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EUTelescope Tutorial

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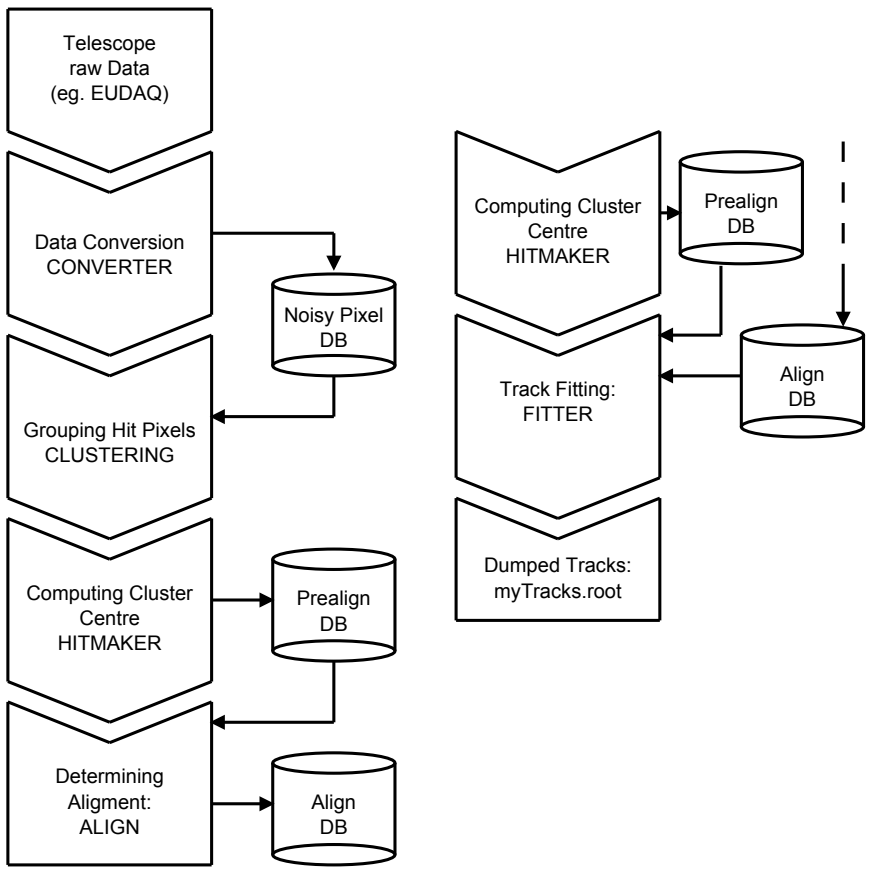
EUTelescope

Overview I

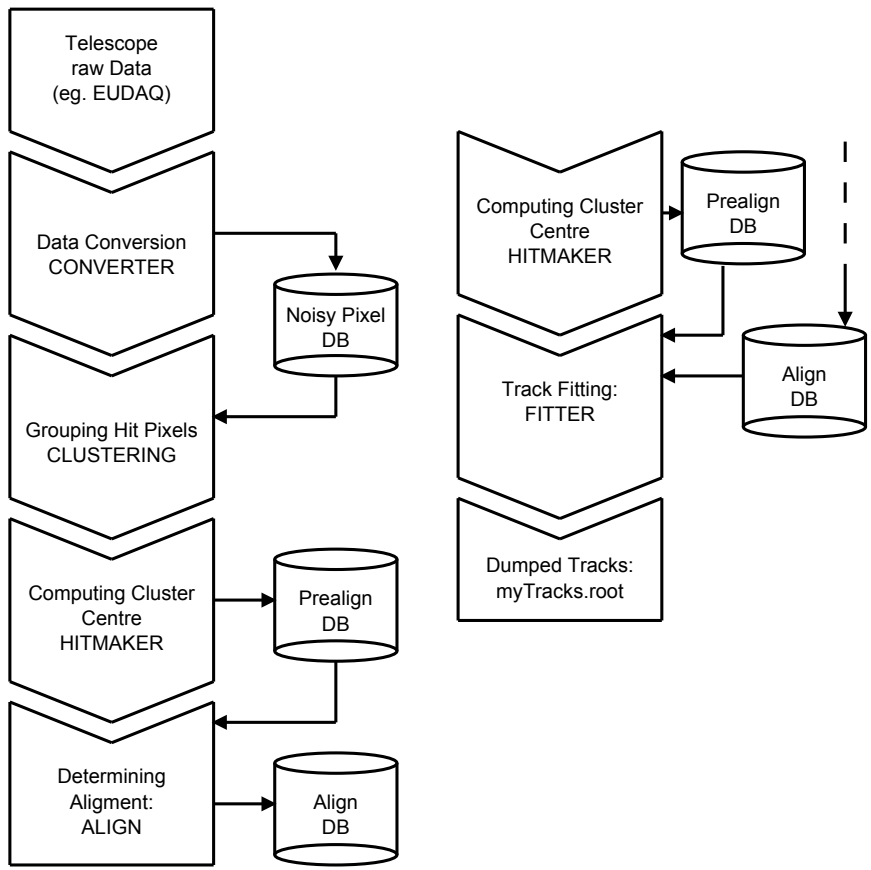
- Converter
  - Convert raw (telescope) data into LCIO
  - Create noisy pixel database (DB)
- Clustering
  - Group together hit pixels
  - Flag/remove clusters with noisy pixel
- Hitmaker
  - Obtain hit position from cluster
  - Determine uncertainty
  - Prealignment
  - (Transform into correct frame of reference)



EUTelescope

Overview II

- Align
  - Apply prealignment
  - Using MillepedeII
  - Preliminary track fit and residuals
  - Results stored in alignment database
- Fitter
  - Apply prealignment and alignment
  - Track fitting processor
  - e.g. Deterministic Annealing Filter Fitter (DAF Fitter)
  - or General Broken Line Fitter (GBL Fitter)
  - Dump tracks into root file



Running Marlin - jobsub

EUTelescope is a collection of Marlin processors, jobsub is the tool for Marlin execution within EUTelescope.

Syntax

```
jobsub -c FILE [-csv FILE] [-g] jobtask runNo
```

- -c specifies the configuration file
- -csv specifies the runlist file
- -g will colour the output

An Example

```
jobsub -c config.cfg -csv runlist.csv -g converter 97
```

Configuration File

config.cfg

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- Stores global variables as well as reco step specific ones
- `[DEFAULT]` section for global
- `[TaskName]` sections for task specific (e.g. `[clustering]`)
- Global variables can be overwritten in tasks
- Task name is arbitrary, will look for `TaskName-tmp.xml` steering file unless otherwise specified
- Specify with `TemplateFile = SteeringFileName.xml`
- `http://eutelescope.web.cern.ch/content/job-submission`

```
[DEFAULT]
# The path to this config file
BasePath = %(eutelescopepath)s/my/reco/folder

# Folder containing the raw/native data files
NativePath = /path/to/my/raw/data

# The location of the steering templates
TemplatePath = %(BasePath)s/steering-templates

# The GEAR file passed from the runlist.csv
GearFile = @GearFileName@

# Path to the GEAR files
GearFilePath = %(BasePath)s

# Verbosity
Verbosity  = MESSAGE4

[fitter]
# Overwrite the verbosity
Verbosity = DEBUG5
```

Runlist File

`runlist.csv`

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- Allows run specific variables
- Column `RunNumber` is mandatory
- First row defined column names which are variables which can be used in the steering templates
- Case insensitive

```
#This is a comment
RunNumber, BeamEnergy, Threshold, GearFile
96, 4.4, 8.0, gear_desy2012_150mm.xml
97, 4.4, 7.0, gear_desy2012_150mm.xml
266,5.0, 10.0, gear_desy2012_20mm.xml
267,5.0, 11.0, gear_desy2012_20mm.xml
268,5.0, 12.0, gear_desy2012_20mm.xml
```

Steering templates

The Marlin Workhorse

- We have access to all our variables
- XML-File
- <execute> section defines processor order
- Variables look like: @SomeVariable@
- Afterwards <processor> nodes for each processor
- Contains processor configuration
- Create <processor> nodes with default values:
  Marlin -x > base.xml

```
<execute>
<processor name="AIDA"/>
<processor name="NativeReader"/>
<processor name="NoisyPixelFinder"/>
<processor name="Save"/>
<processor name="PrintEventNumber"/>
</execute>

<global>
<parameter name="LCIOInputFiles"/>
...
<parameter name="Verbosity">
  "@Verbosity@"
<parameter/>
</global>

<processor name="NativeReader"
  type="EUTelNativeReader">
...
...
</processor>
```

Let's Run It!
The Datura-noDUT Example

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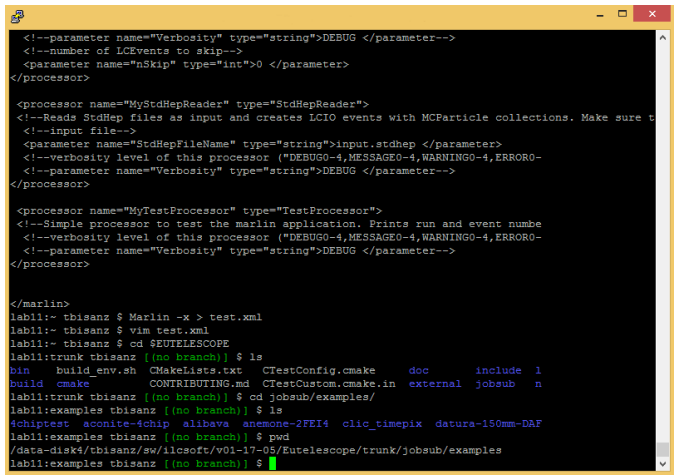
- Located in `$EUTELESCOPE/jobsub/examples/datura-noDUT`
- Following tasks:
  - converter
  - clustering
  - hitmaker
  - align
  - fitter
- Raw data located on DESY AFS



Looking at output

dumpevent

Syntax

```
dumpevent filename eventNo
```

- Will print all the LCIO collections in the specified file for the given event
- As (pre)alignment databases are also LCIO files with collections, also works on them
- Useful to check output:
  - Do collections exist?
  - Randomly check a few events
  - E.g. is my raw data very noisy?
- Very important: `collection name`
- Let's try it!

Example

```
dumpevent output/lcio/run000097-converter.slcio 73
```

Looking at output

Histograms

- Most processors will output histograms
- Stored in ROOT file
- Simply open with ROOT's `TBrowser`
- In case of examples, located in `output/histograms`