkit
- LCCD - conditions data
- CED - event display

Reconstruction packages
- MarlinReco
- MarlinTrk, Clupatra, FwdTracking,..
- MarlinKinFit
- LCFIPlus, LCFIVertex
- + many more

Framework in use for:
- ILD simulation and reconstruction
- Testbeam projects/real data: calice, lctpc, EUTelescope
The ilcsoft dependency graph

- 41 packages (General Broken Lines missing in graph)
- 6 external
The core is the C++ application framework MARLIN:

**Modular Analysis and Reconstruction for the Linear Collider**

- Interacting blocks:
  - Event data model LCIO
    *Linear Collider Input Output*
  - Geometry description GEAR
    *Geometry API for Reconstruction*
  - Extension for non-event data LCCD
    *Linear Collider Conditions Data*
  - Processor code

- Linear, sequential processing
Modular C++ application framework
LCIO as transient data model
XML configuration with local/global parameters
Self documenting (steering parameters and defaults)
For an example try running:
Marlin -x | less
Consistency check event data flow
LCIO
Linear Collider Input Output

- Hierarchical event data model
- Implemented in C++ and Java
  - Interfaces to C and Fortran
- Common (non-ROOT) persistency
- Optional ROOT dictionary
- See: http://lcio.desy.de
- SLAC & DESY started project in 2003 (!)

Anything you want to store must be written in LCIO (!)
Anything you want to pass between processors is LCIO
E.g. eudaq writes LCIO
User defined classes: via the LCGeneric Object
Detector Geometry Description in ilcsoft

Two distinct parts

- ILD simulation: MySQL DB & C++ drivers in Mokka per sub detector
- In reconstruction: GEAR API
Key idea: different views in reconstruction/analysis and (full) simulation

- material voxels in space vs. sensitive detector layers (modules, sensors, cells)

→ API for special sub detector types providing the specific parameters e.g. barrel/end cap calorimeter, TPC, planar tracking detector

→ Also interface for detailed geometry & material properties:
  - material properties at any point: material, density, X0, λ,...
  - material and field properties between two points: B field, X0, λ

The model and its implementation are (slowly) changing:

**DD4Hep**: Detector Description for High Energy Physics
**Versions and reference installations**

### Current releases

- **Production v01-16-02** (December 2012)
- **Developer v01-17** – including General Broken Lines !(today)
- Supported/target platform: SL5 64bit (and SL6)

### Reference installation in afs

path: `/afs/desy.de/project/ilcsoft/sw/$OS/$VERSION`, e.g.

- `/afs/desy.de/project/ilcsoft/sw/x86_64_gcc41_sl5/v01-17/`
- `/afs/desy.de/project/ilcsoft/sw/x86_64_gcc44_sl6/v01-17/`

### Try to use these

- Initialize with, e.g.
  `/afs/desy.de/project/ilcsoft/sw/x86_64_gcc41_sl5/v01-17/init_ilcsoft.sh`
- Run your job
  `Marlin mySteeringFile.xml`
Local installation

Create your own installation with ilcinstall

- https://svnsrv.desy.de/viewvc/ilctools/ilcinstall/tags/
- Adjust paths and requirements in release-versions.py
- Run the installation script ilcsoft-install $CONFIG

Two installation methods for complete install (after download)

- Start from scratch:
  ilcsoft-install releases/$VERSION/release-scratch.cfg
- Separate fast from slow changing content:
  1. ilcsoft-install releases/$VERSION/release-base.cfg
  2. ilcsoft-install releases/$VERSION/release-ilcsoft.cfg

You don’t need the full installation!
Change config file to a minimal set
Summary

- ilcsoft is a full, modular software framework with the key components Marlin, LCIO, GEAR and LCCD
- Used in many different contexts, both in parts and as a whole
- The ilcsoft team provides a world-readable reference installation in DESY afs
- The ilcinstall tool enables to create local installations

Outlook

- The geometry description is changing towards DD4hep
- Examples can be found stepping through ilcsoft.desy.de and the respective sub links