

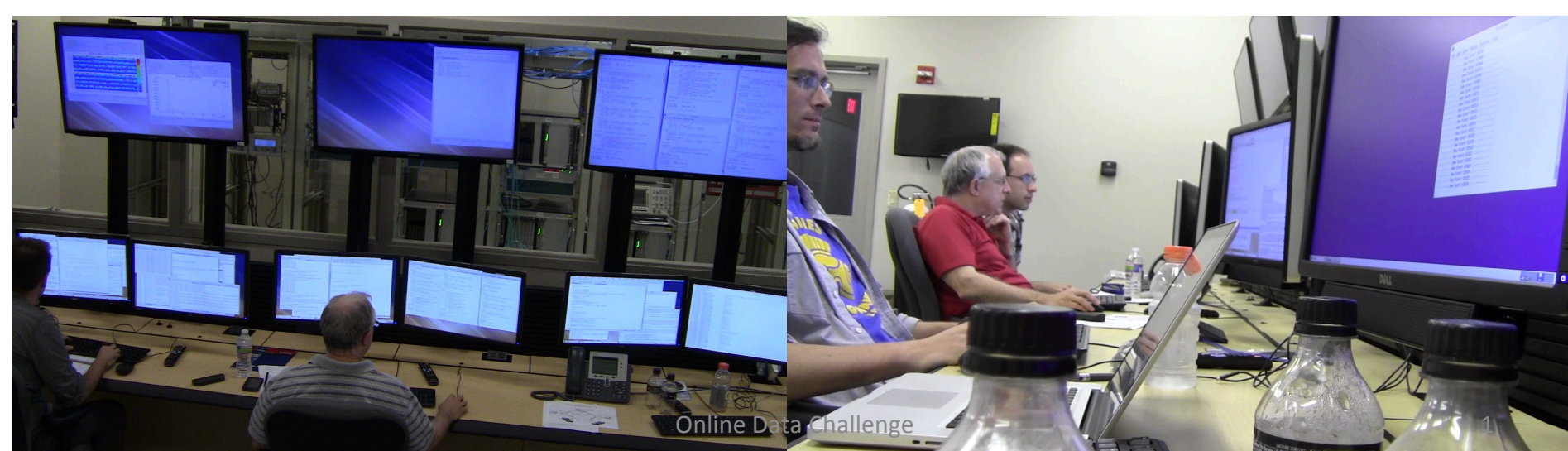
# Online Data Challenge 2013

Primary participants: *Elliott Wolin, Sean Dobbs, David Lawrence*

When: August 26 – 29, 2013

Where: Hall-D Counting House

Objective: Test data flow and monitoring between final stage Event Builder (EB) and tape silo (*i.e. neither the DAQ system nor the offline were included*)



# Input Data

- Pythia-generated events simulated, smeared, and passed through L1 event filter\*
- Events digitized and written in EVIO format
  - *mc2coda* library used to write in the new event building scheme specification provided by DAQ group
  - Translation table derived from Fernando's spreadsheet detailing the wiring scheme that will be used

*\*event filter may have used uncalibrated BCAL energy units, but resulted in roughly 36% of events being kept.*

# Computers systems

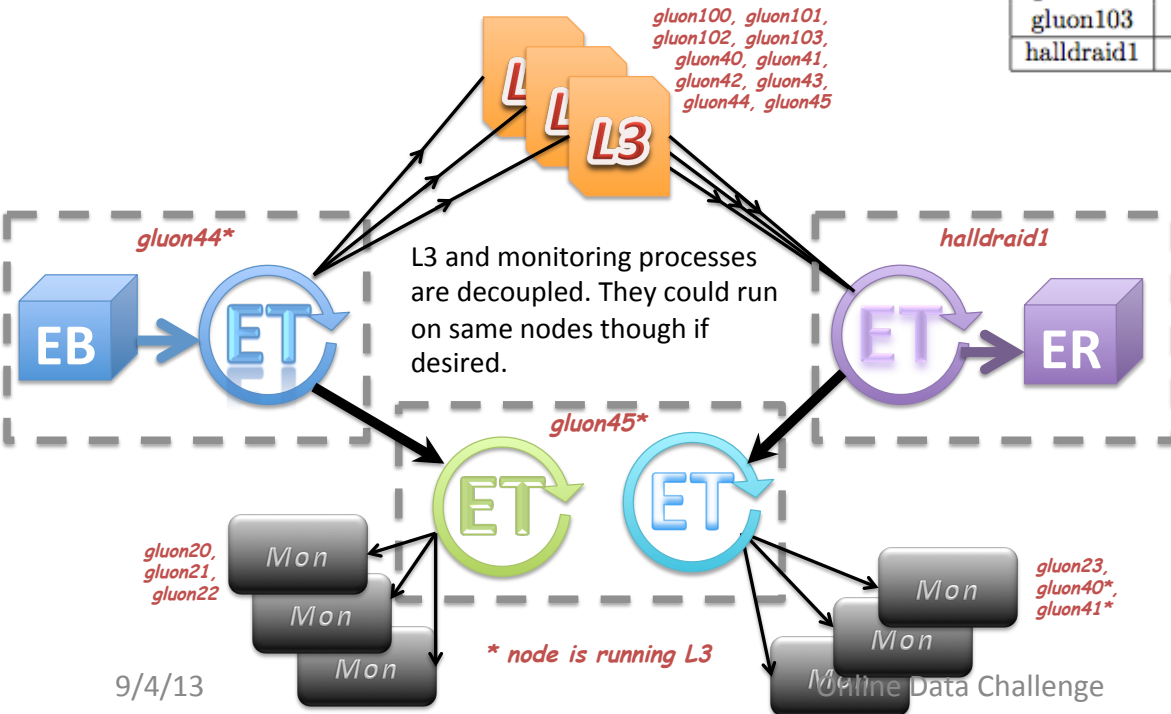
(many of these on loan)

*n.b. all L3 machines connected via InfiniBand*

node	type	cores	RAM	function
gluon01a gluon02 gluon03 gluon04 gluon05	3.4GHz Intel i5	2+2ht	16GB	console (human interface)
gluon20 gluon21 gluon22 gluon23	1.9GHz AMD Opteron	8	8GB	monitoring
gluon40 gluon41 gluon42 gluon43	1.9GHz AMD Opteron	8	8GB	L3 trigger & monitoring
gluon44 gluon45	2.53GHz Intel Xeon	8+8ht	48GB	L3 trigger, event source, & monitoring server
gluon100 gluon101 gluon102 gluon103	1.9GHz AMD Opteron	8	8GB	L3 trigger
halldraid1	2.0GHz Intel Xeon	4+4ht	12GB	RAID disk

## L3 and monitoring architecture

*for 2013 Online Data Challenge*



# L3 Infrastructure Test

- 10 nodes used to pass events from Event Builder (EB) to Event Recorder (ER)
  - EB on *gluon44*, ER on *halldraid1*
- Two “pass-through” modes used:
  - Simple buffer copy without parsing (40kHz)
  - Buffer copy with parsing and application of translation table (~13kHz)
- DL3TriggerBDT algorithm from MIT
  - Worked in single threaded mode, but crashed with multiple threads
  - Cause of crashes unknown and under investigation
    - MIT and TMVA code itself have been eliminated as causes

# Screen Capture of ET systems monitors

**Terminal**

```
status(ACTIVE), flow(SERIAL), blocking(NO), user(MULTI), select(ALL)
restore(OUT), prescale(1), cue(150), select words(-1,-1,-1,-1,-1,-1,-1)
dynamic info
attachments: total#(1), ids(1)
input list: cnt = 150, events in = 199028356
output list: cnt = 0, events out = 199028206

LOCAL USERS:
process #0, # attachments(1), attach ids(0), pid(11578), hbeat(8594)

ATTACHMENTS:
att #0, is at station(GRAND Central) on host(gluon44.jlab.org)
at pid(11578) from address()
proc(-1), blocked(NO)
events: make(150077962), get(0), put(149954946), dump(1238016)
att #1, is at station(MON) on host(gluon44.jlab.org)
at pid(13441) from address(172.19.5.11)
proc(-1), blocked(NO)
events: make(0), get(14286164), put(14286164), dump(0)
att #2, is at station(DANA) on host(gluon44.jlab.org)
at pid(13608) from address(172.19.5.11)
proc(-1), blocked(NO)
events: make(0), get(818479), put(818479), dump(0)
att #3, is at station(DANA) on host(gluon45.jlab.org)
at pid(30216) from address(172.19.5.12)
proc(-1), blocked(NO)
events: make(0), get(879381), put(879381), dump(0)
att #4, is at station(DANA) on host(gluon42.jlab.org)
at pid(9462) from address(172.19.5.26)
proc(-1), blocked(NO)
events: make(0), get(325353), put(325353), dump(0)
att #5, is at station(DANA) on host(gluon100)
at pid(11087) from address(172.19.5.20)
proc(-1), blocked(NO)
events: make(0), get(310934), put(310934), dump(0)
att #6, is at station(DANA) on host(gluon102)
at pid(20986) from address(172.19.5.22)
proc(-1), blocked(NO)
events: make(0), get(330892), put(330892), dump(0)
att #7, is at station(DANA) on host(gluon101)
at pid(3455) from address(172.19.5.21)
proc(-1), blocked(NO)
events: make(0), get(325247), put(325247), dump(0)
att #8, is at station(DANA) on host(gluon41.jlab.org)
at pid(15743) from address(172.19.5.25)
proc(-1), blocked(NO)
events: make(0), get(177715), put(177715), dump(0)
att #9, is at station(DANA) on host(gluon40.jlab.org)
at pid(20351) from address(172.19.5.24)
proc(-1), blocked(NO)
events: make(0), get(173545), put(173545), dump(0)
att #10, is at station(DANA) on host(gluon43.jlab.org)
at pid(24434) from address(172.19.5.27)
proc(-1), blocked(NO)
events: make(0), get(322005), put(322005), dump(0)
att #11, is at station(DANA) on host(gluon103)
at pid(9460) from address(172.19.5.23)
proc(-1), blocked(NO)
events: make(0), get(325735), put(325735), dump(0)

EVENTS OWNED BY:
system (1999), att0 (0), att1 (0), att2 (0), att3 (0), att4 (0), att5 (0), att6 (0), att7 (0), att8 (0), att9 (0), att10 (0), att11 (0),

EVENT RATE of GC = 12898 events/sec

IDLE STATIONS:
STATION CHAIN: GRAND_CENTRAL, DANA, MON,
LOCKED MUTEXES:
```

**Event Builder**

**Terminal**

```
at pid(13441) from address(172.19.5.11)
proc(-1), blocked(NO)
events: make(14294703), get(0), put(14294703), dump(0)
att #1, is at station(MON) on host(gluon20)
at pid(21376) from address(129.57.172.28)
proc(-1), blocked(NO)
events: make(0), get(277398), put(277398), dump(0)
att #2, is at station(MON) on host(gluon22.jlab.org)
at pid(20231) from address(129.57.172.30)
proc(-1), blocked(NO)
events: make(0), get(259140), put(259140), dump(0)
att #3, is at station(MON) on host(gluon21.jlab.org)
at pid(2991) from address(129.57.172.29)
proc(-1), blocked(NO)
events: make(0), get(257360), put(257360), dump(0)
att #4, is at station(MON) on host(gluon05.jlab.org)
at pid(16200) from address(129.57.172.35)
proc(-1), blocked(NO)
events: make(0), get(152), put(152), dump(0)

EVENTS OWNED BY:
system (2000), att0 (2), att1 (0), att2 (0), att3 (0), att4 (0),

EVENT RATE of GC = 2759 events/sec

IDLE STATIONS:
STATION CHAIN: GRAND_CENTRAL, MON,
LOCKED MUTEXES:
```

**Pre-L3 Monitoring**

**Terminal**

```
attachments: total#(3), ids(1,2,3)
input list: cnt = 1919, events in = 114097399, events try = 114097399
output list: cnt = 0, events out = 114095480

LOCAL USERS:

ATTACHMENTS:
att #0, is at station(GRAND_CENTRAL) on host(halldraidl.jlab.org)
at pid(20549) from address(172.19.5.19)
proc(-1), blocked(NO)
events: make(7232849), get(0), put(7232784), dump(0)
att #1, is at station(MON) on host(gluon23.jlab.org)
at pid(21918) from address(129.57.172.31)
proc(-1), blocked(NO)
events: make(0), get(280970), put(280970), dump(0)
att #2, is at station(MON) on host(gluon41.jlab.org)
at pid(15784) from address(129.57.172.25)
proc(-1), blocked(NO)
events: make(0), get(114837), put(114837), dump(0)
att #3, is at station(MON) on host(gluon40.jlab.org)
at pid(20391) from address(129.57.172.24)
proc(-1), blocked(NO)
events: make(0), get(112348), put(112348), dump(0)

EVENTS OWNED BY:
system (1935), att0 (65), att1 (0), att2 (0), att3 (0),

EVENT RATE of GC = 1834 events/sec

IDLE STATIONS:
STATION CHAIN: GRAND_CENTRAL, MON,
LOCKED MUTEXES:
```

**Post-L3 Monitoring**

**Terminal**

```
output list: cnt = 0, events out = 848682328

"MON" (id = 1)
static info
status(ACTIVE), flow(SERIAL), blocking(NO), user(MULTI), select(ALL)
restore(OUT), prescale(1), cue(150), select words(-1,-1,-1,-1,-1,-1,-1)
dynamic info
attachments: total#(1), ids(0)
input list: cnt = 150, events in = 133278882
output list: cnt = 0, events out = 133278732

LOCAL USERS:

ATTACHMENTS:
att #0, is at station(MON) on host(halldraidl.jlab.org)
at pid(20549) from address(172.19.5.19)
proc(-1), blocked(NO)
events: make(0), get(7233684), put(7233684), dump(0)
att #1, is at station(GRAND_CENTRAL) on host(gluon44.jlab.org)
at pid(13608) from address(172.19.5.11)
proc(-1), blocked(NO)
events: make(823110), get(0), put(823110), dump(0)
att #2, is at station(GRAND_CENTRAL) on host(gluon45.jlab.org)
at pid(30216) from address(172.19.5.12)
proc(-1), blocked(NO)
events: make(884236), get(0), put(884236), dump(0)
att #3, is at station(GRAND_CENTRAL) on host(gluon42.jlab.org)
at pid(9462) from address(172.19.5.26)
proc(-1), blocked(NO)
events: make(327167), get(0), put(327167), dump(0)
att #4, is at station(GRAND_CENTRAL) on host(gluon100)
at pid(11087) from address(172.19.5.20)
proc(-1), blocked(NO)
events: make(312707), get(0), put(312706), dump(0)
att #5, is at station(GRAND_CENTRAL) on host(gluon102)
at pid(20986) from address(172.19.5.22)
proc(-1), blocked(NO)
events: make(332746), get(0), put(332746), dump(0)
att #6, is at station(GRAND_CENTRAL) on host(gluon101)
at pid(3455) from address(172.19.5.21)
proc(-1), blocked(NO)
events: make(327078), get(0), put(327078), dump(0)
att #7, is at station(GRAND_CENTRAL) on host(gluon40.jlab.org)
at pid(20351) from address(172.19.5.24)
proc(-1), blocked(NO)
events: make(174466), get(0), put(174466), dump(0)
att #8, is at station(GRAND_CENTRAL) on host(gluon41.jlab.org)
at pid(15743) from address(172.19.5.25)
proc(-1), blocked(NO)
events: make(178602), get(0), put(178602), dump(0)
att #9, is at station(GRAND_CENTRAL) on host(gluon43.jlab.org)
at pid(24434) from address(172.19.5.27)
proc(-1), blocked(NO)
events: make(323833), get(0), put(323833), dump(0)
att #10, is at station(GRAND_CENTRAL) on host(gluon103)
at pid(9460) from address(172.19.5.23)
proc(-1), blocked(NO)
events: make(327544), get(0), put(327543), dump(0)

EVENTS OWNED BY:
system (1999), att0 (0), att1 (0), att2 (0), att3 (0), att4 (1), att5 (0), att6 (0), att7 (0), att8 (0), att9 (0), att10 (1),

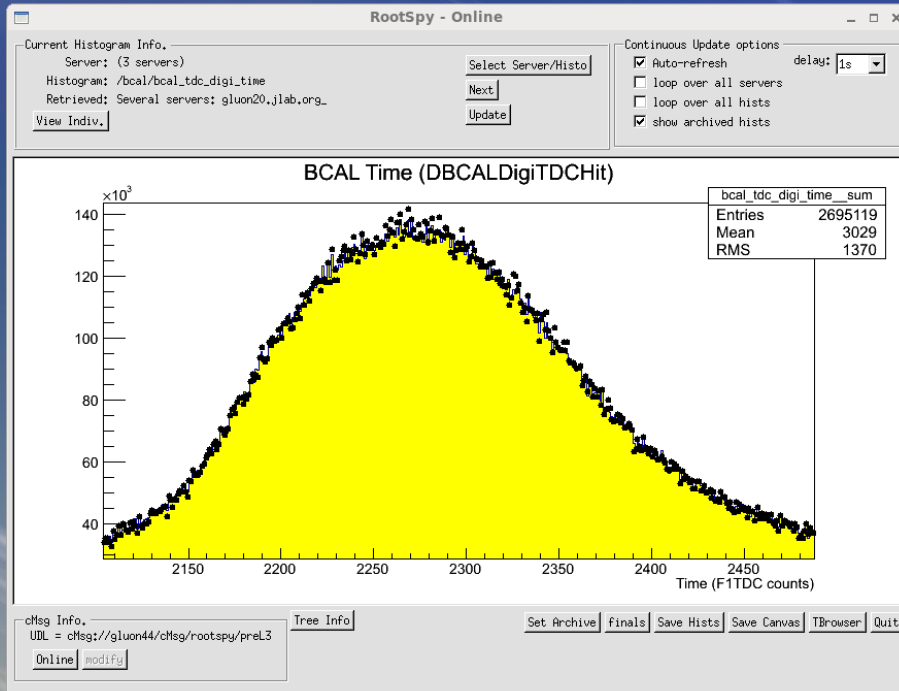
EVENT RATE of GC = 12878 events/sec

IDLE STATIONS:
STATION CHAIN: GRAND_CENTRAL, MON,
LOCKED MUTEXES:
```

**Event Recorder**

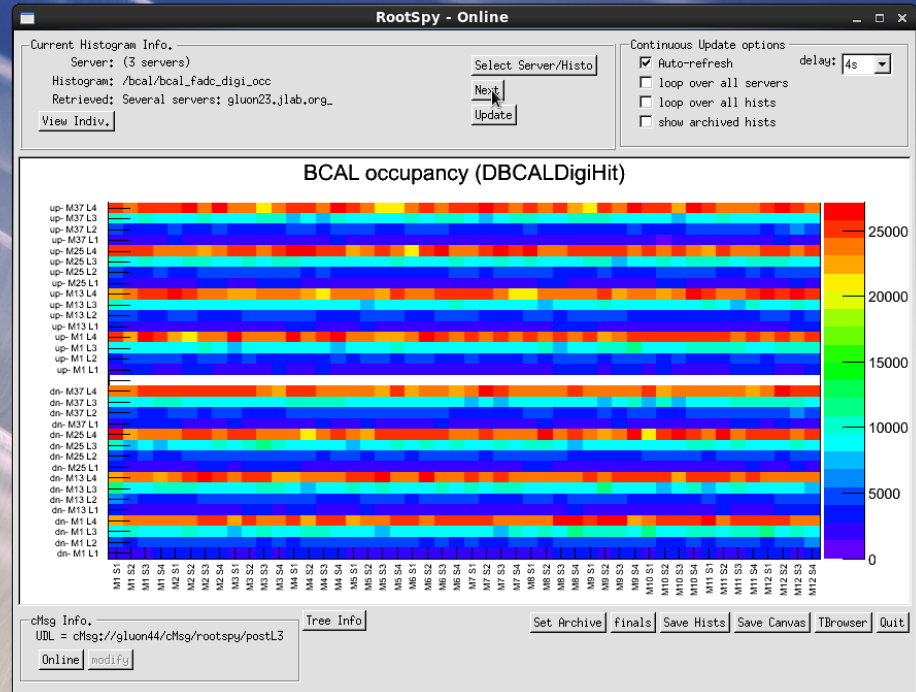
# Monitoring System (RootSpy) test

- Histograms produced by several plugins were displayed via the RootSpy GUI
- Overlay with archive histograms
- RootSpy archiver (writing summed histograms to file)
  - Integration with CODAObjects
  - Still need to fully implement *final histograms* mechanism



Pre-L3 Monitoring

Post-L3 Monitoring



# Other monitoring

- Ganglia installed and working for monitoring general health of all computer nodes

```
HDOPS gluon04:~> janactl -t 0.1 thinfo
Sent command: get threads to janactl

Threads by process:
-----
gluon100.jlab.org_347:
  thread: 0 0x7f681e1fc700 4590 events 76.0909Hz (45.5811Hz avg.)
  thread: 1 0x7f681ebfd700 4667 events 71.113Hz (46.3516Hz avg.)
  thread: 2 0x7f681f5fe700 4295 events 64.6926Hz (42.6587Hz avg.)
  thread: 3 0x7f681ffff700 4441 events 73.4932Hz (44.1011Hz avg.)
  thread: 4 0x7f6834dfa700 4797 events 80.417Hz (47.6384Hz avg.)
  thread: 5 0x7f68357fb700 4735 events 46.3996Hz (47.3674Hz avg.)
  thread: 6 0x7f68361fc700 4635 events 74.3584Hz (46.026Hz avg.)
  thread: 7 0x7f6836bfd700 4596 events 75.2129Hz (45.6399Hz avg.)
gluon101.jlab.org_26978:
  thread: 0 0x7f40ea1fc700 4722 events 25.347Hz (46.889Hz avg.)
  thread: 1 0x7f40eabfd700 4762 events 78.416Hz (47.282Hz avg.)
  thread: 2 0x7f40eb5fe700 4602 events 33.9704Hz (45.6912Hz avg.)
  thread: 3 0x7f40ebfff700 4843 events 60.7648Hz (48.0869Hz avg.)
```

# RAID to Silo test

- Transfer from RAID disk to silo tested
  - At least 50MB/s achieved, but possibly higher
  - Certificate and jput set up, but we were informed later that a different mechanism should be used for experimental data from the halls
  - Will arrange for IT division experts to come run tests and educate us on the proper way we should be transferring to the silo



# Summary

- EB to ER Data flow piece tested
  - L3 infrastructure tested and works in pass-through mode at 40kHz (mysterious issues with L3 plugin still being tracked down)
- Monitoring system tested
  - Identical pre-L3 and post-L3 monitoring systems
  - RootSpy GUI used with multiple producers
  - RootSpy archiver
- RAID to Tape silo tested
  - Successfully transferred > 1TB from counting house to silo at  $\geq 50\text{MB/s}$
  - Rate seemed slower than anticipated by factor of 2, but measurement mechanism not accurate due to staging
  - Alternate transfer method has been advised and will be pursued