

Collaboration Mtg Eric, Yale, 8-Aug-2013

Outline

- Status
 - PMT data
 - Run Control
 - SlowMonCon
 - EPICs, HV controls, Glomations
 - Beam data
 - Run Configuration, Channel Map data bases
 - Online Monitoring
 - MRT
- MicroBooNE DAQ After the MRT Phase 1&2
 - % completions

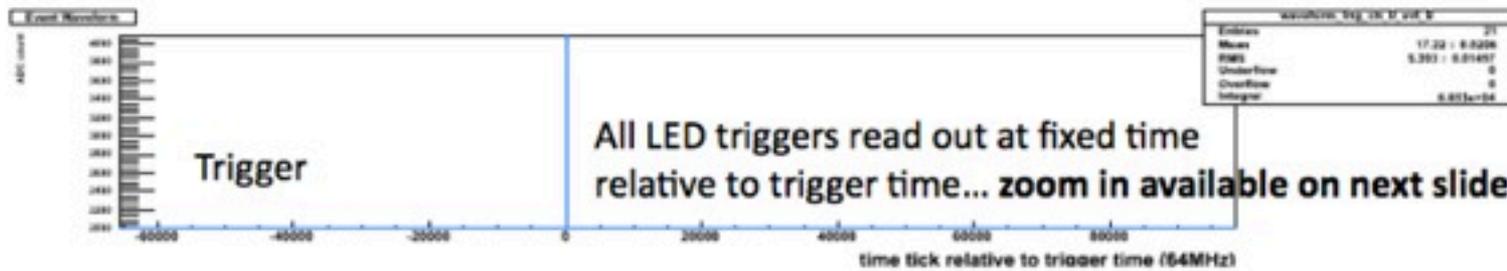
PMT data -- Georgia

- 80 slides at docdb 2720

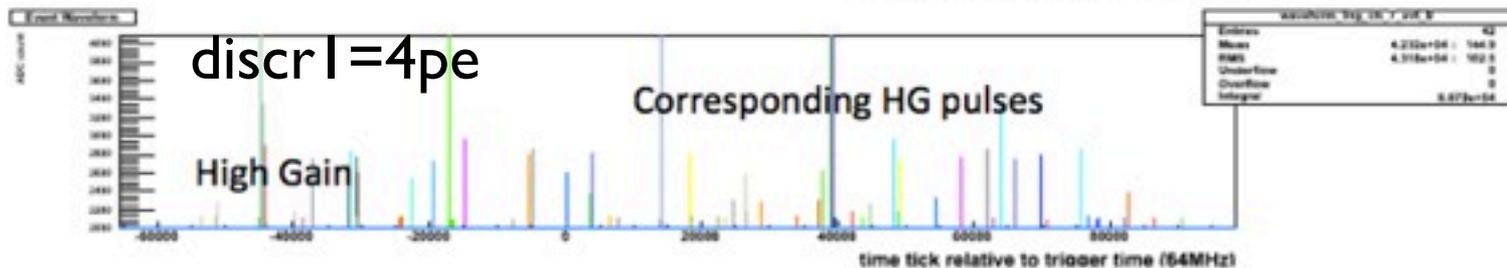
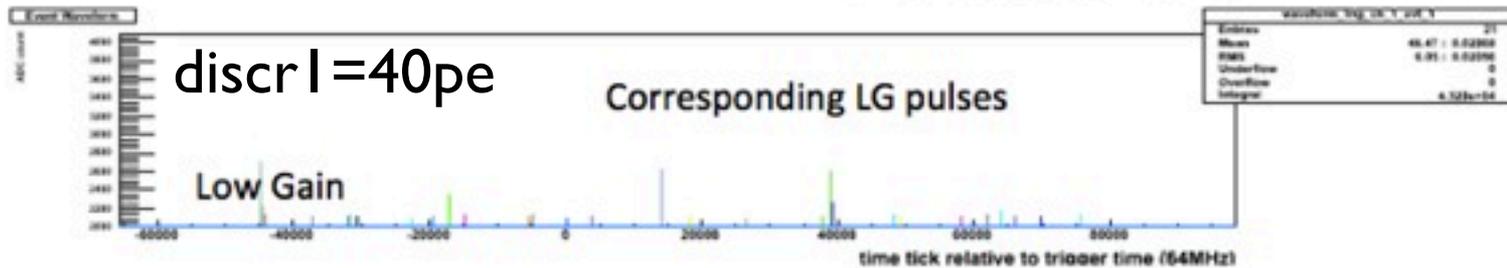


Event overlays: time-corrected relative to trigger frame and sample number

Frame size = 8192 16MHz ticks = 32,768 64MHz ticks (shown) = 512 us



LED flasher



PMT data -- Georgia

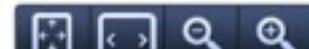
- docdb - 2727 Run mode plans

Planned runs with Bo

- <http://microboone-docdb.fnal.gov:8080/cgi-bin/ShowDocument?docid=2682>

Types of test runs (leading up to Final Goal Run):

- 1) LED run, triggering on EXT=LED, no beam gate into FEM → Only Discr 1 will fire (20-400 samples)
- 2) COSMIC run, triggering on EXT=paddles, no beam gate into FEM → Only Discr 1 will fire (20-400 samples)
- 3) BEAM run, triggering on BNB=BEAM gate, beam gate into FEM → 1500 samples will always be in the event; Discr 1 (20 samples) data will sometimes be in the event
- 4) PMT run, triggering on PMT trigger, no beam gate into FEM → Only Discr 1 will fire (20-400 samples)
- 5) PMT run, triggering on PMT (cosmic only) trigger, beam gate into FEM → Mostly Discr 1 (20 samples) data and/or sometimes 1500 samples
- 6) PMT run, triggering on PMT (beam only) trigger, beam gate into FEM → Always 1500 samples and sometimes Discr 1 (20 samples) data
- 7) PMT run, triggering on PMT (beam or cosmic) trigger, beam gate into FEM → combination of (5) and (6)
- 8) Final Goal Run: combines (7) and (3). The "Final Goal Run" is a possible commissioning run configuration.



PMT data -- Wes docdb2715

- Meanwhile, we are preparing to read these binary data files up in the DAQ
 - Readying ourselves for when we're reading this data with actual DAQ code
 - datatypes directory

Name	Size
CTakeLists.txt	4.5 kB
beamData.cpp	588 Bytes
beamData.h	1.2 kB
beamHeader.cpp	820 Bytes
beamHeader.h	1.4 kB
cardData.cpp	4.3 kB
cardData.h	3.1 kB
cardDataPMT.cpp	4 kB
cardDataPMT.h	3.4 kB
cardHeader.cpp	1.2 kB
cardHeader.h	2.6 kB
cardHeaderPMT.cpp	1.7 kB
cardHeaderPMT.h	3 kB
channelData.cpp	2.3 kB
channelData.h	3.1 kB
channelDataPMT.h	1.8 kB
constants.h	547 Bytes
crateData.cpp	5.3 kB
crateData.h	3.6 kB
crateDataPMT.cpp	3.7 kB
crateDataPMT.h	3.6 kB
crateHeader.cpp	275 Bytes
crateHeader.h	3 kB
dataHeaderTrailerPMT.h	2.4 kB
eventHeaderTrailer.h	2.3 kB
eventHeaderTrailer.cpp	1.4 kB

Run Control -- Rashid and David K

- ❑ Need to get a couple packages updated from NOvA
- ❑ Very close to providing a Splash Screen and functioning GUI.
- ❑ Application Monitor will follow

SlowMonCon -- Sowjanya and Glenn

- ▣ See Sowjanya's talk

Glomations

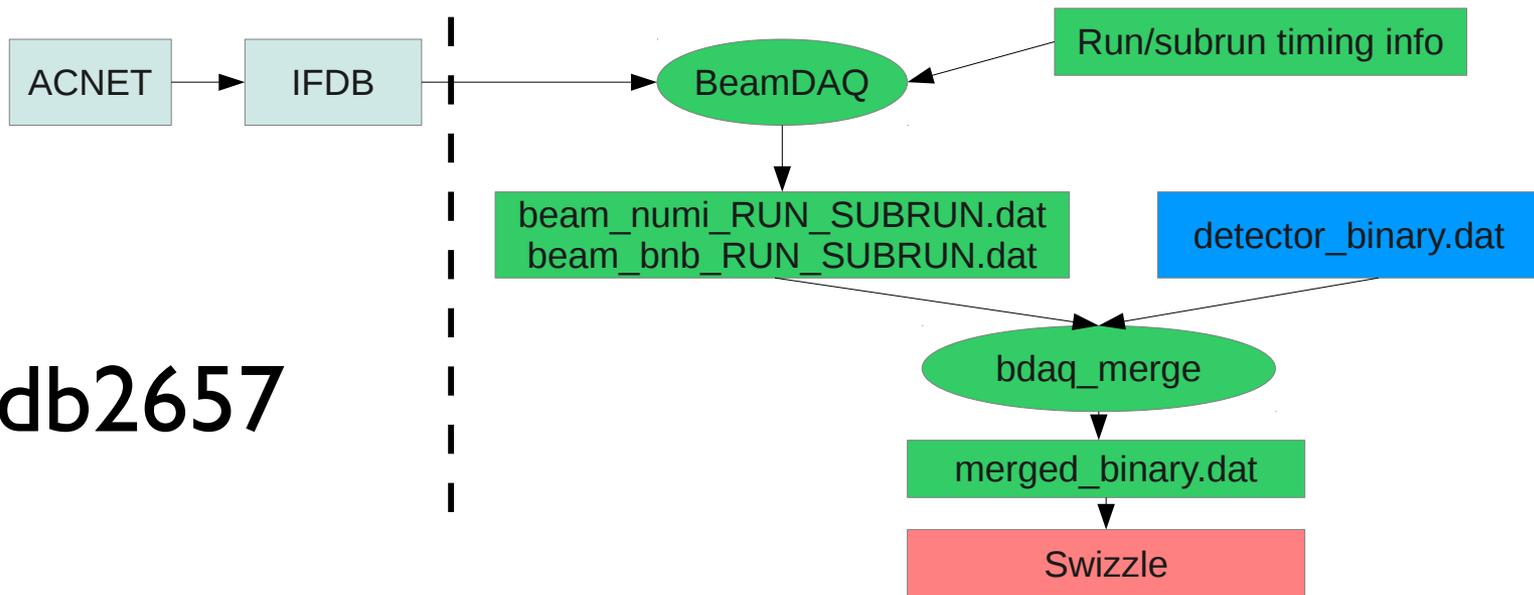
- These use I2C (protocol) and serial ports to measure fan speeds and various temperatures in racks
 - The Glomations shipped to us use a kernel (3.2.6) for which I2C drivers don't work.
 - They worked fine on pre-production boards that ran kernel 2.6.27. We thus need a kernel patch for all 18 of these. Andrzej has done this, via tftp.
 - Also, we need each to know who it is (IP address, name) and so the proposal is to put the root file system and kernel on an SDRam card and boot from it. This is proving difficult. Default: kernel in Flash.
 - In short: progress, but it'd be nice if it were less keystroke-heavy. Progress here to script the tftp! New talk of booting/mounting over NFS. (my fave idea)

Run Config dB -- Andrzej, Wes

- The postgres dB exists on uboonedaq-smc.fnal.gov
- Run config tables defined
- python api to do postgres inserts/queries work
- Much work still for run control to have all the dB connections that are needed

Beam data - Zarko

- Use IF beam DB to get the acnet data
- Two modes of running:
 - Get data for specific time period
 - Get data continuously until receiving end subrun command
- At the end of subrun merge beam and detector binaries



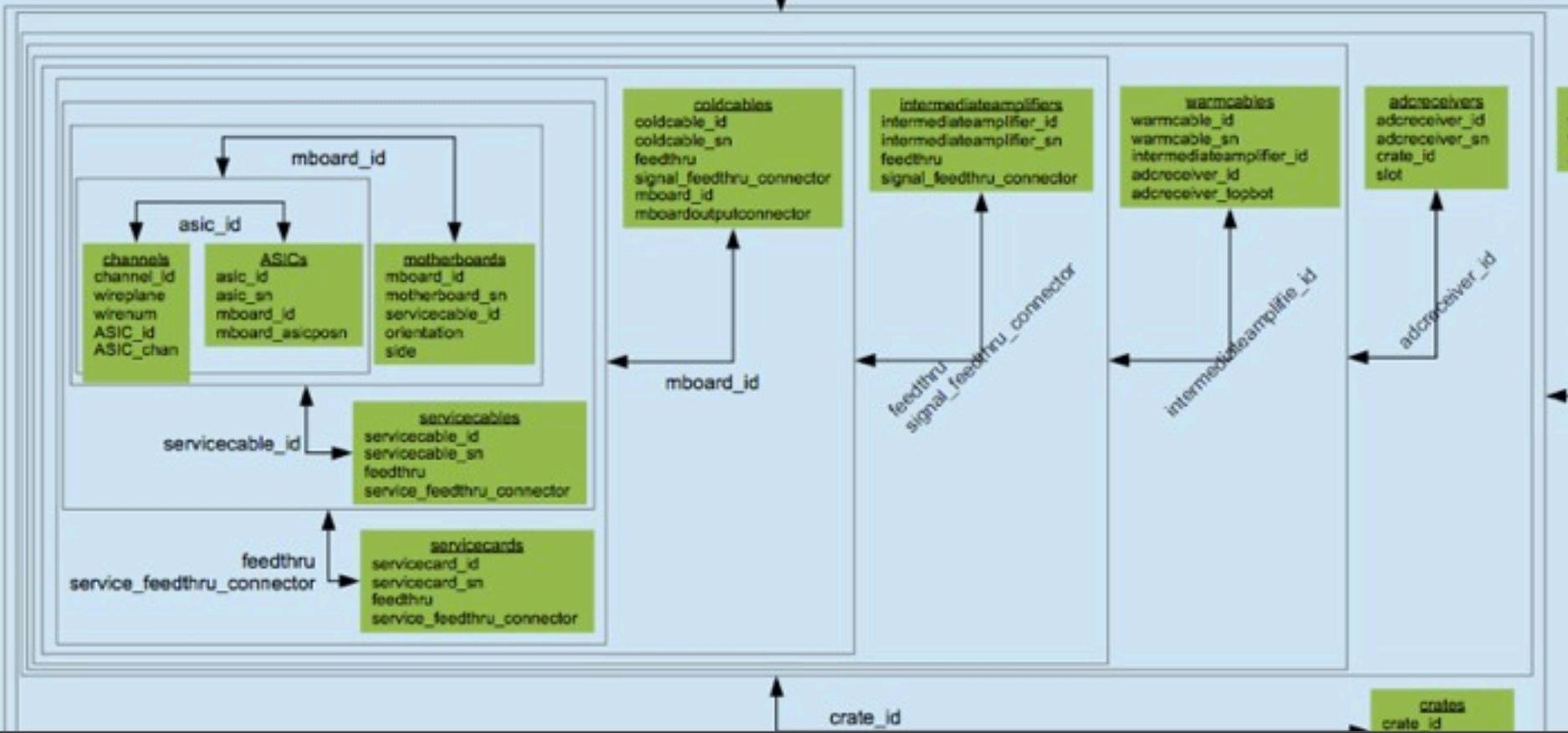
docdb2657

Channel Map -- Jason St John docdb-2574

This page may need updating to match the previous page.
-jmsj 2013.06.12

orientation
asic_chan
mboard_asicposn
mboardinputconnector

motherboard_mapping
mboard_channel_id
orientation
asic_chan
mboard_asicposn
mboardinputconnector
mboardinputconnector_pin
mboardoutputconnector
mboardoutputconnector_pinpair



channel map dB -- Jason

docdb-2574

- A set of tables indexed to each other, to spell out every connection from FEMs down: “joins” of tables are performed with each submit

TPC Hardware Connections Database



What is Connected to What?

Use this page to find out how the hardware in the TPC readout system is connected together.

What can you specify?

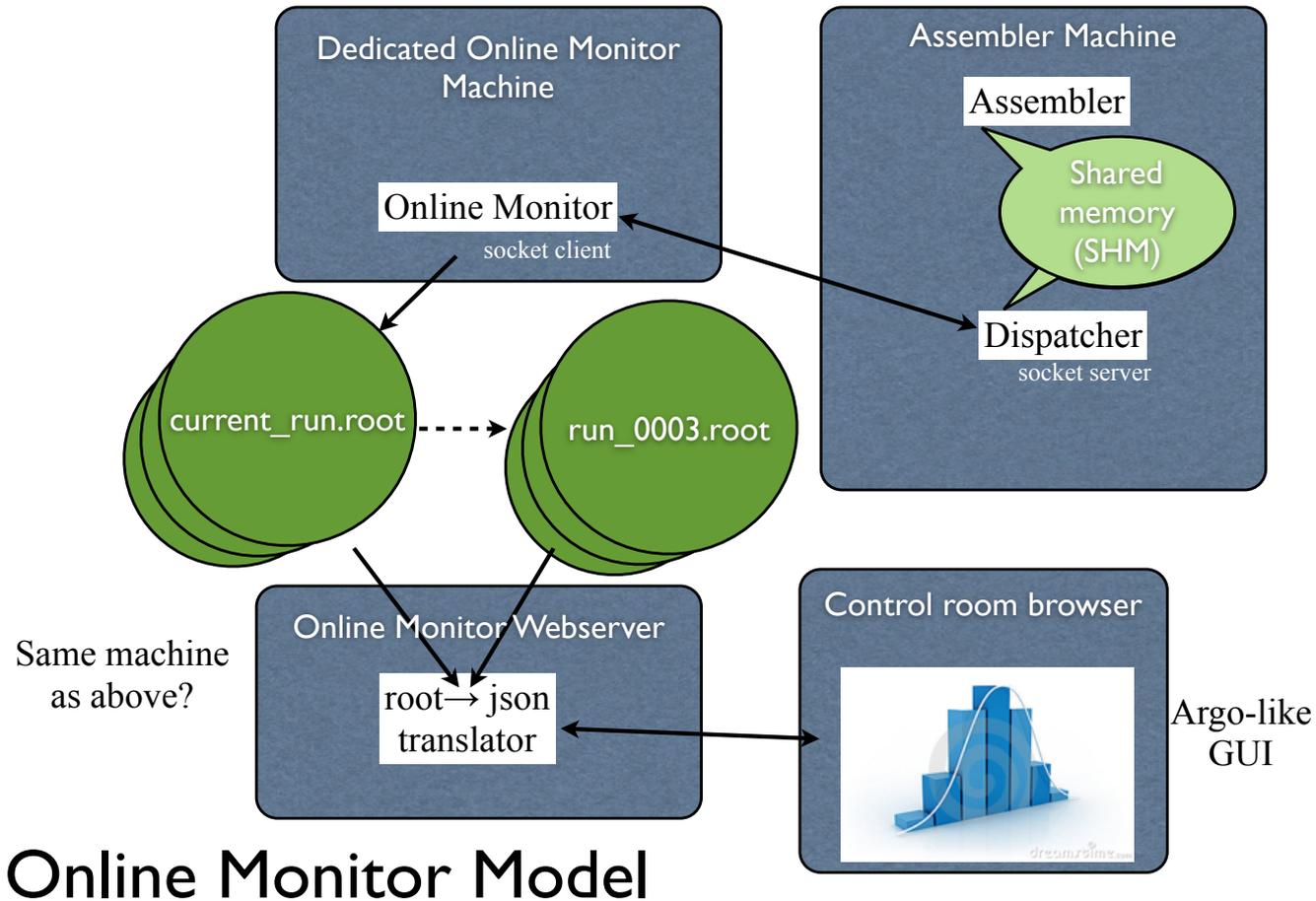
Shared @ Feedthrough			
signal_feedthru_connector A1 to B12 <input type="text"/>	service_feedthru_connector AB CD <input type="text"/>	feedthru 1 to 11 <input type="text"/>	faraday_cage_connector A-1 to D-6 <input type="text"/>
channels ID 0 to 8255 wireplane U/V/Y wirenum in plane asic_chan 0 to 15 LArSoft Channel 0 to 8255 LArSoft Wirenum 0 to 8255	asics ID 0 to 515 S/N mboard pos'n 1 to 12	motherboards ID 0 to 49 S/N orientation hori vert side downstream top upstream	coldcables ID 0 to 257 S/N mboard outputconnector 1 to 6
motherboard_mapping mboard_channel_id 0 to 191 inputconnector 1 to 6 inputconnector_pin 0 to 63	intermediate amplifiers ID 0 to 257 S/N	cold servicecables ID 0 to 21 S/N	servicecards ID 0 to 21 S/N

databases (by my count)

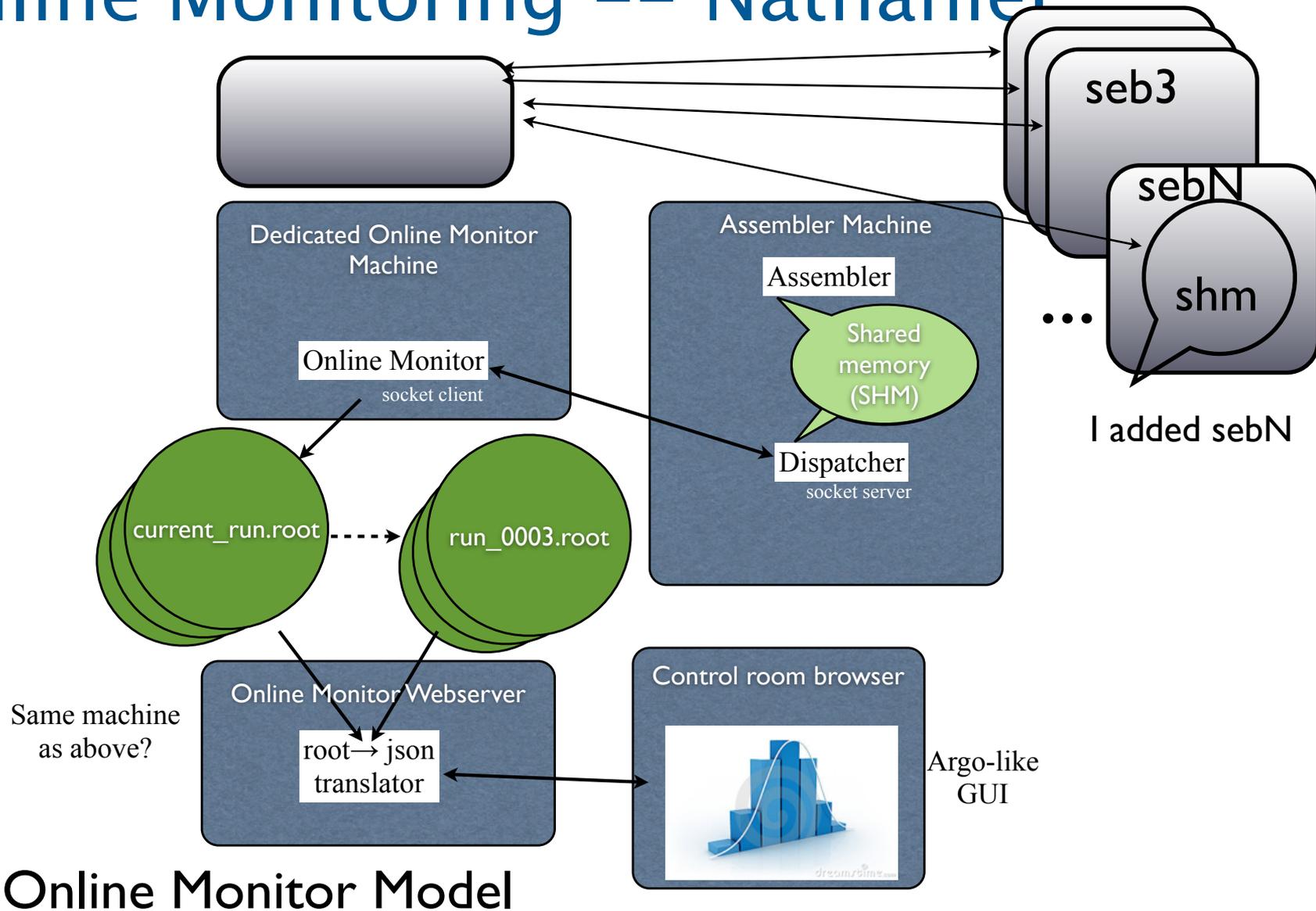
dB	hosted server
EPICs slowmon	uboonedaq-smc
Run Configuration	uboonedaq-smc
Channel Map	uboonedaq-evb (eventually smc)
Offline (not DAQ) dB	dbdata0.fnal.gov

Online Monitoring -- Nathaniel

docdb-2674



Online Monitoring -- Nathaniel



Online Monitor Model

MRT, phase 1 & 2

- Phase 1 is complete
 - Testing all the boards with one common cold cable, one common warm cable set.
 - roll the MRT along the anode frame, one flange (4 boards at a time), detach/attach cold cables each time at new position

- Phase 2 involves testing out a unique cold cable set per flange (4 boards), and laying them into a cable tray
 - They will sit there as the TPC is pushed into the cryostat and fished out and attached to real flange

What we have accomplished with the MRT phase 1 docdb2627

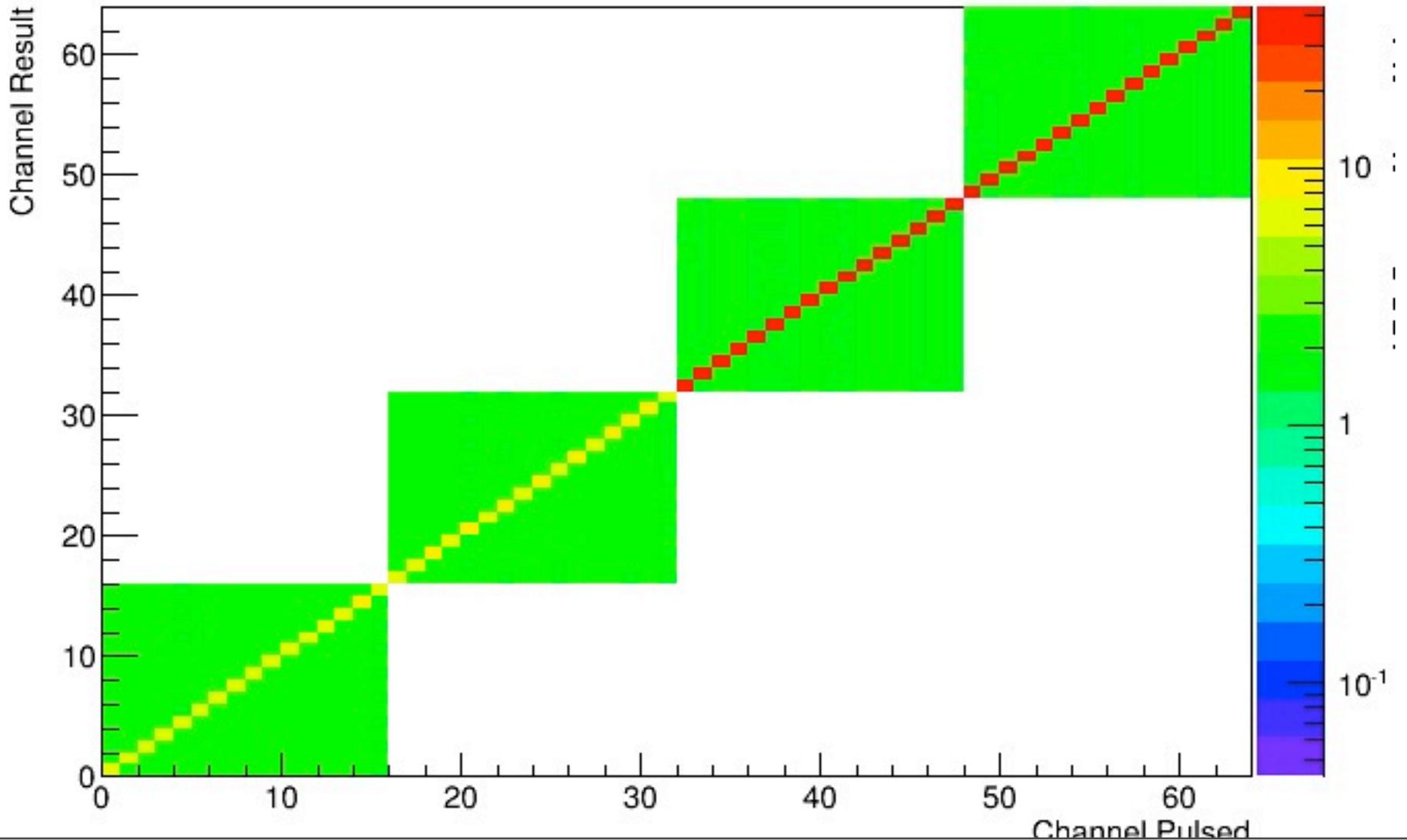
- Exercised many elements of the DAQ
 - Message passing: necessary for run control
 - Calibration-mode running of NEVIS readout
 - Configuration of ASICs
 - Building of (simple, single-crate) events
 - Unpacking and analysis of built events
- Only two major errors that stopped data-taking over millions of events
 - Unknown DMA timeout
 - Strange loss of message passing to seb
- Verified our electronics are working!

From the results of the MRT, we have...

- Identified and replaced motherboards with bad channels
- Identified and repaired cold cables with bad connections
- Identified and repaired bad connection to wire-carrier boards
- Identified and reported strange signals from wires
 - Turned out: corner wire not held at enough tension and was shorting out another wire
- Learned a lot about the configuration and readout order of ASICs/channels

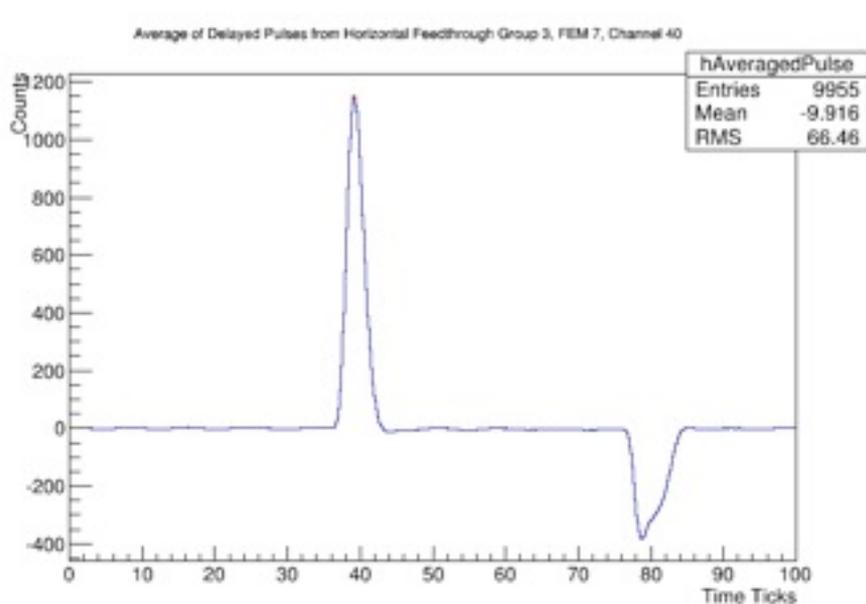
Cross-talk on 4 ASICs of one motherboard

Intra-ASIC Crosstalk Check from Horizontal Feedthrough Group 3, FEM 3

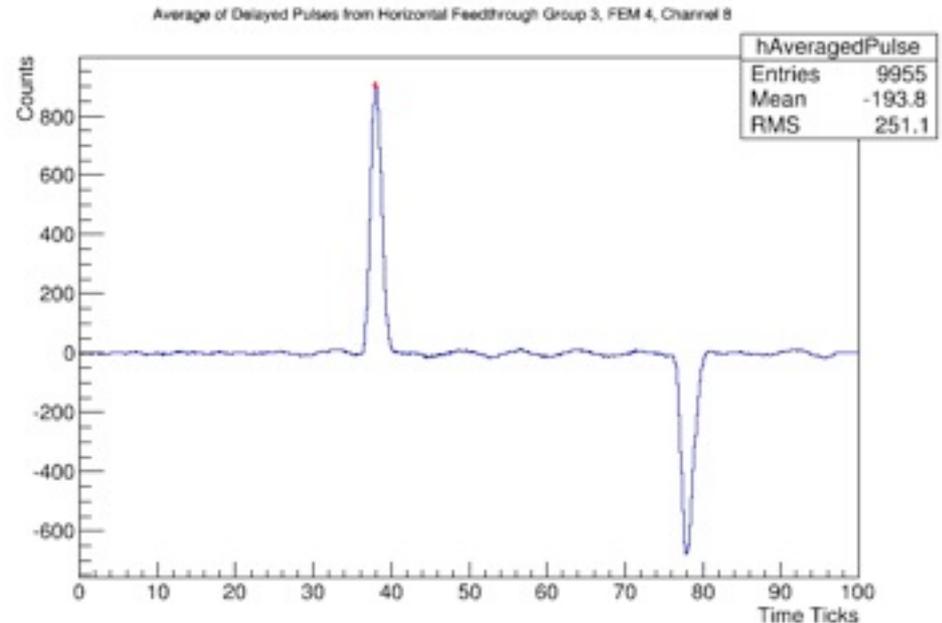


raw signals

Collection channel



Induction channel



We actually sample here, by delaying the pulser by 50nsec intervals, at a resolution finer than the 500nsec sample time: these pulses are therefore actually averages putting this together, diluting the random phase noise.

A summary of tools (tasks) yet to build (perform)

- Let's presume MRT, Phase 1&2 is behind us (end-Aug)
- Sept-end 2013 timeframe
 - DAQ team should have a TPC crate and a PMT/trigger crate setup somewhere.
 - LArTF: PMT+TPC rack in the computer room, say
 - pros: has the IRM there and thus can tune the beam timing. Can begin actual commissioning at LArTF in-place with real DAQ computers. cons: no flange, no PMT
 - MRT: add a PMT crate
 - pros: We have ASICs and a flange already. PMT-on-Wire pick-up can be studied. And then it can be done with TPC in cryostat, which will be nice. cons: not commissioning at LArTF!
 - Configuring computers at LArTF September
 - Currently are close. Need to network them, mainly. FEF standing by. ACNET timing, GPS coding...PMT crate

First things first, post-MRT phase1&2 on DAB test stand:

- Fix/understand problem of missing Beginning/
End of event words in compressed mode
- This is our 0th order readout hurdle right now.
- Once solved, run in SN + Trigger mode.
- Can we query status on crates while we run??
- Then ...
 - Read the Trigger card directly in crate on its fiber/
PCIe

Progress at Nevis. Port of code at
DAB needs attention.

Work that must be done in September when a test stand gets a PMT crate **and** a TPC crate.

- ❑ Will likely continue to run in small frame (<1.6 msec) mode, uncompressed, no SN data, as currently on MRT.
- ❑ Generate triggers
 - Pulse LED flashers, not wires, with software triggers
 - Make sure we can read PMT data
 - Pulse flashers **and** wires
- ❑ ~~Fan out trigger to generate readout of both crates. Fanout clock.~~ Here at DAB, after Nevis sorts it out there.
- ❑ Run in compressed mode
- ❑ Get assembler to read and build data from both.
- ❑ Do it with TPC in Cryostat

Nevis TPC Crate Testing Status

- All 9 TPC crates assembled in their final configuration at Nevis.
- Suite of tests performed to ensure proper performance of all boards/functions.
- Tests described in write up soon to be on **docdb-2734**. Tests include:
 - 1. Checking backplane voltages
 - 2. Filling crate with (CTRL)+(18 ADC+FEM)+XMIT, reading out fake data from all FEMs simultaneously through XMIT TRIG to check token passing
 - 3. Reading out similarly through XMIT SN to check supernova path
 - 4. Reading out real digitized pulser data through CTRL (slow)



Nevis TPC Crate Testing Status

- All testing has finished, all crates performed as expected.
- 4 TPC crates packed and shipped to FNAL ahead of schedule.
 - Arrived in very good condition!
- 4 more crates will ship August 20th.
- One crate remains at Nevis for combined TPC+PMT readout



procurements & project

- procurements recently complete, except
 - data fibers, network fibers/cat6 not yet PR'd
 - Networking getting these, we just give 'em the project code
 - equipment for newly-discussed PMT expansion of the MRT
 - not much: a new AFG, ...
- Project to close out end of September
 - presuming we can show some functional dual-crate readout, as I understand it
 - This means almost nothing to the DAQ
 - We do need to be sure Kurt/Ron/Gennadiy stay on the payroll at a sufficient level

software components List

Tasks /components	completion (%)	effort
Beam Data	90	
Online Monitoring	70	
State Machine	70	
Read-out	40	
GPS time into event	30	
DAQ config dB	30	
Run Control GUI	20	
Application Manager	20	
Swizzling*	20	
Parallel Swizzling	0	no one
SuperNova	0	VT,Yale,

* process of taking .bin -> ART .root files

install at LArTF

- see Evan's talk
- In short: it's 80% done
 - some cabling still to be done after end of next wk
 - ORCs needed
 - CD-FEF (sysadmins) standing by

Backup

Post-September: SuperNova data. (Big project, I think)
this code is not writing itself.

- ❑ Scripts needed, listening/reacting to SNEWS email, to tell processes on SEBs to drill down into appropriate frame numbers ± 1 hr around putative SN. Then, fake this email at reasonable rate (~ 1 wk).
- ❑ Ensure we're in a low rate trigger mode.
 - if not, stop, reconfig, re-start Run.
- ❑ Pull that data off disks, ship it over sockets to assemblerSN, intelligently, over network.
- ❑ Swizzle, analyse to look for the actual events.
- ❑ Scripts to monitor/reap disks
- ❑ Meta scripts to watch over all this.

New Work and moving parts that are remaining that (I think) we should have at least parts of running by end of June/July.

□ ~~DataSpy Online Data monitoring~~

- Start with SEB SN info. Look for messed up data words: show good/bad in color coded grid at actual wire/PMT data in in-browser histograms. Hand off data to online monitor via shared memory. `argo_backend`

□ Dispatching data from files to NEARSoft swizzling processes. Is this something we build from scratch?

- nothing done here yet

□ Application Manager

- should likely port this from NOvA, as planned

Other things that have been started that I hope can be pretty mature by end of August

- DAQ dB schema and hooks into dB
 - Calculate calib constants
 - Should fall out from MRT work
- Process to insert beam data into data file.
- data swizzling
 - decompressing
- Run Control GUI
- GPS time into SEB header, then G1b1 header
 - Code is there, machine is ready.
- Ensure State Machine has all transitions properly defined.