Features of the new EUTelescope release 0.8 and the plans for future development

Hanno Perrey

1. Motivation
   - EUTelescope development goals

2. The EUTelescope release 0.8
   - Overview
   - Revised job submission
   - New central web pages
   - Regression tests

3. Plans for future development
EUTelescope: A look back

- actively developed for over 6 years by several authors
- extended in features and sensor-support
- successfully used by many groups in various testbeam studies

SVN trunk activity

EUTelescope has been...
EUTelescope: A look back

SVN trunk: lines of “code” vs. time

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Aside from new features: establish testing, refactorize & document!
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**SVN trunk:**

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Other side of the coin

- complexity increasing (new sensors, more elaborate alignment, ...)
- documentation didn’t keep up, knowledge transfer by word of mouth
- steep learning curve, potential pitfalls for new users & developers

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Aside from new features: establish testing, refactorize & document!
Important features for users

- centralized documentation
- easy installation
- working examples
- stable releases
- a place to ask questions

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Partially already addressed with EUTelescope release 0.8!
Important features for users

- centralized documentation → new web page
- easy installation → verified installation on various platforms
- working examples → early stage/examples = test cases
- stable releases → will maintain releases through bug fixes
- a place to ask questions → new online forum

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Important features for developers

- combining efforts

- communication and coordination

- maintainability & stability

Goal: Close & productive collaboration between developers
Important features for developers

• combining efforts
  ➤ merging of diverged branches (ongoing)
  ➤ SVN accounts available for everyone interested!

• communication and coordination
  ➤ web page modifiable for everyone with CERN account and registered
  ➤ bug/issue tracker
  ➤ forum

• maintainability & stability
  ➤ automated nightly builds and tests (→ more stable trunk)
  ➤ removed old “cruft”
  ➤ started code review (ongoing)
  ➤ fixed many warnings and errors (compiler/static code analysis)

Goal: Close & productive collaboration between developers

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Changes with EUTelescope 0.8

Change log for release 0.8.0:
- Maintenance and stability release;
- New lean and flexible job submission tool `jobsub`;
- all examples now use CTest framework for automated regression tests;
- includes processors for CMS Pixel chips (PSI46xxx);
- removed legacy code, fixed various bugs and improved code quality (e.g. fixed compiler warnings);
- revised producer console output messages and verbosity;
- updated and improved documentation;

also: already new point release 0.8.1 with a couple of fixes (installation/updating will be covered in the tutorial tomorrow)
New features: *jobsub*, a versatile job submission tool

**job submission:** generating run-specific steering files based on generic templates and executing them through Marlin

**out go pysub and simplesub...**

**pysub:**
- code base with > 30k LoC (!), difficult to maintain/extend
- inflexible, often required additional scripting on top
- inconsistencies between various scripts

**simplesub:**
- functional but a bit too simple; configuration cumbersome
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... enter *jobsub*!

- **simple**: lean & well commented python code ($\sim 500$ LoC)  
- **flexible**: steering templates filled with any information from config file, table (csv text file), and/or command line  
- **consistent**: the same tool for every analysis step  
- **only missing feature** (w.r.t. *pysub*): direct grid support/submission
New features: Central Web Pages

http://eutelescope.web.cern.ch

central location for...

- announcements
- documentation
  - installation/updating
  - jobsub with examples
  - getting started with development
    - ...
- support forums
- issue tracker

- CERN-hosted, using drupal content management system
  → directly editable by registered users (with CERN-account)
- forum & tracker open to anybody (if CERN user, please log in!)

great tool for documentation and collaboration!
New features: full-featured examples = test cases

From examples . . .

- example analyses consist of all steering template & configuration files
- they provide a good starting point for new users
- add real-life data & output validation → data-driven regression tests!
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. . . to automated nightly tests

- CTest provides framework to define and execute tests
- fail/pass conditions determined from exit status & shell output
- complex output (e.g. ROOT or LCIO files) validated through external tools running as test in CTest
- test not only ability to execute analysis but also ensure consistency with known-good results
- nightly run: SVN checkout, configure, build, tests → submit to server
New features: CDash test results monitoring

CDash: provides web-based access and monitoring of test results

- compilation messages
- fail/pass conditions
- console output
- test duration
- numeric & graphical test results

- available to all interested developers of EUTelescope
- links to SVN revisions → easily identify problematic commits
- email warnings to developers if tests should fail
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New features: running tests locally

- run CTest to **verify code changes before committing** to SVN
- prerequisites:
  - data & known-good results (currently on DESY AFS)
  - tests enabled and test files included in CMakeLists.txt
- available tests:
  - static code analysis using cppcheck
  - analysis chain for Datura telescope @DESY w/o DUT
  - analysis chain for Anemone telescope with ATLAS FEI4
  - check of output files with LCIO tools
  - verification of results (e.g. residuals) with stattest (from GEANT4)
- configure & modify tests through
  - example configs & steering files
  - testing.cmake file in example directory
- example CTest commands:
  - cd $EUTELESCOPE/build # output will be in ./Testing
  - ctest -N # list available tests
  - ctest -I 2,6 # run tests 2 to 6
  - ctest -V # run all tests, show output
The Road Ahead: plans/tasks/issues

planned next FEATURES

- GBL for fitting & alignment
- merging of asynchronous data streams (on trigger id/time stamp)
- full telescope simulation chain

known ISSUES (a.k.a. skeletons in the closet)

- need to refactorize geometry description & coordinate transformations
  - important for track fits using e.g. GBL
  - makes producers easier to maintain, extend and exchange
- need to clean-up further
  - refactorize historic structures/dependencies, drop obsolete functionality, re-structure processors (e.g. for consistency), fix compiler warnings, manage external dependencies
- need to fix EUDAQ circular-dependency
- need to provide more documentation
- need more examples/test cases (→ code coverage)
- does jobsub need grid functionality (?)
Contributions are appreciated!

- let us know of any bug/issue you are aware of! (→ bug tracker)
- send us bug fixes you have developed
- send in hints, documentation & feedback
- make your data & analysis templates available for automated regression tests
- commit improvements to code, optimizations or new features to the SVN trunk

let’s stay in touch!

- sign-up to become SVN developer
- sign-up to devel-mailing list
- want to keep up to date with releases, workshops and forum activity? → sign up to users-mailing list!
Summary

• EUTelescope is a versatile data analysis framework, constantly being extended and improved

• EUTelescope release 0.8 was a big step forward, but more tasks are ahead

• Igor and I feel responsible for coordination of development
  ▶ let us know when features are needed or problems occur!

• you are welcome to join in developing EUTelescope!

Some further points to discuss over the next days

• who currently maintains/uses a branch on EUTelescope (non-trunk/release)

• who is interested in working on EUTelescope (e.g. technical task PhD)

• is there interest for a next workshop? or infrequent but regular developer meetings?