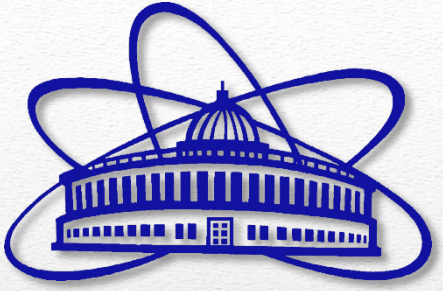
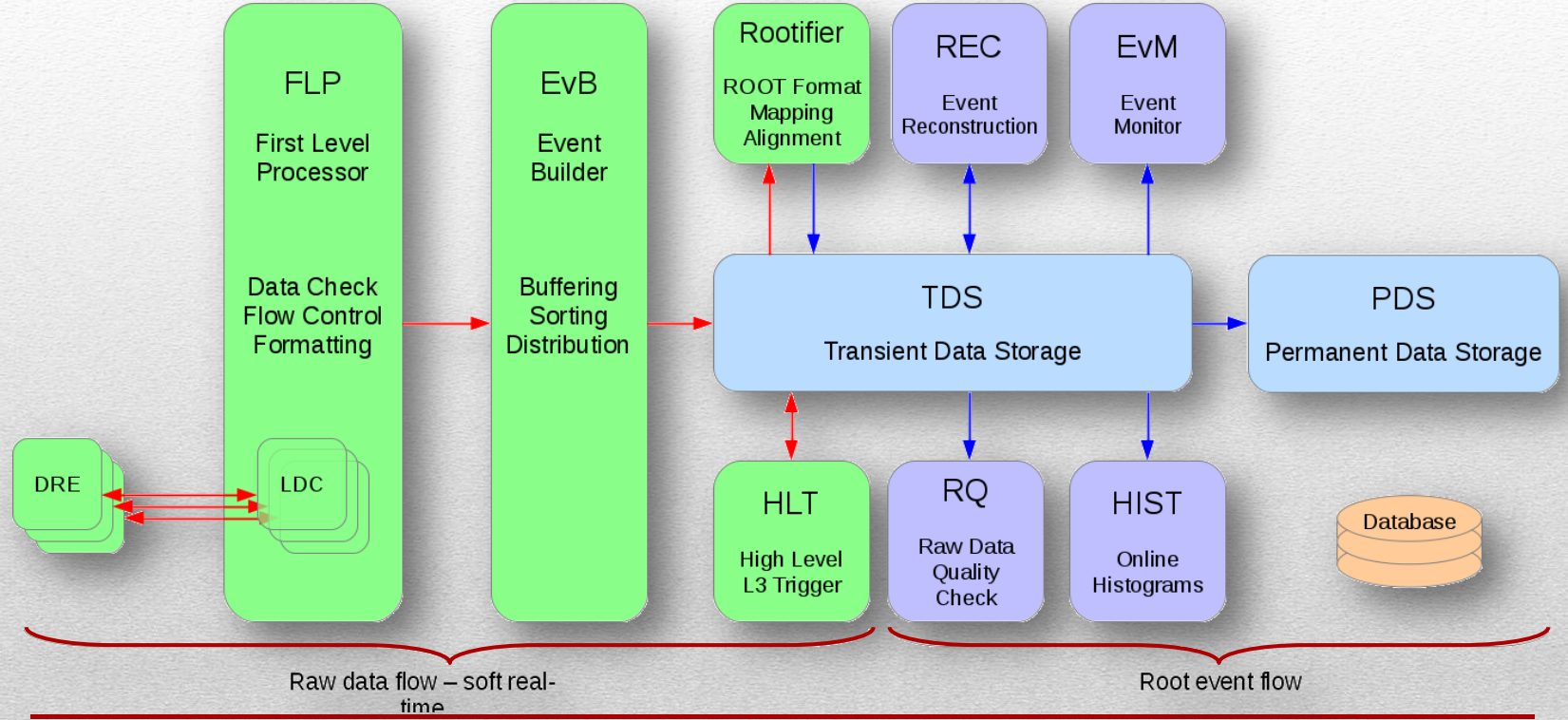


DAQ software in MPD experiment NICA

I.A. Filippov, I.V. Slepnev

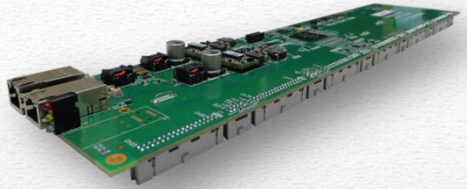
NEC'2015, 29 September 2015

MPD DAQ Data Flow

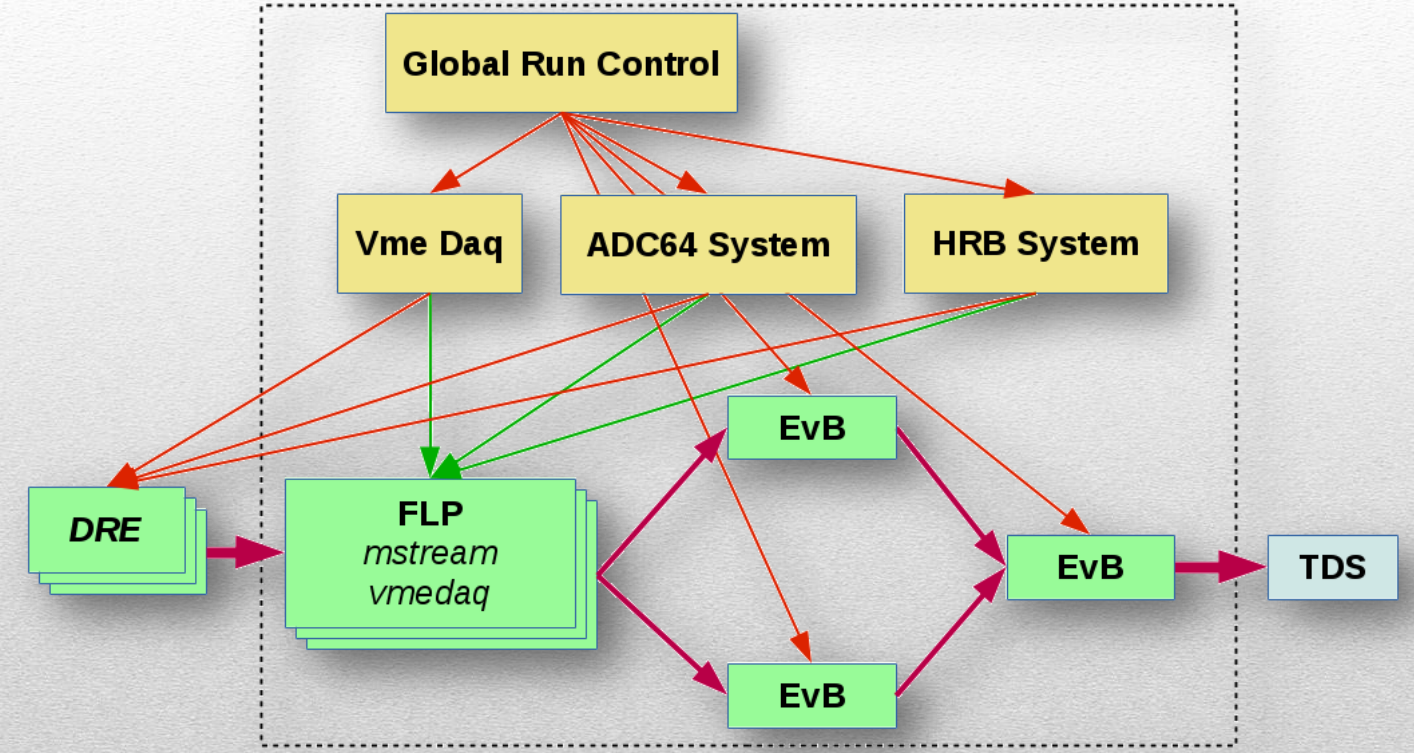


DRE list:

- ✓ HRB6ASD – CPC
- ✓ ADC64s2 – ZDC, ECAL
- ✓ TDC64V – DCH
- ✓ TDC72VHL – mRPC (TOF-400), T_0T (FFD)
- ✓ TDC32VL – mRPC (TOF-700)

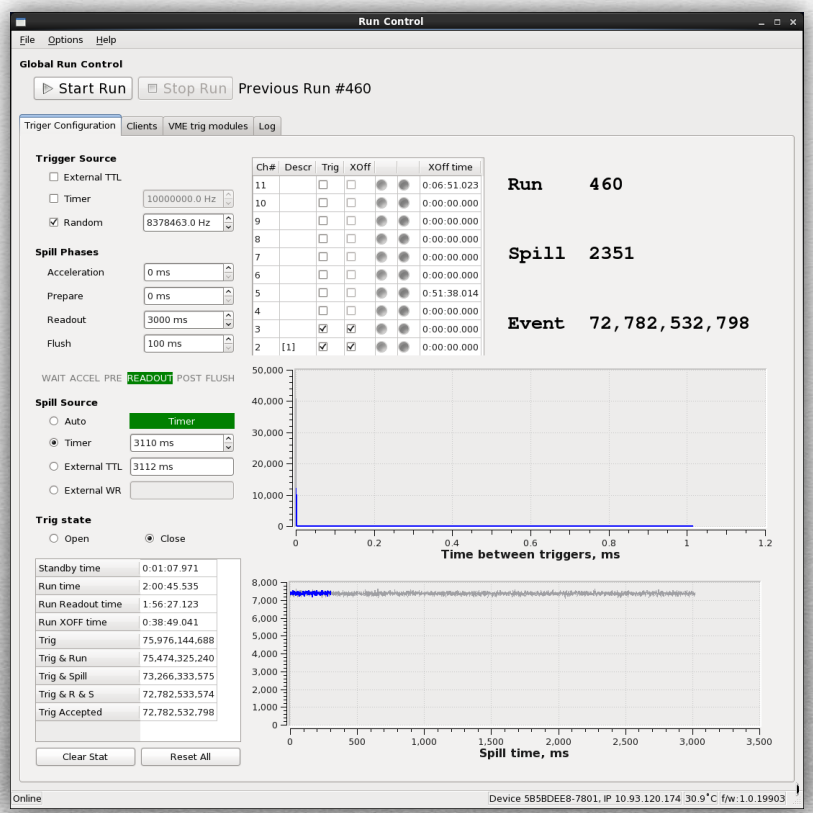


MPD DAQ Software



Global Run Control

- ✓ Configure trigger block
  - trigger source
  - worked detectors
- ✓ Current Run status

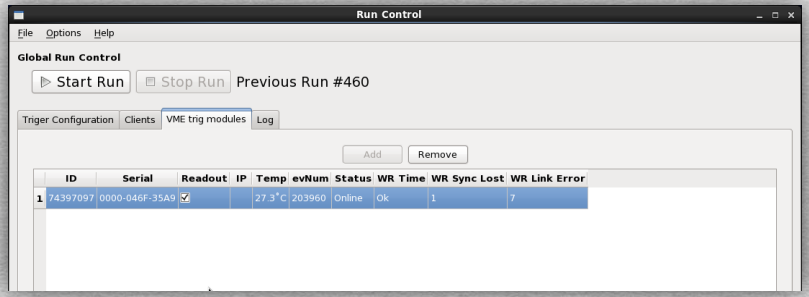


Global Run Control – Clients

- ✓ Enable/disable worked clients
- ✓ Client's state

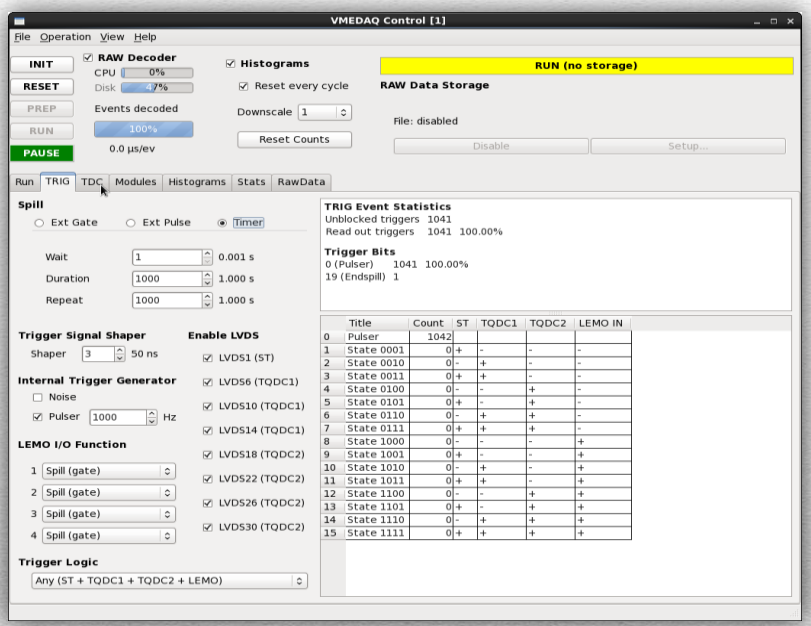
Global Run Control – VME trigger

- ✓ Configure trigger source
- ✓ Configure working detectors



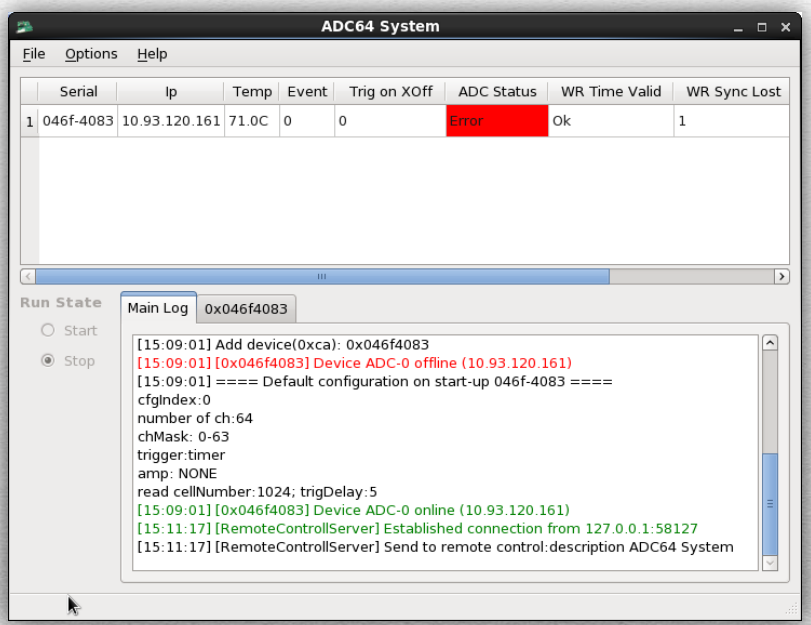
VME DAQ

- ✓ Presets configurations to all modules in VME crate
- ✓ Itself a FLP program

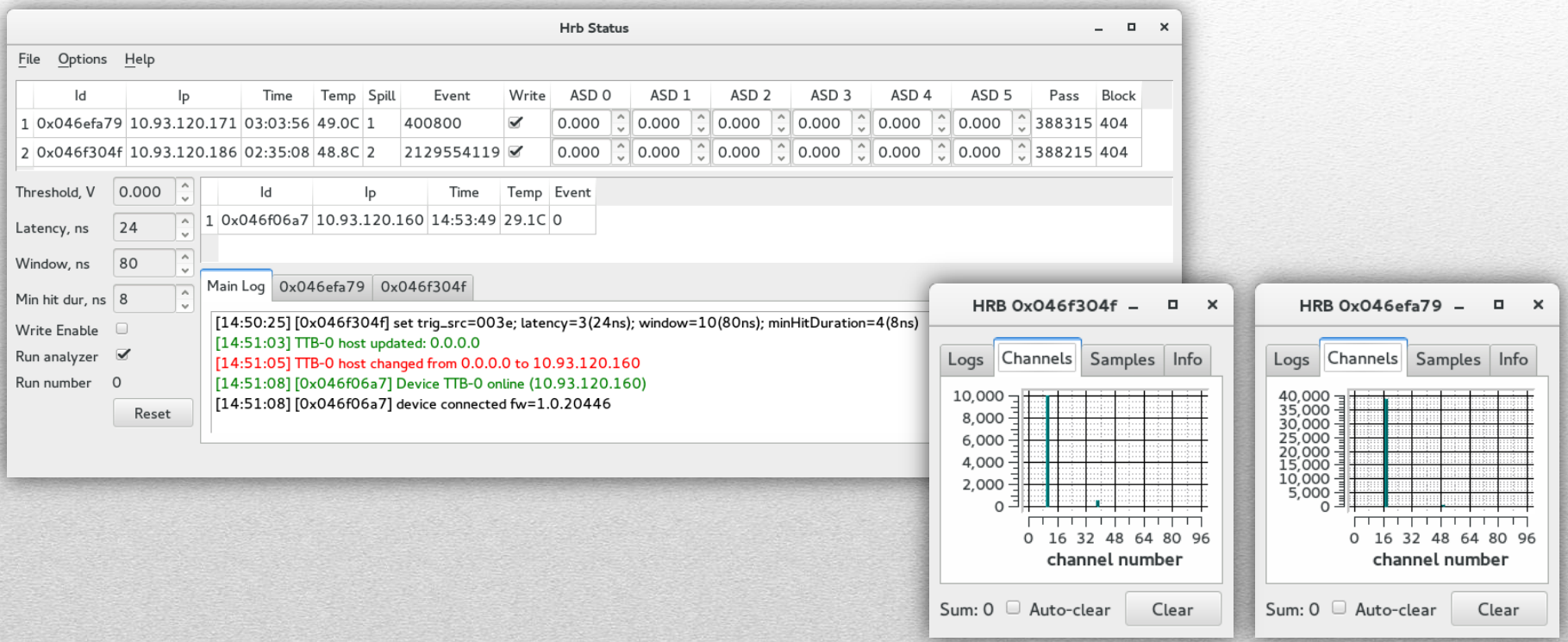


ADC64 System

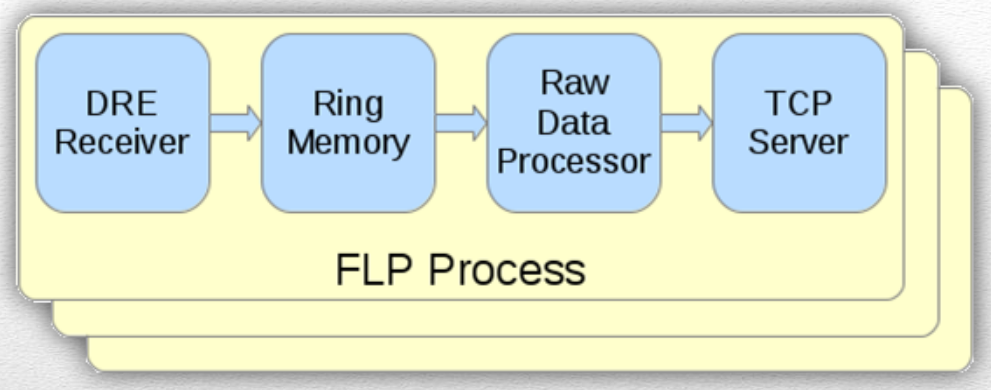
- ✓ Presets configuration to ADC64 boards
- ✓ Starts FLP program (mstream)



HRB System


Hrb Status
File Options Help
Id Ip Time Temp Spill Event Write ASD 0 ASD 1 ASD 2 ASD 3 ASD 4 ASD 5 Pass Block
1 0x046efa79 10.93.120.171 03:03:56 49.0C 1 400800 0.000 0.000 0.000 0.000 0.000 0.000 388315 404
2 0x046f304f 10.93.120.186 02:35:08 48.8C 2 2129554119 0.000 0.000 0.000 0.000 0.000 0.000 388215 404
Threshold, V 0.000
Latency, ns 24
Window, ns 80
Min hit dur, ns 8
Write Enable
Run analyzer
Run number 0
Reset
Id Ip Time Temp Event
1 0x046f06a7 10.93.120.160 14:53:49 29.1C 0
Main Log 0x046efa79 0x046f304f
[14:50:25] [0x046f304f] set trig_src=003e; latency=3(24ns); window=10(80ns); minHitDuration=4(8ns)
[14:51:03] TTB-0 host updated: 0.0.0.0
[14:51:05] TTB-0 host changed from 0.0.0.0 to 10.93.120.160
[14:51:08] [0x046f06a7] Device TTB-0 online (10.93.120.160)
[14:51:08] [0x046f06a7] device connected fw=1.0.20446
HRB 0x046f304f
Logs Channels Samples Info
10,000 8,000 6,000 4,000 2,000 0
0 16 32 48 64 80 96
channel number
Sum: 0 Auto-clear Clear
HRB 0x046efa79
Logs Channels Samples Info
40,000 35,000 30,000 25,000 20,000 15,000 10,000 5,000 0
0 16 32 48 64 80 96
channel number
Sum: 0 Auto-clear Clear

FLP Structure



Event block
Event block
...
Event block

Event header
Event payload

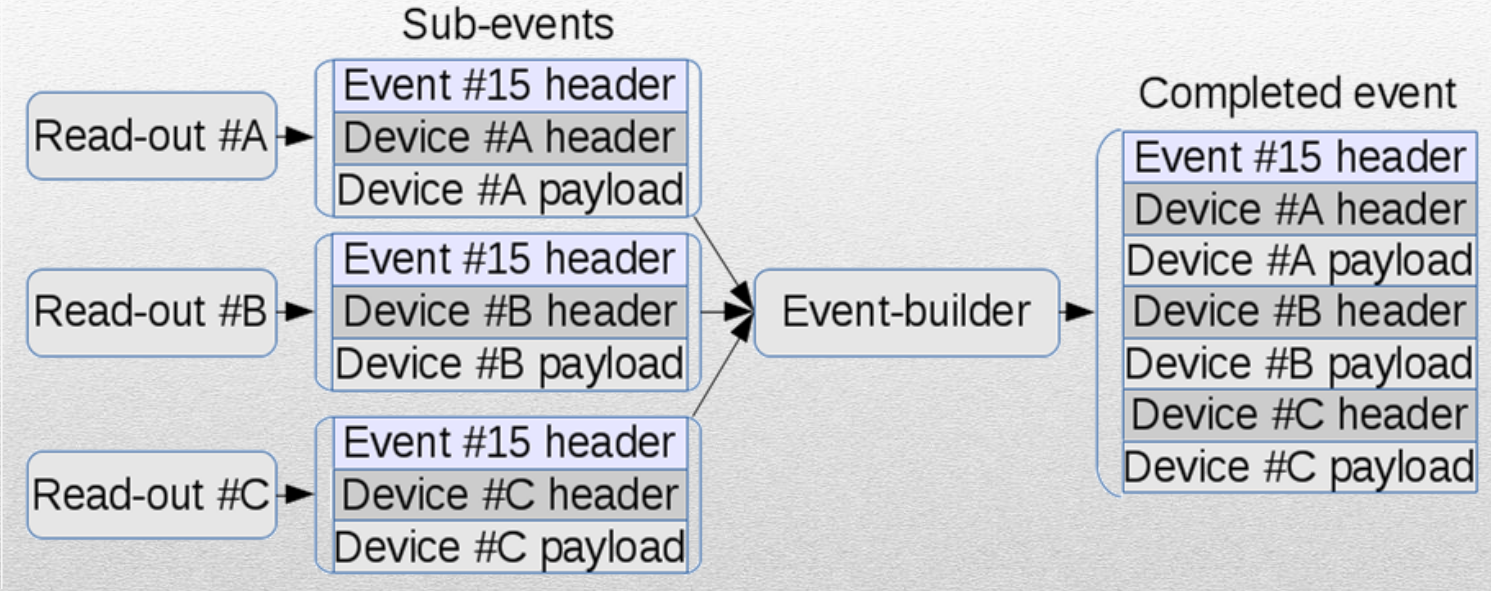
Device block
Device block
...
Device block

Device header
Device payload

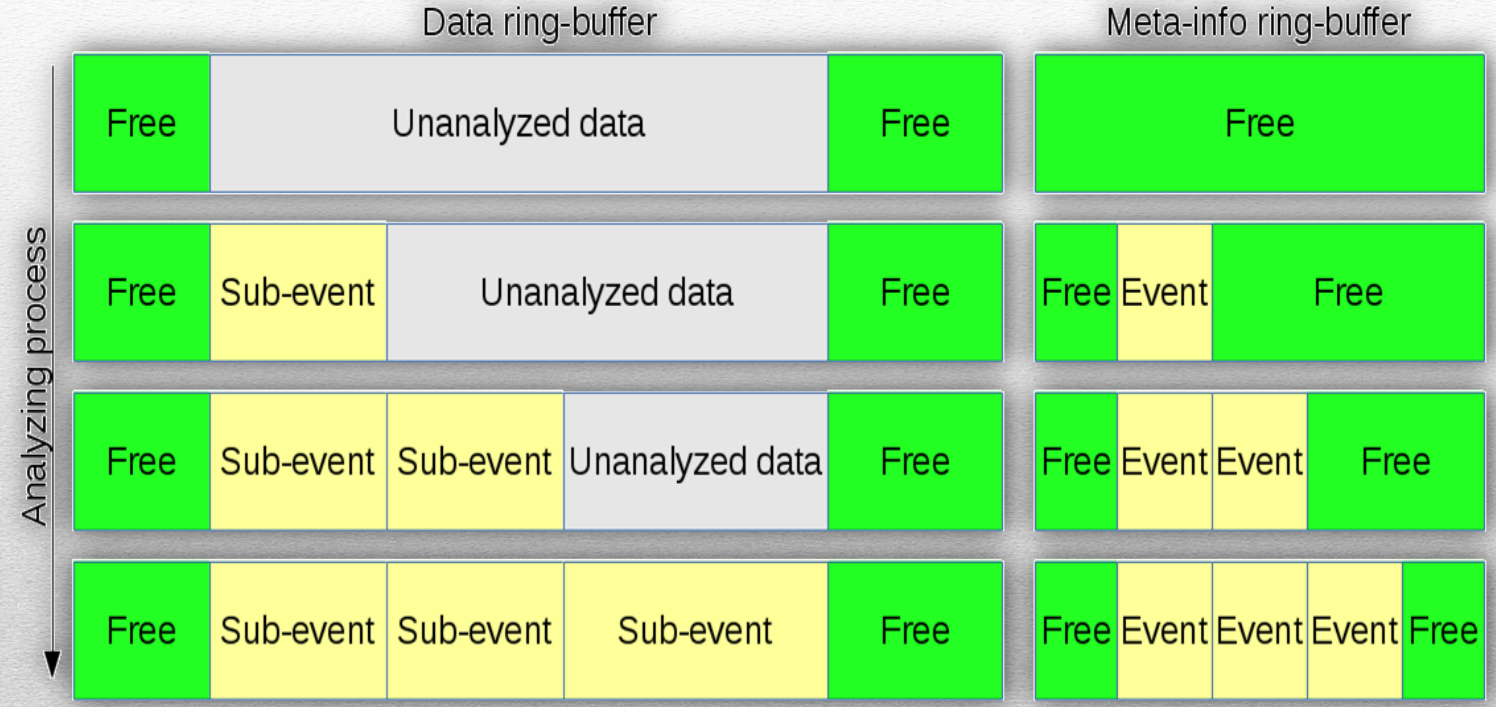
Event header	Bits
Synchro word	31:0
Payload length	31:0
Event number	31:0

Device header	Bits
Serial Number	31:0
Device ID	31:24
Paylload length	23:0

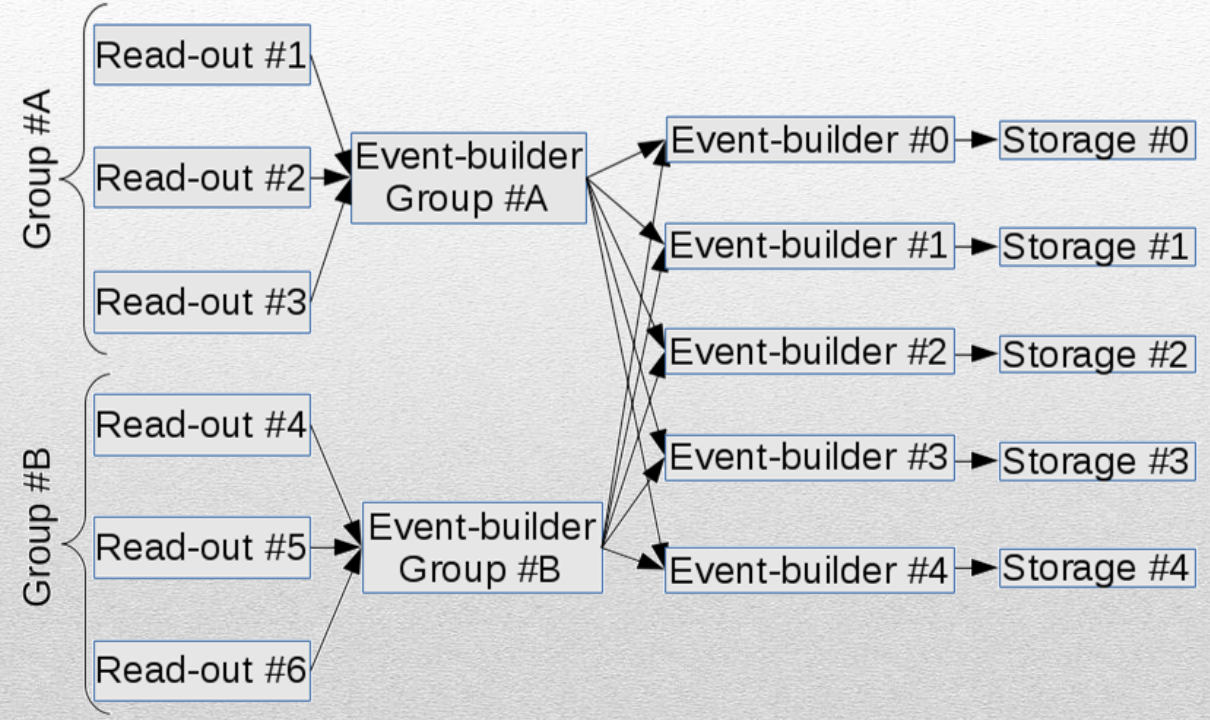
Event Builder Concept



Event Builder Analyzer work

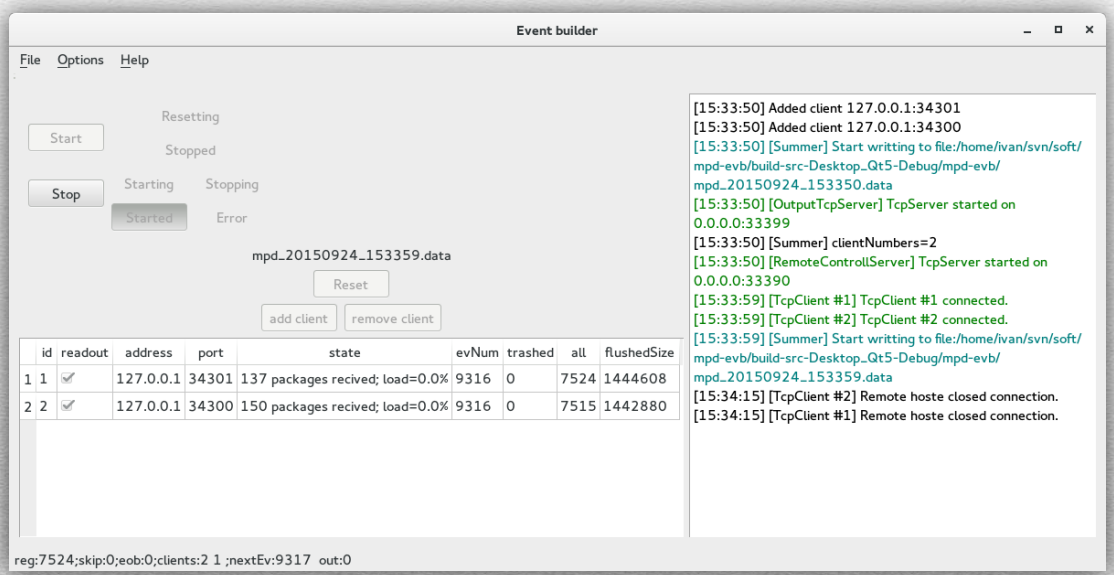


Event Builder Global Architecture



Event Builder

- ✓ Connects to FLP programs (mstream)
- ✓ Receives subevents
- ✓ Combines them into completed event block
- ✓ Save to disk or retransmit to 2nd stage of EvB



Auto-discovery

- ✓ Name
- ✓ Serial number
- ✓ Firmware ID
- ✓ IP address
- ✓ Connections

Conclusion:

- ✓ All DAQ system in passed BM@N run worked successfully.
- ✓ Current DAQ architecture is suitable for future BM@N and MPD experimental facilities.

Active development:

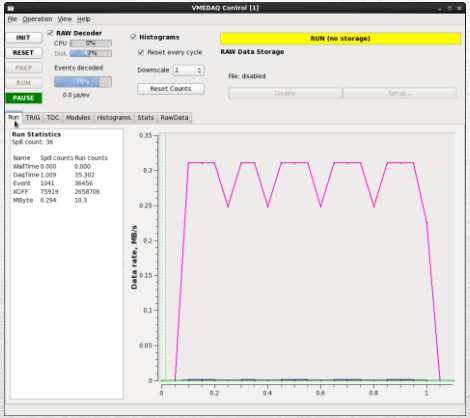
- ✓ Data transfer management
- ✓ Live monitor and central logging
- ✓ Configuration management

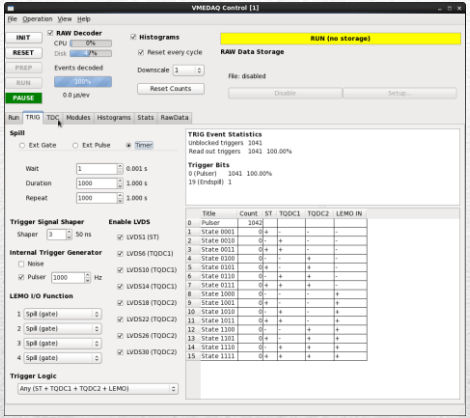
Thank you!

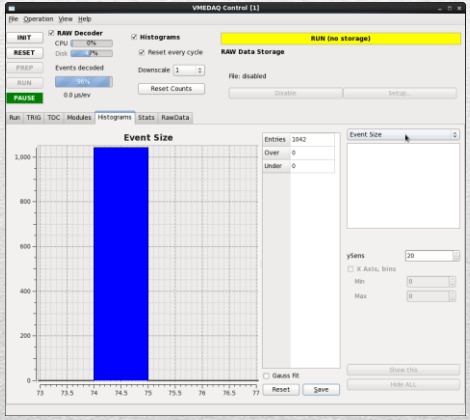
Conclusion:

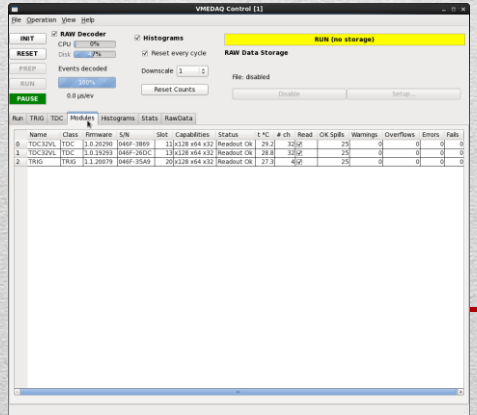
- Connects to FLP programs (msteam)
- Receives subevents
- Combines them into completed event block
- Save or retransmit to second stage of Event Builder

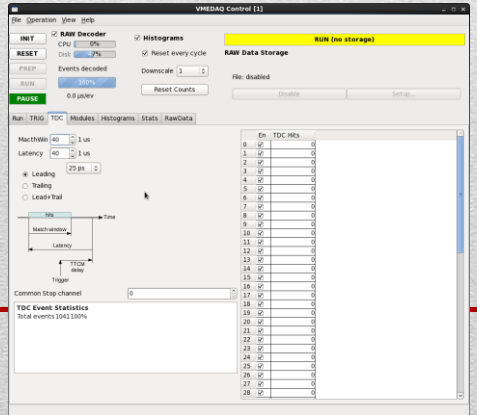
VMEDAQ:


VMEDAQ Control [1]
RUN (no storage)
RAW Data Storage
Run Statistics
Data rate, MB/s

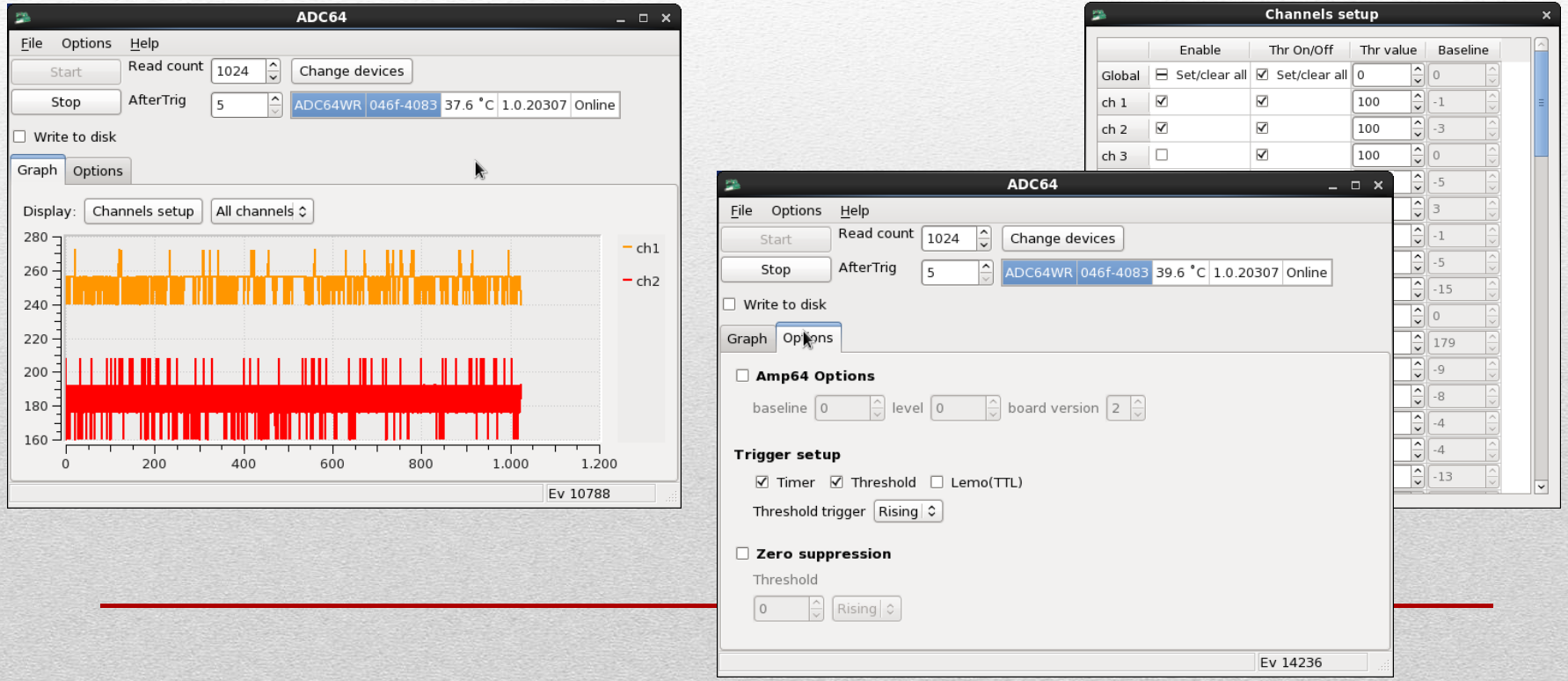

VMEDAQ Control [1]
RUN (no storage)
RAW Data Storage
Spill
Trigger Logic


VMEDAQ Control [1]
RUN (no storage)
RAW Data Storage
Event Size


VMEDAQ Control [1]
RUN (no storage)
RAW Data Storage
Modules


VMEDAQ Control [1]
RUN (no storage)
RAW Data Storage
TDC Event Statistics

ADC64:


ADC64
File Options Help
Start
Read count 1024
Change devices
Stop
AfterTrig 5
ADC64WR 046f-4083 37.6 °C 1.0.20307 Online
Write to disk
Graph Options
Display: Channels setup All channels
280 260 240 220 200 180 160
0 200 400 600 800 1.000 1.200
ch1
ch2
Ev 10788
Channels setup
Enable Thr On/Off Thr value Baseline
Global Set/clear all Set/clear all 0 0
ch 1 100 -1
ch 2 100 -3
ch 3 100 0
-5 3 -1 -5 -15 0 179 -9 -8 -4 -4 -13
ADC64
File Options Help
Start
Read count 1024
Change devices
Stop
AfterTrig 5
ADC64WR 046f-4083 39.6 °C 1.0.20307 Online
Write to disk
Graph Options
Amp64 Options
baseline 0 level 0 board version 2
Trigger setup
Timer Threshold Lemo(TTL)
Threshold trigger Rising
Zero suppression
Threshold
0 Rising
Ev 14236