DUNE Software Architecture – Coldboxes, Channel Numbering, HDF5

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DUNE Software Architecture Meeting

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Progress and Near-Term Needs

- Jake, Barnali and David have worked on a HDF5 input source, a deserializer tool with delayed reading, and dataprep upgrades for the VD Coldbox
- Tom has worked on the channel map and monitoring scripts, and the DAQ dataformats interface (dunedetdatformats, dunedaqdataformats)

- HD Coldbox data are coming!
  - We have not been told what the data and file formats are.
  - Good guesses: HDF5 format, similar to VD coldbox data (APA group names).
  - I am not sure which WIB Frame format is going to be used.

Progress and Near-Term Needs

- ProtoDUNE-SP decoder cannot be used for HD Coldbox data (it's HDF5)
- VD Coldbox decoder uses the VD coldbox channel map and we need either a new channel map or re-use the ProtoDUNE-SP channel map
- Giovanna tells us that WIB1 frames will be used for this year's HD coldbox data, the same as VD coldbox BDE data.
- One could in principle reuse the VD source and deserializer for the HD data, and switch the channel map as a fcl parameter
- If this is a long-term solution, we could rename the input source and deserializer tool so they are not considered useful only for the VD coldbox.

Progress and Near-Term Needs

- What we have seen however from past experience on ProtoDUNE-SP and Iceberg is that each detector develops its own personality
  - Iceberg: cable swaps depending on run number, data format changes (WIB1 vs WIB2 vs spy buffer vs FELIX buffer)
  - ProtoDUNE-SP: FELIX vs. RCE, FEMB 302, dodging around corrupt data.
- I propose keeping VD and HD source and deserializer tools separate, even if there is some duplication. Maybe move some common HDF5 tools to a utility library somewhere.
- At the very least, dataprep needs to be aware of which detector it is preparing/making plots for (channel labels differ: U, V, X(or Z or C, vs. U, Y and Z).

ProtoDUNE-2-HD

- Need a good name for this
- Need a new offline geometry
  - Four APAs instead of six
  - I do not know how far away from the upstream cryostat wall the FC will be
  - Probably the shorter the better, for physics – less material for the beam to pass through. Shorter beam plug.
- Two APAs will be "upside down"
  - Electronics on the bottom
  - Symmetry of wires may mean we don't need to redesign the channel sorter – just a channel map of electronics → offline channel numbers

Offline Channel Numbering

E-mail exchange with Marco Verzocchi

I had proposed mapping offline numbers to APA and CE schemes so we can speak their languages without disrupting our internal numbering. APA numbers, TPC set numbers, and Z or X wire names have differed based on context.

Hi Tom
you seem to be missing the point. Throughout ProtoDUNE-1 we have been suffering from the fact that the APA was using one numbering scheme, TPC Electronics, DAQ, offline were using a different numbering scheme. When there is a problem with a wire, we need some conversion to make sure that we identify the wire in a unique way.
The technical board agreed that we were going to use a single numbering scheme everywhere and not just for making plots. Because if you agree that you use one wire numbering inside the code and another one in the software to make plots, somebody is going to forget at a certain point.
The next discussion was whether we would use the APA numbering scheme or the other numbering scheme, and Thomas R Junk (your evil alternate ego) said "we can use whatever you want, we can easily change things". We are at the point where we need to make the changes. Yes, sooner or later we will need to decide how to handle old MCs. And to be honest, I think it is too late to tell the APA consortium "sorry, we should not have listened to the evil alternate ego, can we revisit the decision ?"
Marco

Offline channel numbering

- Not changing for ProtoDUNE-SP or Iceberg.
- VD and HD coldbox getting settled in
- ProtoDUNE-2 we can renumber our channels – no great investment in MC yet
- Only real issue is the FD. We have existing MC, with six-digit (decimal) integers as channel numbers. Not very human-friendly, but natural in the software (uint32_t, contiguous).
- No proposal yet from CE or APA consortia. My guess is that descriptive labels would be easier for them. APA124:U799 or something like that. One could write that as 12400799 or something like that in decimal.
- I wouldn't try to guess.

Offline channel numbering

- If the proposed numbering fits in uint32_t's, we could write a new sorter method, but we'd have to support the old one too for old MC.
- New geometry name category: see DUNEGeometryHelper_service.cc
  Have to use names not including "dune10kt" as they use the old channel sorter.
- Enforce geometry consistency with geometry configuration writer so we don't mix and match geometries.

detchannelmaps

- Still don't quite know what to do with this repository
- Belongs to DAQ, but straddles DAQ and offline.
- Though if CE or APA consortia own the channel numbering, then we follow along.
- Versioning is the problem brought up last week
  - offline must support all old versions because data are on disk and tape.