EUTelescope: User Guide

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Abstract

This guide is intended for all users of EUTelescope. It is an all inclusive guide covering the install process to the operation, right the way through to troubleshooting. This guide can be read all in one go, if one has the inclination, or it can be dipped in and out of to revise procedures as and when the user sees fit.
If you notice any errors in this guide, please contact Tom Daubney: *thomas.daubney@desy.de*.

1 Introduction

1.1 Overview

1.1.1 EUTelescope

The EUTelescope[1] framework is a group of Marlin (link is external) processors to be used for analysis and reconstruction of data taken with pixel beam telescopes. It was implemented in the context of the EUDET project supported by the European Union in its 6th Framework Programme for the European Research Area and is embedded into the ILCsoft framework. The main goal of the EUTelescope software is to get from raw data to high level objects like tracks crossing through the telescope. These tracks are used to characterize both the telescope itself and any other position sensitive detector (DUT ="device under test") that can be inserted into the telescope setup.

The EUTelescope software package was originally created as consistent data analysis chain for the EUDET telescopes. These telescopes consist of six planes with high-resolution MIMOSA26 pixel sensors and are constructed to provide a full-featured infrastructure for DUT measurements. This includes the telescope with the sensors, cooling, and readout electronics as well as the Data Acquisition (DAQ) tool EUDAQ and the analysis software EUTelescope. The ILCsoft framework is being developed by the ILC community and unites several tools for data processing, originally intended for application in detector development efforts towards the International Linear Collider (ILC). The core elements of the framework are the Linear Collider I/O (LCIO) data model, the Geometry API for Reconstruction (GEAR) markup language and the event processor Modular Analysis & Reconstruction for the LINear collider (Marlin).

The implementation of EUTelescope into the ILCsoft framework and its modular structure has several advantages, such as the possibility to submit large analysis jobs for Grid computing and the possibility of a simple step-by-step analysis chain. Marlin allows the modular composition of analysis chains for various applications. Every task is implemented as an independent processor that is called by Marlin. The processors can expose parameters to the user which can be configured and loaded at runtime via so-called steering files in Extensible Markup Language (XML) format.

The main input of the full analysis chain is the LCIO output file produced by the DAQ system containing the pixel raw data. Along with that other data is also needed: for example calibration constants (pedestal and noise), eta distributions for each sensor and alignment constants. EUTelescope provides several processors for Marlin implementing algorithms necessary for a full track reconstruction and data analysis of beam test experiments. Most of the EUTelescope processors have been developed for the full-frame readout MIMOSA26 sensors and later adapted for zero-suppressed data. ILCsoft and EUTelescope installations are available on the DESY Andrew File System (AFS).

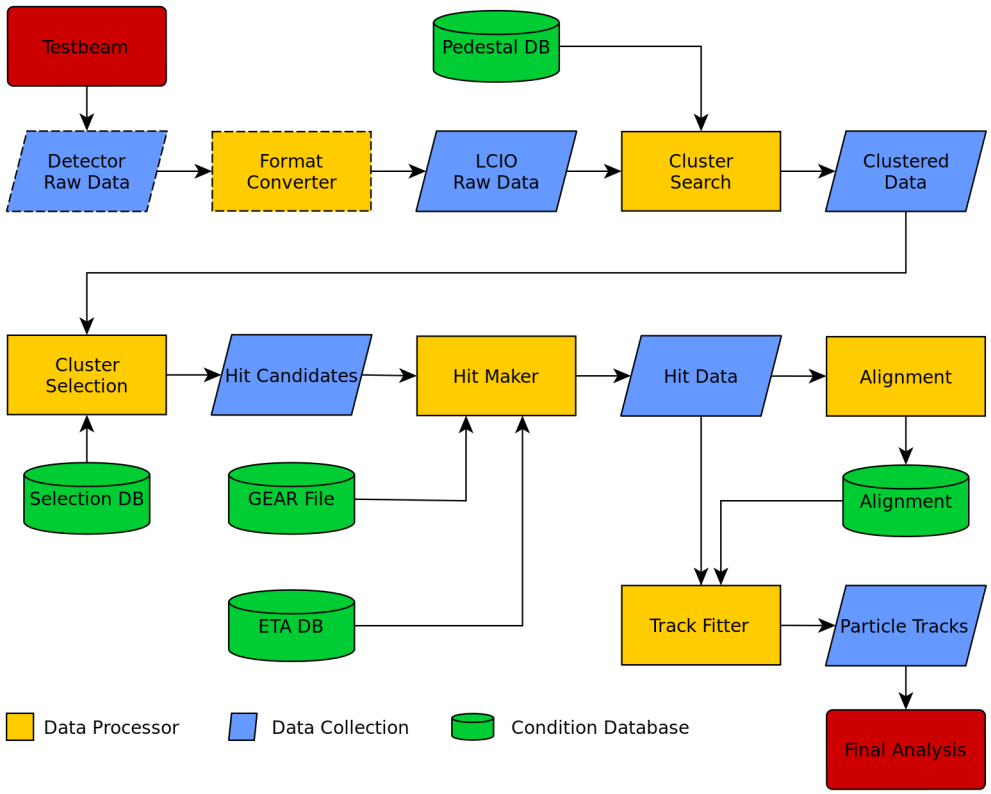

Figure 1: *The EUTelescope framework*

1.2 Software

1.2.1 Marlin

1.2.2 LCIO

2 Installation

3 Operation

3.1 Components

4 Worked Examples

5 Troubleshooting

5.1 Common Problems

5.2 Support

References

[1] http://eutelescope.web.cern.ch/content/about-eutelescope
Accessed at: 16:30, 20/01/2016