

LArSoft architecture project report

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(Presented/compiled by Erica Snider)
(i.e., don't blame him...)

Fermilab

J
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Current activities

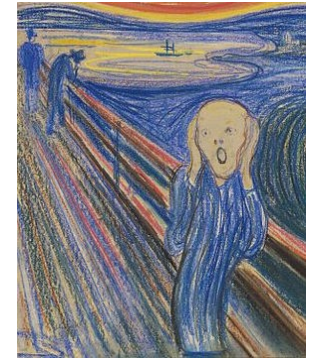
- Factorization of basic services
 - DatabaseUtil: preliminary version by GP, needed as dependency of...
 - LArProperties: Jonathan Paley completing the work
 - DetectorProperties: Brandon Eberly or Jonathan Paley (?) have volunteered after LArProperties is completed.
- After the services are factorized, focus will move to reconstruction algorithms
 - CosmicTracker
 - TrackKalman3DHit
 - fuzzyCluster
 - RawHitFinder
 - others

Future topics

- Detector topology
 - Make geometry service aware of relative spatial relationship between detector elements
 - e.g, answer questions such as “which TPC is downstream of this TPC?”
 - Will consult with experiments (esp. DUNE!) to establish requirements

Event display optimization

- MicroBooNE reported event display for data is unbearably slow
 - ~300 s to display raw digits in a noise run with:
 - Local data source, local working area
 - Uncompressed raw digit input (no Huffman, no zero sup)
 - Remote graphic display (like GPVM node)
 - On zooming any view, same amount of time required to re-draw
 - Investigation and profiling findings
 - Main issue: attempt to draw too much information
 - Secondary issue (~15% of the time): redundant checks in LArProperties

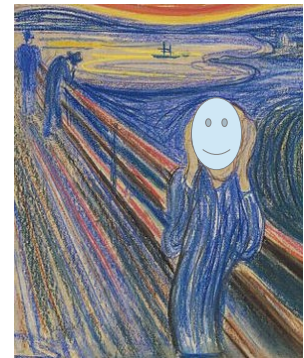


Event display optimization

- Event display works through three “components”
 - EventDisplayBase (nutools)
 - Provides basic classes for implementation of the display and the mechanisms to control user interactions (e.g., changing event)
 - EventDisplay (LArSoft)
 - provides content to be displayed, details of the interaction (e.g., zoom on digits)
 - ROOT
 - Provides interface with the graphic server (in our case, X11)
- Components 1 and 3 are shared with NOvA via nutools
 - NOvA does not experience any slowness – the system works for them (!?)
 - Each raw datum is drawn as a rectangle (“box”)
 - Displays one box for each of the ~300k (?) channels
 - uBooNE display one box for each TDC tick of each TPC readout channel
 - ~ 80M data points

Event display optimization

- This system does not scale
 - Root attempts to draw all 80M boxes
 - The screen can't fit all the information
 - Default view allows for about 15k pixels per view
 - Ends up clipping out or covering most of those boxes
- The “work-around”
 - Re-write LArSoft side of raw digit treatment to limit the data displayed
 - Now the information is combined as soon as it is read
 - No more boxes are created than the number that can be displayed on the screen
 - Also added a cache for compressed raw digits
- The result:
 - The event that took ~300 sec now takes ~5 sec (!!)



Event display optimization

- The current status

- Implemented in larveventdisplay branch feature/gp_FasterDigits
- A number of known glitches

Please test it and report the glitches that you feel need to be fixed
Gianluca will request merging no later than two weeks from now

- But what about the other 15%??

- Birks correction is called for each digit
 - It queries LArProperties for two bits of information that might be in the DB
 - Currently there is no DB...
 - Those bits check whether there is a DB connection. This check is expensive
- The solution:
 - Made the check cheap
 - This change is already in lardata

The end