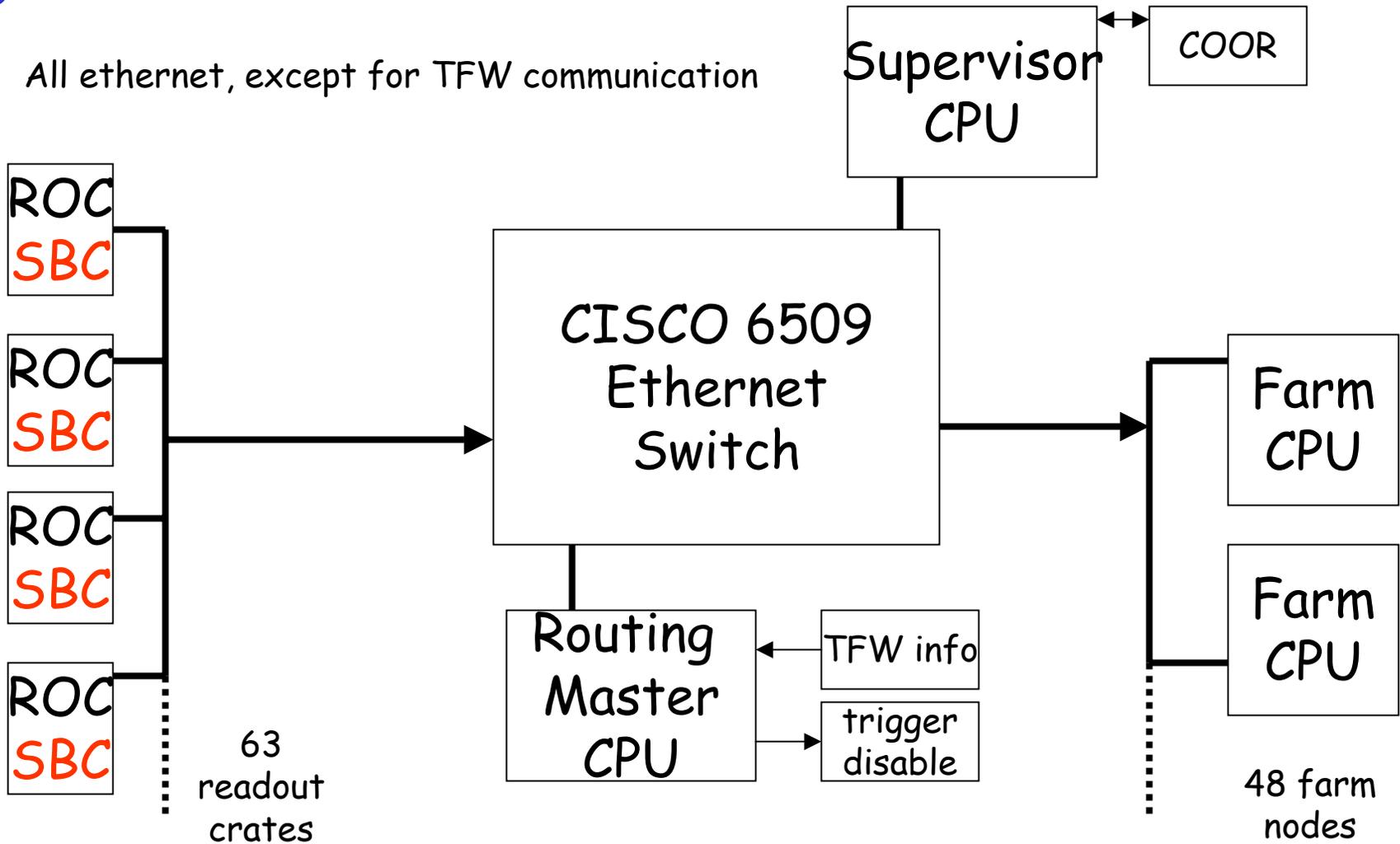


L3 DAQ

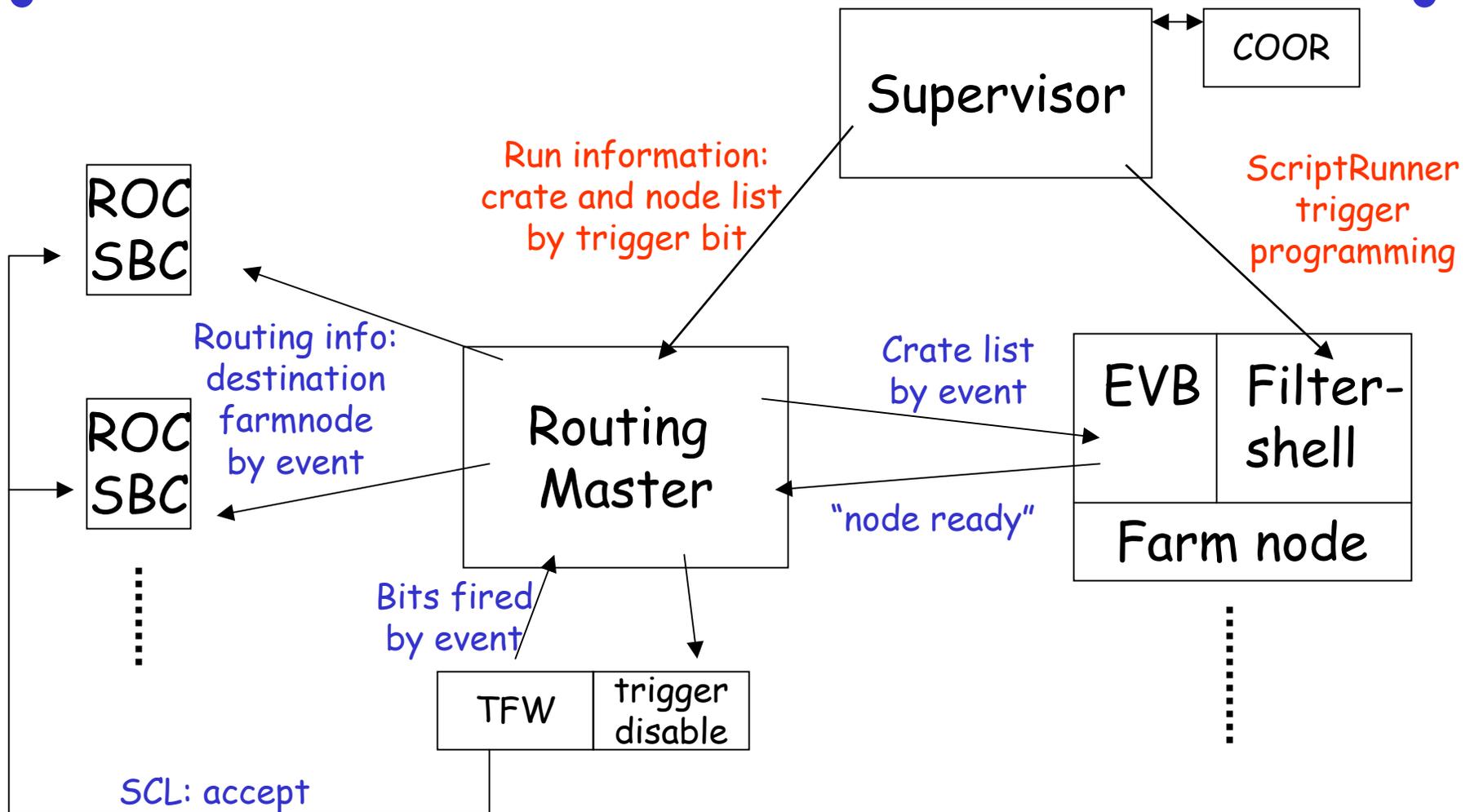
Doug Chapin
for the L3DAQ group

- Overview of L3 DAQ
- uMon
- l3xqt
- l3xmon

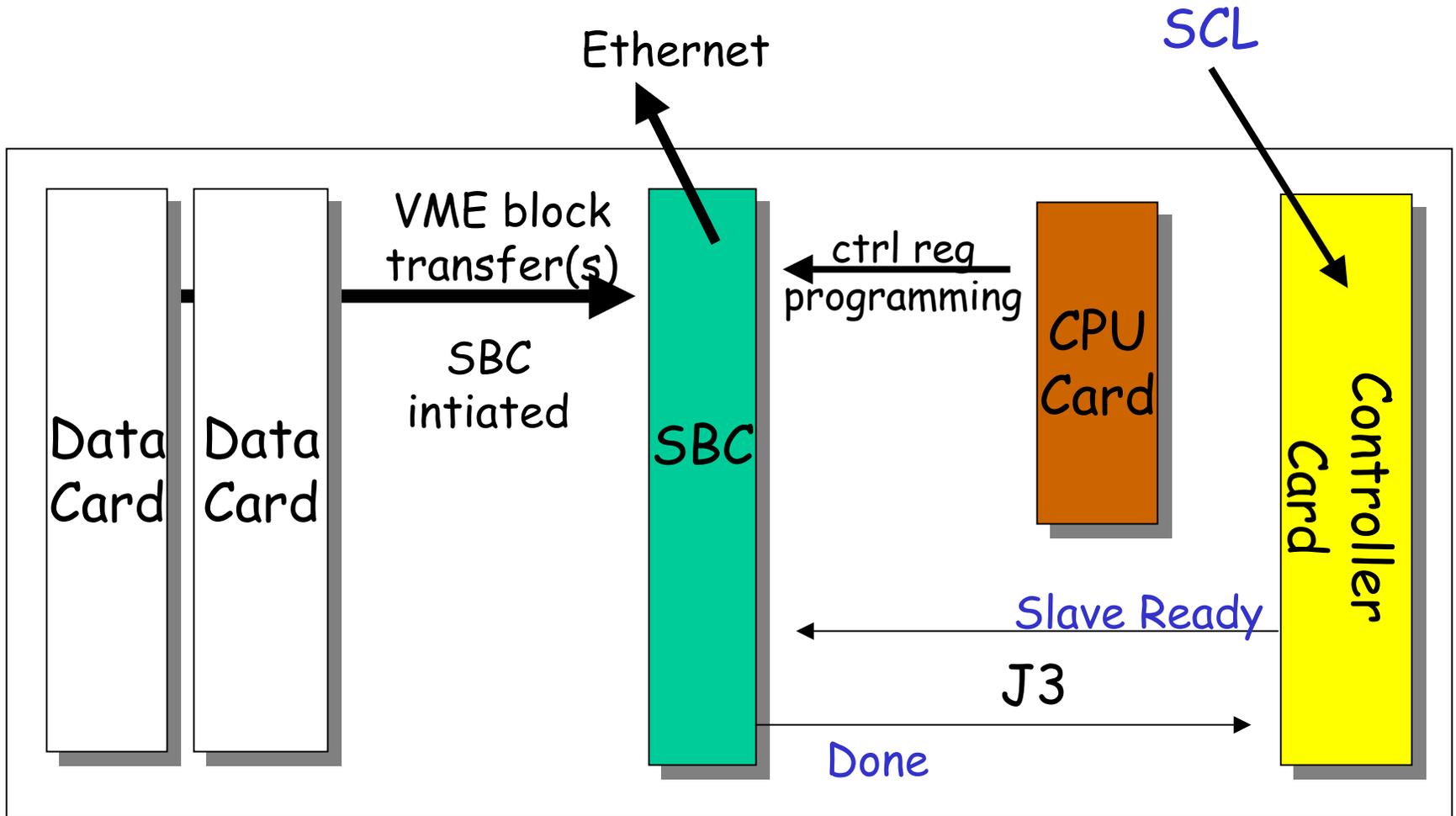
The L3DAQ System



Communication Flow



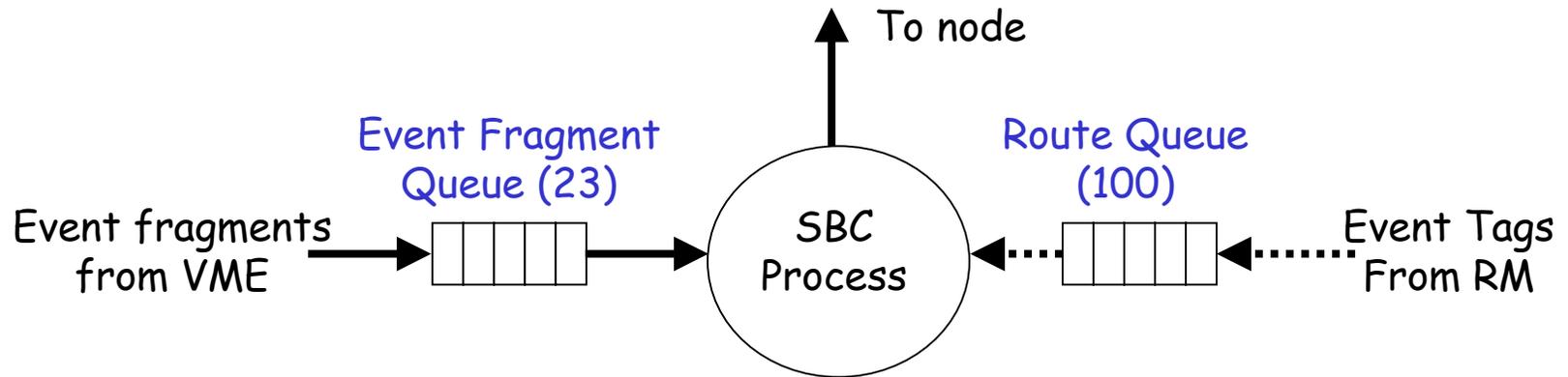
ReadOutCrate Example



SBCs

- Intel ~1GHz, 128MB RAM, dual 100Mb ethernet, 128MB flash, VME Universe2
- VME slave interface
 - VBD control register emulation
 - Data buffer access
 - Component front-end debugging
- J3 Control (SlaveReady,Done)
 - DIO PMC add-on card
 - Also drives status LEDs
- Software connections
 - Actively connect to RM
 - Recieve up to 2 connections from each farmnode

SBC Operation



- Match head event tag to head fragment via event number
- Fragments have one sec timeout
 - If no tags, throw away head event after 1s
- Route queue circular, non-blocking
 - Tags can be overwritten if no fragments are available
- Event number mismatch
 - If frag ev# > tag ev#, throw away tag
 - If frag ev# < tag ev#, drop fragment

Supervisor Process

- Connections to
 - RM
 - Receives crate and node list per bit
 - RM complains if needed nodes/sbcs not connected
 - Scriptrunner processes
 - Receive complete trigger programming
 - Passed on from COOR
 - When trigger downloaded
 - Node processes may get stuck
 - Big trigger lists take several minutes to download
 - ***NO*** connection to SBC or EVB processes

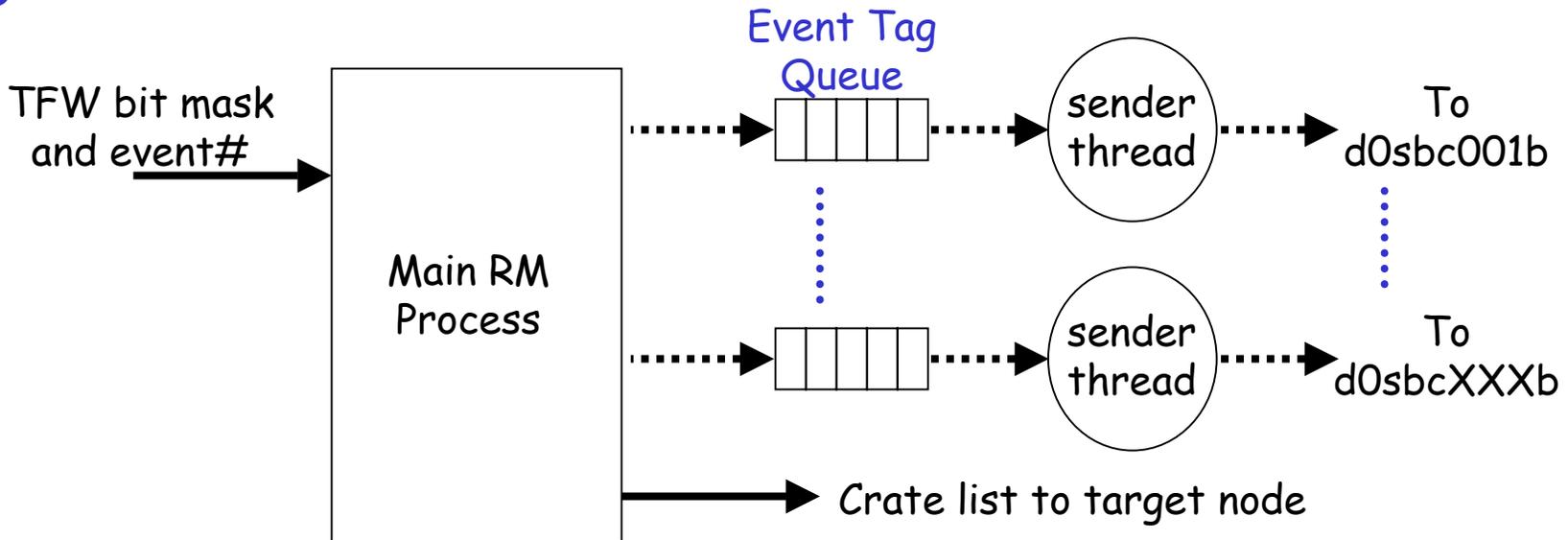
Farm Nodes

- Dual 1GHz Intel, 1GB RAM
 - 48 nodes so far
- Runs Event Builder (EVB) and Filtershell processes
- Filtershell Processes (usually 2)
 - This is ScriptRunner (L3 filters)
 - Receives trigger programming info from supervisor
 - Receives full event from EVB process
- EVB Process Operation
 - Connects to all SBCs (incl RM), all the time
 - Receive crate list by event# from RM
 - Sends no. of free buffers to RM ("node ready")
 - Builds event from received fragments
 - 1 - 5 second timeout

Routing Master (RM)

- Receives "run" information from supervisor
 - Farm node list and crate list per bit
- Gets bits fired per event# from TFW
- Receives no. of free buffers from each farm node
- Decides which nodes receive which events
- Sends routing info by event# to SBCs
- Sends crate list by event# to farm nodes
- Disables triggers when necessary

RM Operation



- Process generates event tags and crate list
 - based on bits fired and run info
- One sender thread and event tag queue per SBC
 - Wait for 10 tags or 250ms, then send
 - Minimize ethernet overhead
- Crate list sent to target node on every event

L3 Disable

- RM process running on TFW crate's SBC (d0sbc001b)
- Spy on the TFW data block
 - Extract L1 fired bits and L3 transfer number
- When L3-disable is needed
 - Update RM monitoring information
 - RM tells SBC to stop reading out the TFW crate
 - TFW crate goes 100% front-end-busy and stops triggers
 - Acts as global disable
- Cons
 - Actual L3 Disable line is not used
 - Cannot easily separate out l3daq backup (accounting issue)
 - Shifter must check L3DAQ monitoring every time TFW crate is 100% front-end-busy

Monitoring

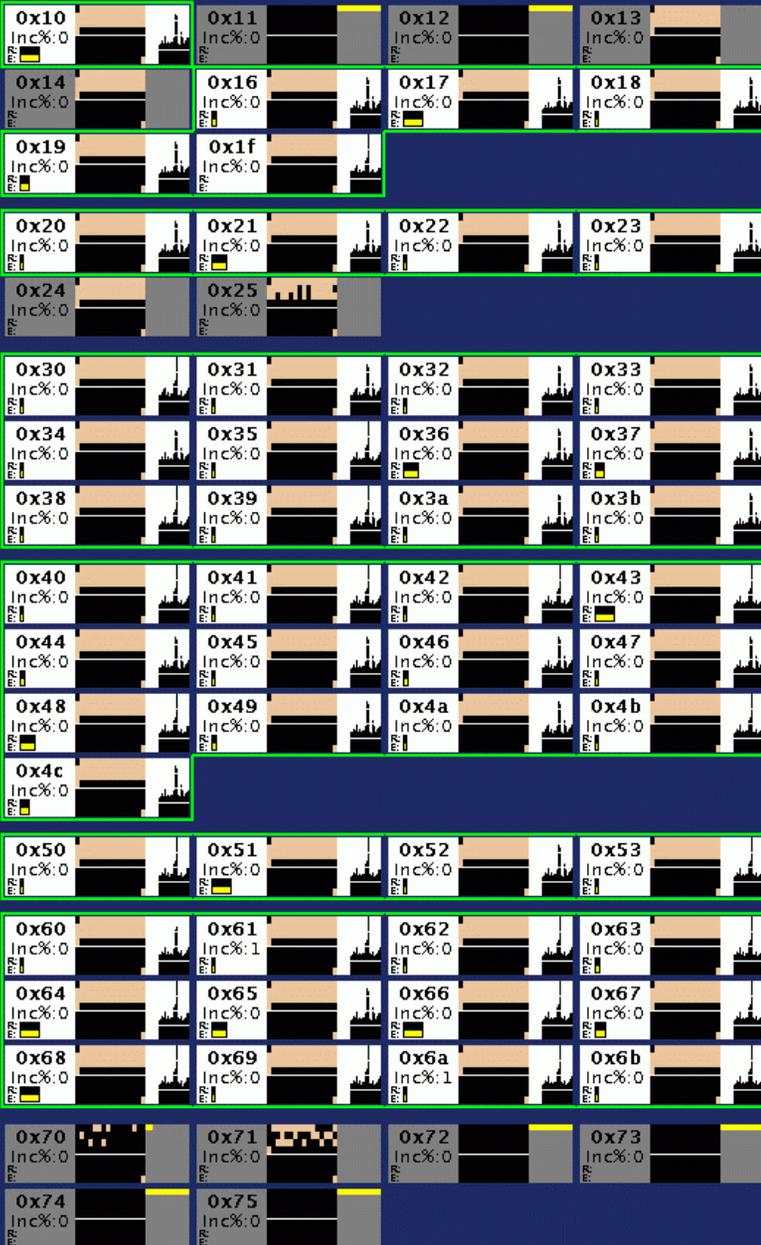
- All processes (SBC, RM, super, EVB) produce monitoring info
- Monitor clients
 - 13xmon
 - ScriptRunner status (processing, flattening, sending,...)
 - üMon is your friend
 - SBC, RM, and some Supervisor info
 - EVB info (missing crates, input rate)
 - Send comments to sean@fnal.gov
 - 13xqt
 - Mostly expert info
 - Daqmon info (L1/L2 busy fractions) useful to shifters

9
99.9466

50
85.8286

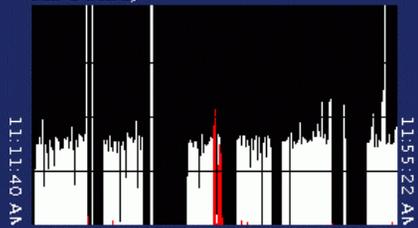
OK

dzero Data Acquisition UDBI Monitor



L3 Input/Incomplete Event Rate (250 Hz Scale)

250 Hz S...



Current L3 Input Rate 111.903 Hz

L3 Farm Buses Fraction

L3 Input Rate Bit: Rat...
By Bit 0 1.1



4 Hz Scale

Current Disable Fraction: 0.0

Farm Node EVB Rates

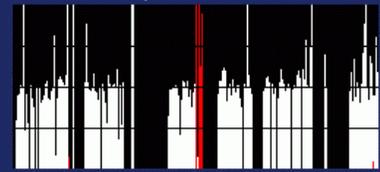
1 2...



4 Hz Scale

Total EVB Rate 113.033 Hz

Rate History for Node 1



1 Routing Group(s) Configured

Showing routing grou...

[Reset Inc Counters](#) [UNreset Inc Counters](#)

Super Status Ready

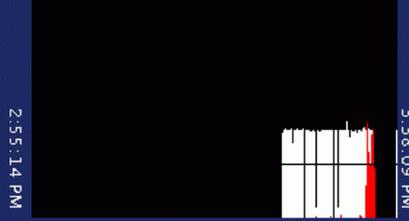
Data Refresh

dzero Data Acquisition UDBI Monitor



L3 Input/Incomplete Event Rate (250 Hz Scale)

250 Hz S...



Current L3 Input Rate 100.885 Hz

L3 Farm Buses Fraction



L3 Input Rate By Bit Bit: Rat...

		0	0.0
--	--	---	-----

4 Hz Scale

Current Disable Fraction: 0.0

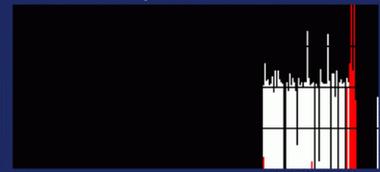
Farm Node EVB Rates



4 Hz Scale

Total EVB Rate 99.796 Hz

Rate History for Node 1



1 Routing Group(s) Configured

Showing routing grou...

Reset Inc Counters

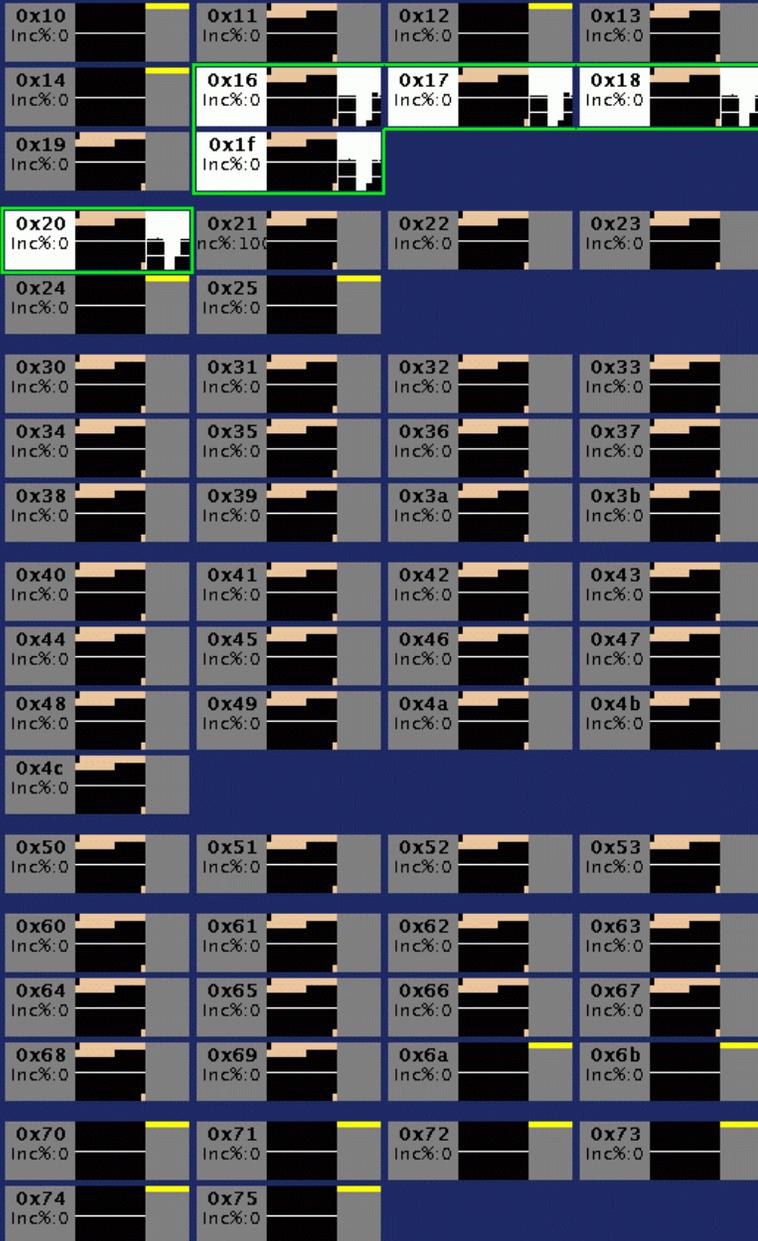
UNreset Inc Counters

Super Status Ready

Data Refresh

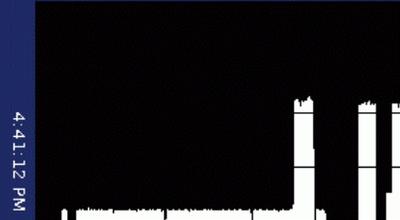


Data Acquisition UDB1 Monitor



L3 Input/Incomplete Event Rate (250 Hz Scale)

250 Hz S...



Current L3 Input Rate 133.597 Hz

L3 Farm Buses Fraction



Current Disable Fraction: 0.989

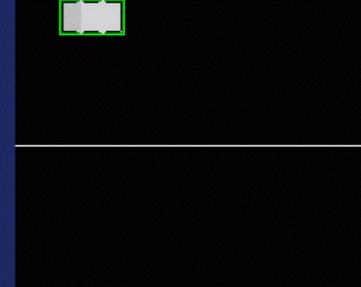
L3 Input Rate
By Bit

Bit: Rat...

<input checked="" type="checkbox"/>	1	13...
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

250 Hz S...

FARM NODE EVB Rates



50 Hz Sc...

Total EVB Rate 133.89 Hz

Rate History for Node 24



1 Routing Group(s) Configured

Showing routing grou...

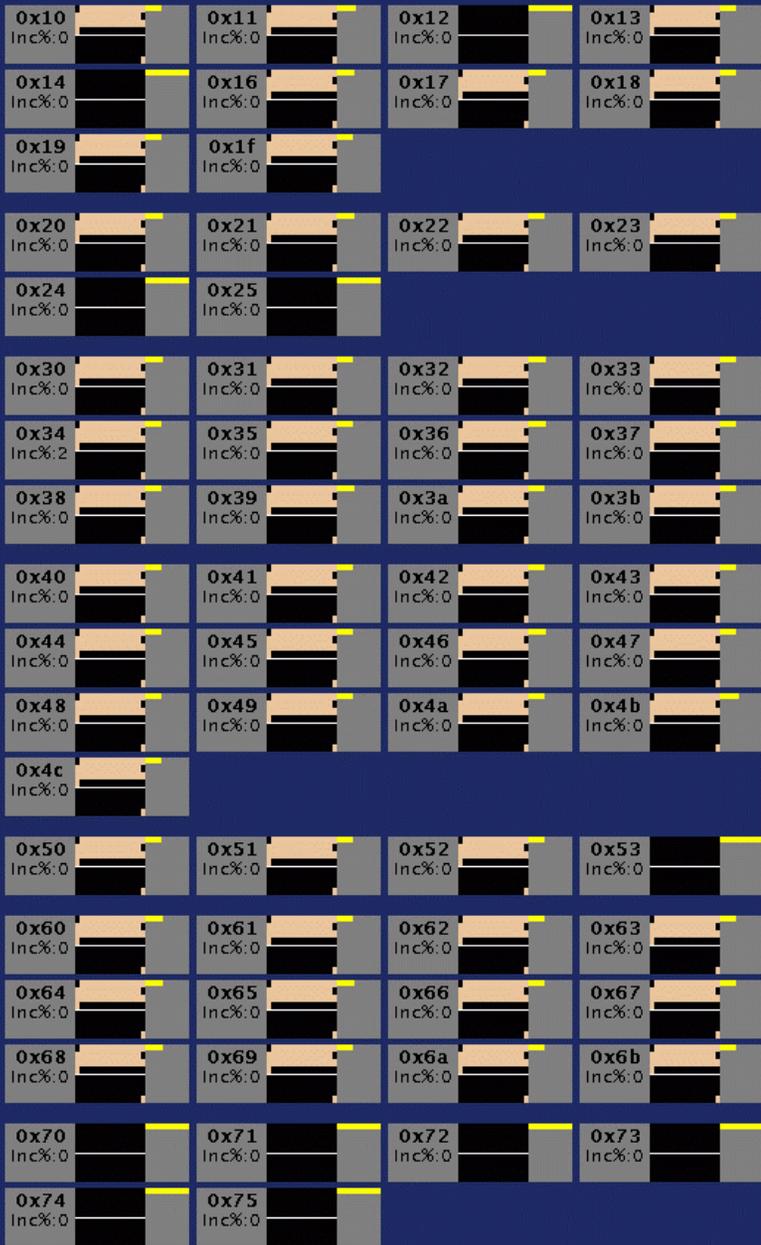
Reset Inc Counters

UNreset Inc Counters

Data Refresh

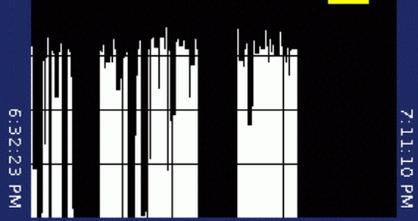


Data Acquisition UDB1 Monitor



L3 Input/Incomplete Event Rate (1 KHz Scale)

1 KHz Sc...



Current L3 Input Rate 0.0 Hz

L3 Farm Buses Fraction

L3 Input Rate
By Bit

Bit: Rat...
1 0.0



1 KHz Sc...

Current Disable Fraction: 0.0

FARM NODE EVB Rates 48 0.0



25 Hz Sc...

Total EVB Rate 0.0 Hz

Rate History for Node 48

0 Routing Group(s) Configured

No Routing Groups to...

Reset Inc Counters

UNreset Inc Counters

Data Refresh

Scripts

- Online scripts
 - `l3xreset`
 - can restart farmnode processes\
 - EVB and ScriptRunner simultaneously
 - can restart Supervisor process (node d0lxmast)
 - `l3xdaq_reset`
 - Restarts sbc processes (incl RM)
- SBC scripts
 - `is_crate_requesting_readout.sh` (SlaveReady asserted?)
 - `getInfo.sh` (sbc driver stats and status)
 - `reset_all.sh` (restarts processes)

L3DAQ Shifter Webpage

- <http://www-d0ol/www/groups/l3daq/shifter>
- "What To Do When"
 - Extremely useful
 - Frequently updated???
- On-call schedule
- uMon documentation!!!
- Logfile access

Typical Problems

- Prescales set for $< 10\text{Hz}$
 - Unpredictable results (all crates missing)
- Not enough nodes in run
 - L3 disables (TFW 100% FEB)
 - SMT/CFT/CAL in full-readout mode?
- Farmnode loses connection to SBC
 - Crate is missing (reset farmnode to fix)
- Crate 100% missing
 - Almost always a component problem
 - Check Route and Event queue state in uMon

Improvements to Come...

- Phase out l3xmon
 - Currently uses a separate monitor server
 - Move features into uMon
- Trigger Crate
 - Set L3 disables correctly