

Core Project Status

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For the LArSoft Project Team

LArSoft Steering Group Meeting

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- Summary of status of releases, architecture, usability, larlite/larsoft integration, continuous integration.
- Task force led by Jim K to do memory performance profiling of the uBooNE simulation executables/workflows, a recommendation from the recent Scientific Computing Portfolio Management Team review.
- Discuss ideas related to the proposed review

Core Project Area: Releases

- Important to have release using Geant 4 10 validated ASAP by experiments
- Release with root6 is targeted by end of March. The preceding validation is crucial for this.
- Continuous integration continuing to detect some issues before they reach the experiments.

Core Project New Area: Usability

- Hep Software Foundation report likely to recommend use of SPACK for HEP build/releases.
 - Developed by LLNL,
 - Brett, Jim Amundson, Benedict all extending the s/w and had productive meeting with the developers.
 - Jim Amundson will build out project goals and timeline over the next few weeks. (will need effort released by end of Larlite/LArsoft integration project)
- Short term focus on usability for June workshop
 - Gianluca finished initial information collection stage. Project will work internally and with software and computing coordinators to determine what can get done in the next few months.

Core Project Area: Re-architecture

- Saba released Phase I of Track3DKalmanHit re-architecture:

- available in the following feature branches in larreco and lardata
 - feature/ss-refactoring
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- With Gianluca take a look at fcl configurations before merging to develop.
- New files are as follows:
 - larreco/larreco/RecoAlg/Track3DKalmanHitAlg.h
 - larreco/larreco/RecoAlg/Track3DKalmanHitAlg.cxx
 - larreco/larreco/RecoAlg/Track3DKalmanHit.h
 - larreco/larreco/TrackFinder/DumpTracksSpacepoints_module.cc
 - larreco/larreco/TrackFinder/dumptracksnspts.fcl
- Modified files are as follows:
 - larreco/larreco/TrackFinder/Track3DKalmanHit_module.cc
 - larreco/larreco/TrackFinder/trackfinderalgorithms.fcl
 - larreco/larreco/TrackFinder/trackfindemodules.fcl
 - larreco/larreco/TrackFinder/trackfindemodules_microboone.fcl
 - larreco/larreco/TrackFinder/trackfindemodules_noinclude_base.fcl
 - larreco/larreco/TrackFinder/TrackStitcher_module.cc
 - lardata/lardata/RecoObjects/KHitContainer.h
- New Structure is as follows: Track3DKalmanHit_module
 - Track3DKalmanHitAlg
 - KalmanFilterAlg SeedFinderAlg
 - SpacePointAlg
 - SeedFinderAlg
 -
 - Track3DKalmanHit_module.cc now provides an implementation of art module with an interface to the algorithm class (Track3DKalmanHitAlg) that doesn't directly interact with an event.
 - There are several places in the code, which were not refactored/modified in this version and need much more work.
 - **Testing**
 - Tested and verified the following modes:
 - UsePFParticleHits is true
 - UseClusterHits is true
 - SelfSeed is true/false

- Agreed to continue for 2 months on Phase II:

- Gather information and gain understanding of the current code beyond the top level module and refactored algorithm to add "interoperability" to the code
- Setting up test cases, other experiment code
- Understanding the geometry assumptions in the code, Investigate the use of geometry service and interfaces
- Looking/reviewing the KalmanFilterAlg and SeedFinderAlg in particular to understand the next level of the code and detector specific assumptions and fix the top level module and algorithm in the process where needed
- Work with experiment people to gain an understanding of the detector specific design

- Continued framework, architecture, futures discussions between Amir, art, LArSoft, experiments

Core Project Area: Larlite/LArSoft integration

- With Kazu's efforts in April, May, June hope to complete the project in a few months.
- Tasks include an agreed upon mechanism to maintain interoperability post this development phase.

Core Project Area: Sharing of Algorithms

- Many algorithm changes going into the shared code base
 - PMA developed for DUNE now part of end-to-end chain for MicroBooNe
- Regular Pandora updates now happening at each coordination meeting. Short term goals include
 - Accomplished ROOT-based Pandora visualisation tools now work nicely in LArSoft. Enables full support for Pandora algorithm development in LArSoft.
 - making changes more accessible to LArSoft users e.g. immediate access to feature branches
- Some small additional work for WA105 with in LArSoft (Robert Sulej and Dorota Stefan have joined the collaboration) towards parameter optimization,
<http://laguna.ethz.ch/indico/getFile.py/access?contribId=11&sessionId=4&resId=0&materialId=slides&confId=170>
- Panagiotis sponsoring part-time contract with Robert
working toward the full development of the reconstruction software for the ProtoDUNE experiment at CERN. This activity, to be carried out at CERN, will be within the context of the development of the LArSoft software package currently led by the FNAL SCD. In addition, your role will include the coordination of LArSoft activities at CERN and being a point of contact for the aggregation of forthcoming ProtoDUNE European activities in matter of LArTPC event reconstruction and data analysis.

Task force on memory (then CPU) performance profiling

- Strong recommendation from the Scientific Computing Portfolio Management, reviewers for SCD experts to help address memory footprint issues of LArSoft based experiment code. Highest priority uBoone MCC7 codes.
 - Jim K leading this effort. Additional effort from Vito and consulting from Soon Yung Jun from the Simulation Group.
 - Goals include putting in place ongoing infrastructure and processes - ? integrated into continuous integration ? – for collection and analysis (latter much more difficult) of data. Hope to increase collaboration with local Geant4/Geant5 group.
 - Data collection now; Analysis in ~2-weeks (many people traveling next week); Recommendations for changes ~4 weeks.
 - Expect experiments and SCD to provide effort needed to address recommendations
 - Will ultimately publish list of tools and include such consulting as an ongoing Scientific Service Offering.

Project short term timeline – reminder and updates

Target Completion:

- ~~3/1:~~ 5/1-*Paraview-based event display prototype*: Jim Kowalkowski: Report on pilot/prototype using Paraview-based event display of LArTPC data from MicroBooNE
- ~~5/1:~~ *TBD.(Taking an incremental approach at present) Review of LArSoft*: all:
- ~~4/1:~~ 6/1 *Refactoring/Architecture development*: Saba: Complete Track3DKalmanHit refactoring, make recommended changes to art and LArSoft utilities as a result of this work, Herb (owner) acceptance of the outcomes.
- ~~5/1:~~ 6/15 *LArLite/LArSoft Integration*: Chris Jones, Marc Paterno and team: Complete and in use at/by Microboone.
- 6/22 : *LArSoft Workshop*: all:
- 7/1: *Performance Improvements*: SCD and Experiment contributors - TBD: Improve selected algorithm efficiency performance based on recommendation reports already written.
- 7/1: *Focus on Usability*: Gianluca: Gather specific input from developers and users and address assess/make progress on several specific issues.

Target Start:

- 5/1: *Improvements in event display capabilities*: Saba: Based on more specific requirements: Define/design directions based on report from the Paraview-prototype
 - Targeting summer student hire to come help here also.
- 7/1: *Assess multi-threading needs and impact*: Gianluca: Participate in more general work to design and develop for multi-threading support in art and LArSoft

Miscellaneous

- Productive LArSoft related discussions at ProtoDUNE DAQ workshop. Follow ups include:
 - Daniel Elvira's team working towards slides/discussion within GeantV and Pere Mato on neutrino LArTPC experiment simulation scenarios/information
- Discuss ideas to have incremental review:
 - Following CERN visit, Pere Mato is reading (architecture, requirements) and will send comments soon
- ICHEP abstract accepted for oral talk in technology session
- Next newsletter aims to include first shared algorithm info and credit :
 - Cluster crawler from Bruce Baller
- Looking for postdoc/grad student for art workbook work in the summer <https://indico.fnal.gov/getFile.py/access?resId=0&materialId=0&confId=11693>

Discussion
