

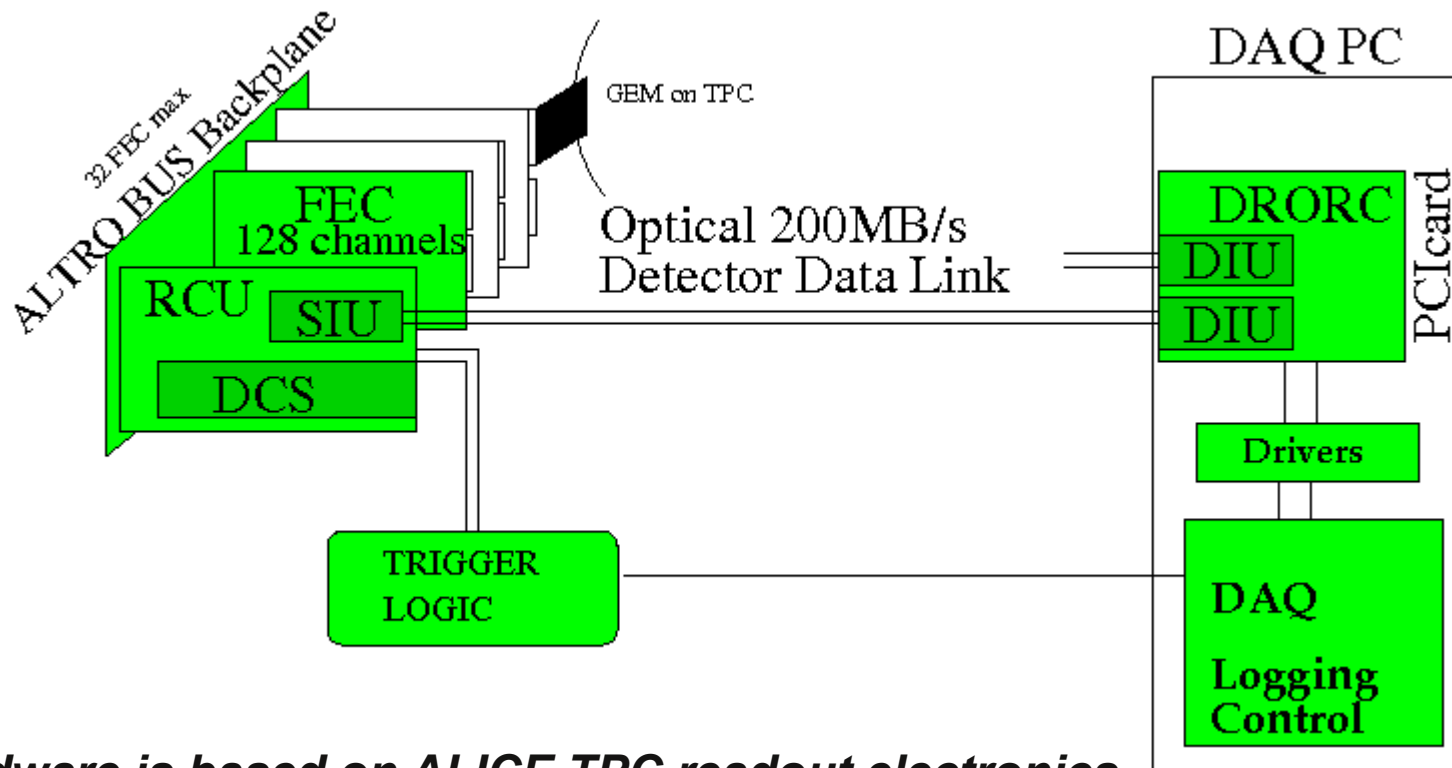
LPTPC ALTRO DAQ

Readout of GEM

A status report

29 September 2010

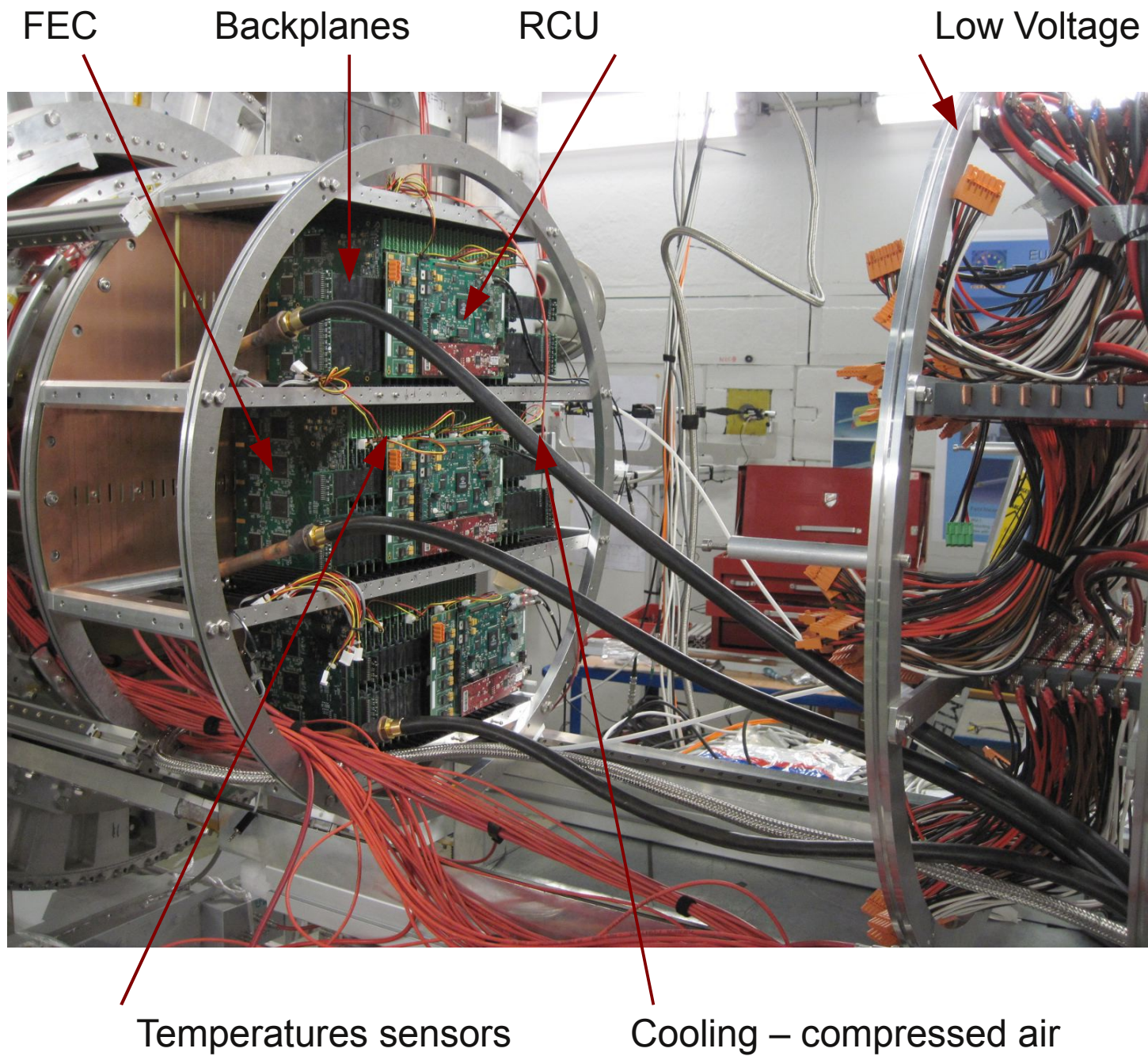
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Hardware is based on ALICE TPC readout electronics

modified Front End Cards (FEC) with 8×16 ch ALTRO chips (128 ch/FEC):
 Preamplifier 16 ch PASA $\rightarrow$ 16 ch PCA16 with programmable gain, shaping
 Added hardware to program PCA16 settings
 Modified board controller firmware for downloading PCA16 settings
 Other input connectors to use kapton cables between GEM and FEC

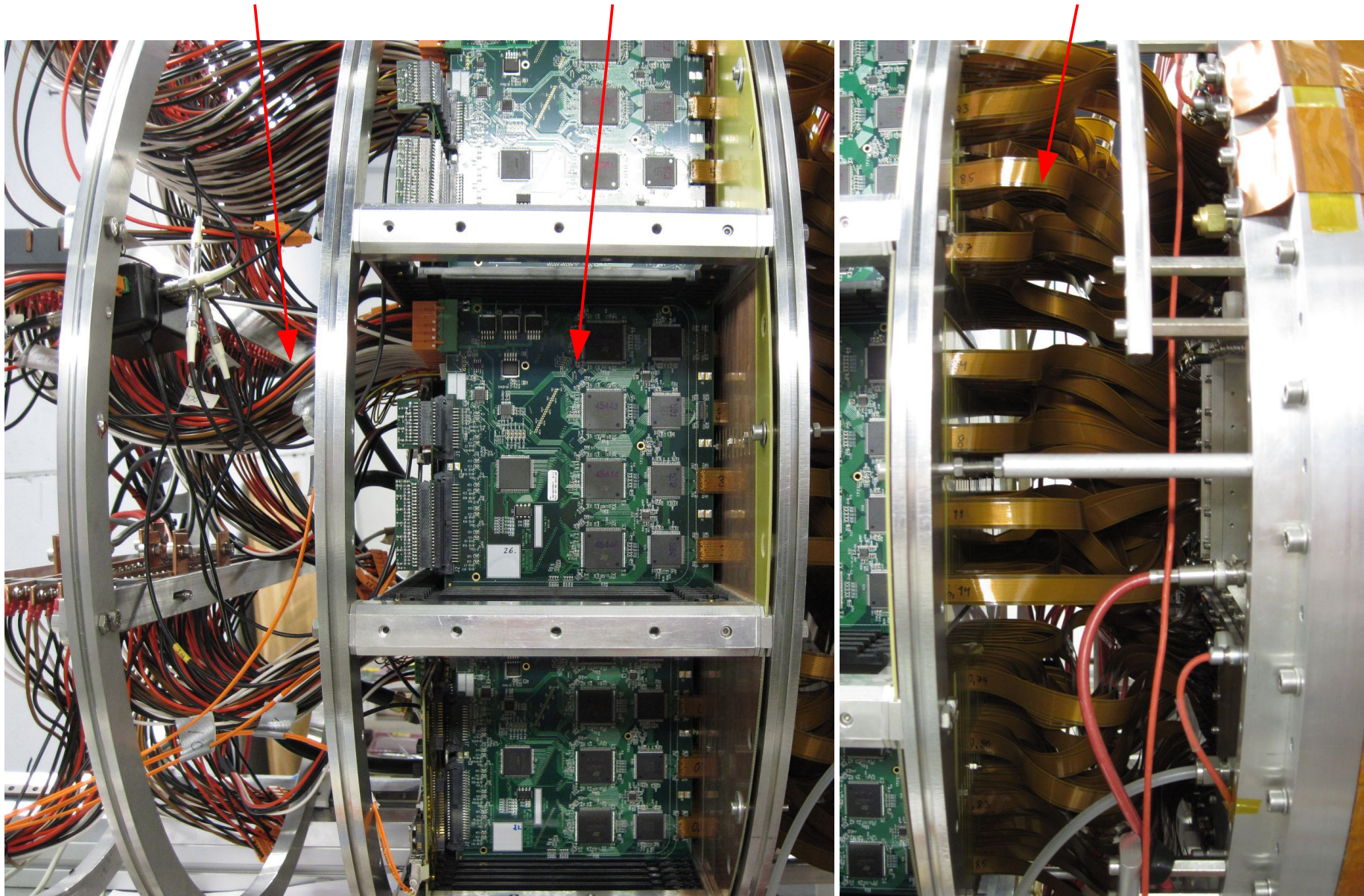
Modified ALTRO BUS backplane to allow 32 FECs instead of 26
 Modified Readout Control Units (RCU) to handle external trigger and clocks
 Standard Data Receiver (DRORC)



Low Voltage

FEC

Kapton cables



User interface:

Local run control (JAVA)

Local monitoring (C++/ROOT)

Temperature monitoring

No common DAQ interface

DAQ software (C):

readout, logging, configure

ALICE software used:

libraries

drivers

ALICE hardware:

DRORC

RCU

FEC

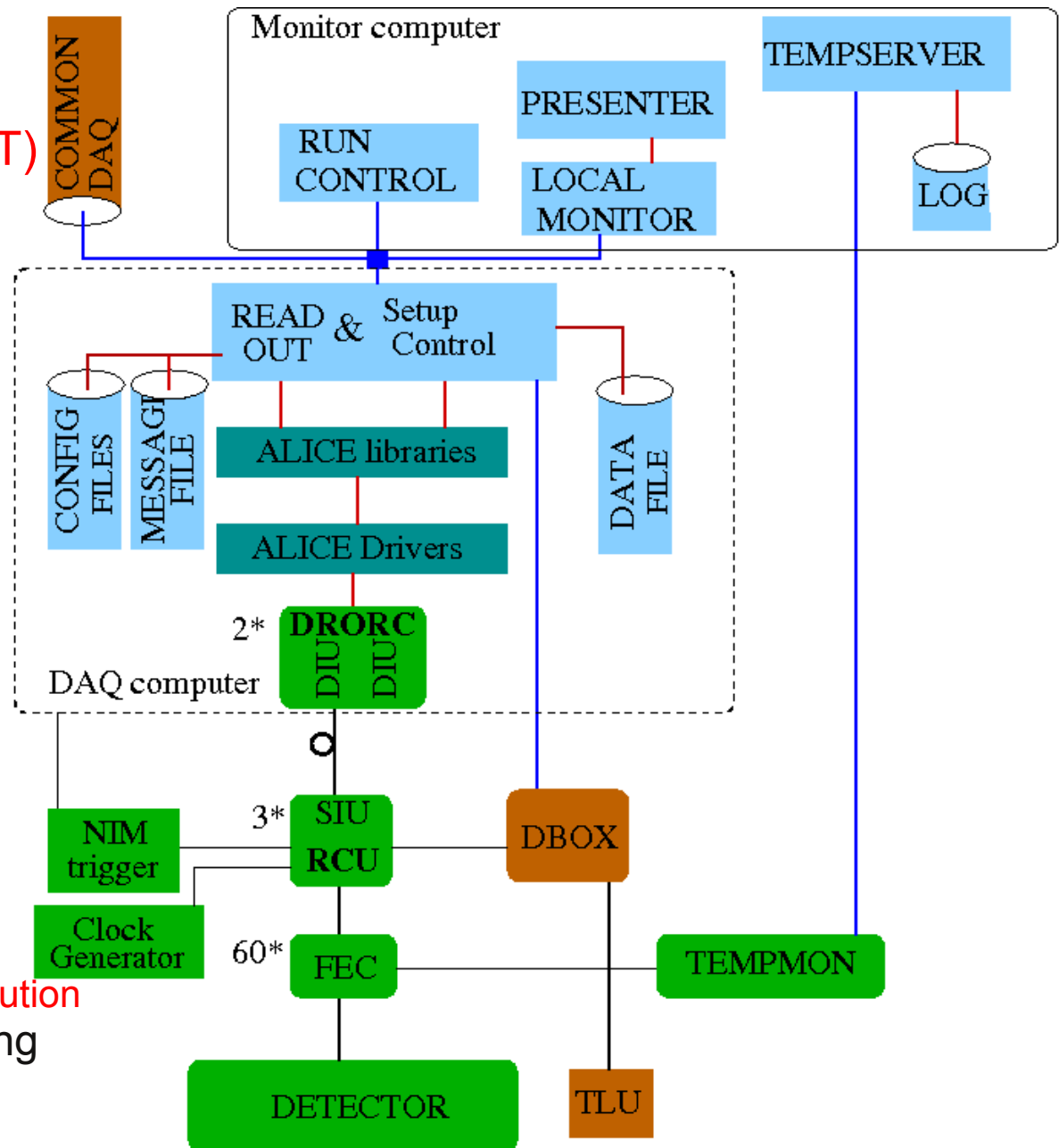
Trigger:

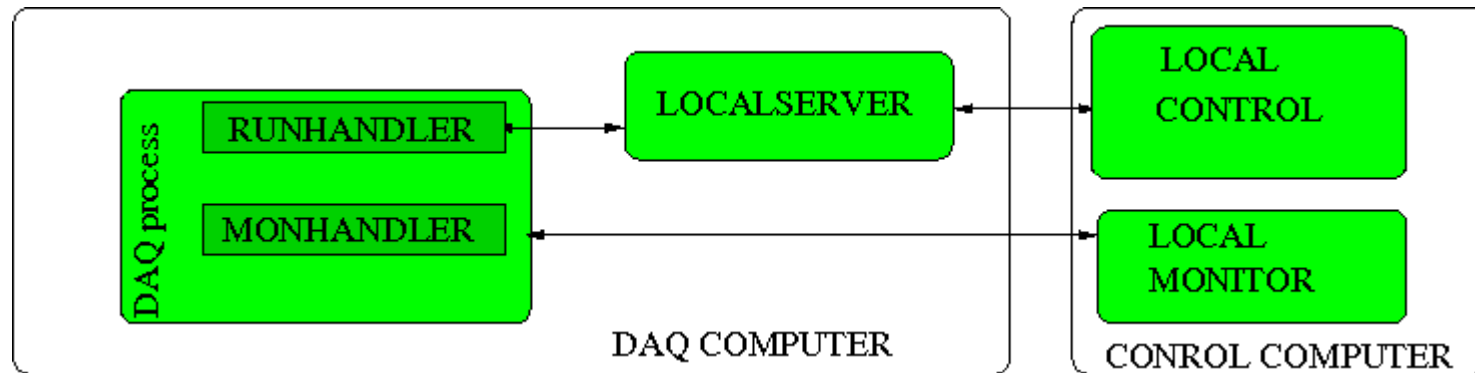
NIM system

DBOX-TLU trigger & clock distribution

DBOX-TLU for common running

not fully tested and used





Messages are sent between local control and localserver over network as simple text strings:

*<command> <parameters> e.g.:

*START configure DRORC/data memory/RCU/ALTRO

*SOR, *EOR start of run, end of run

*PCA configure PCA16

*STOP close DRORC/data memory

*POW power on/off FECs, download lookup tables (takes long time)

Localserver communicates with DAQ runhandler using sockets or UNIX signals depending on run state (should have be done differently today).

Local monitor communicates with a thread (monhandler) in the DAQ process

*GETEVT request an event, event is sent as raw binary data over the network

TRIGGER SYSTEM

NIM electronics and using the parallel port on DAQ computer to enable/reset trigger.
External clock generator for the RCUs

One trigger mode:

1 - Data driven readout (DAQ process waits for data from DRORCs)

DBOX – TLU intended to be used for common running

D(istributor)BOX receives trigger from TLU, distributes trigger and clocks to the RCUs

Two trigger modes:

1 - Data driven readout (DAQ process waits for data from DRORCs)

2 - Network trigger from DBOX to DAQ process

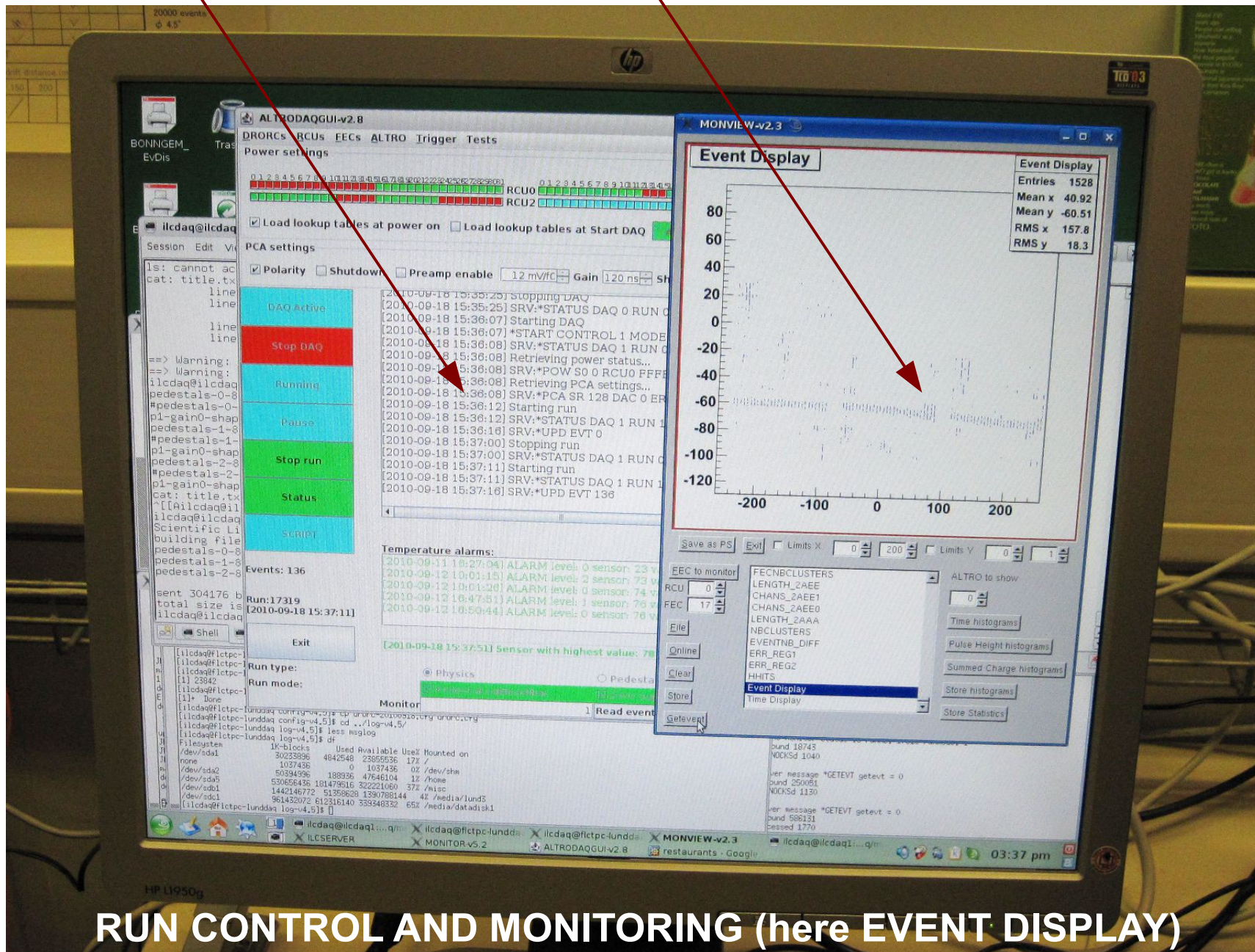
DAQ process send an acknowledge through the network to the DBOX when finished

Problem: acknowledge is sometimes sent but not received.

There has not yet been any combined running, so DBOX – TLU has not been the standard trigger system used.

Run Control

Event display



RUN CONTROL AND MONITORING (here EVENT DISPLAY)

EXPERIENCE WITH READOUT SYSTEM

Operated reliable when taking data in test beams at DESY:

February – March 2009

July 2009

September 2009

September 2010

In September 2010 did the system consist of:

7680 channels (60 Front End cards)

3 RCUs

2 DRORCs

The system is designed to handle 10000 channels.

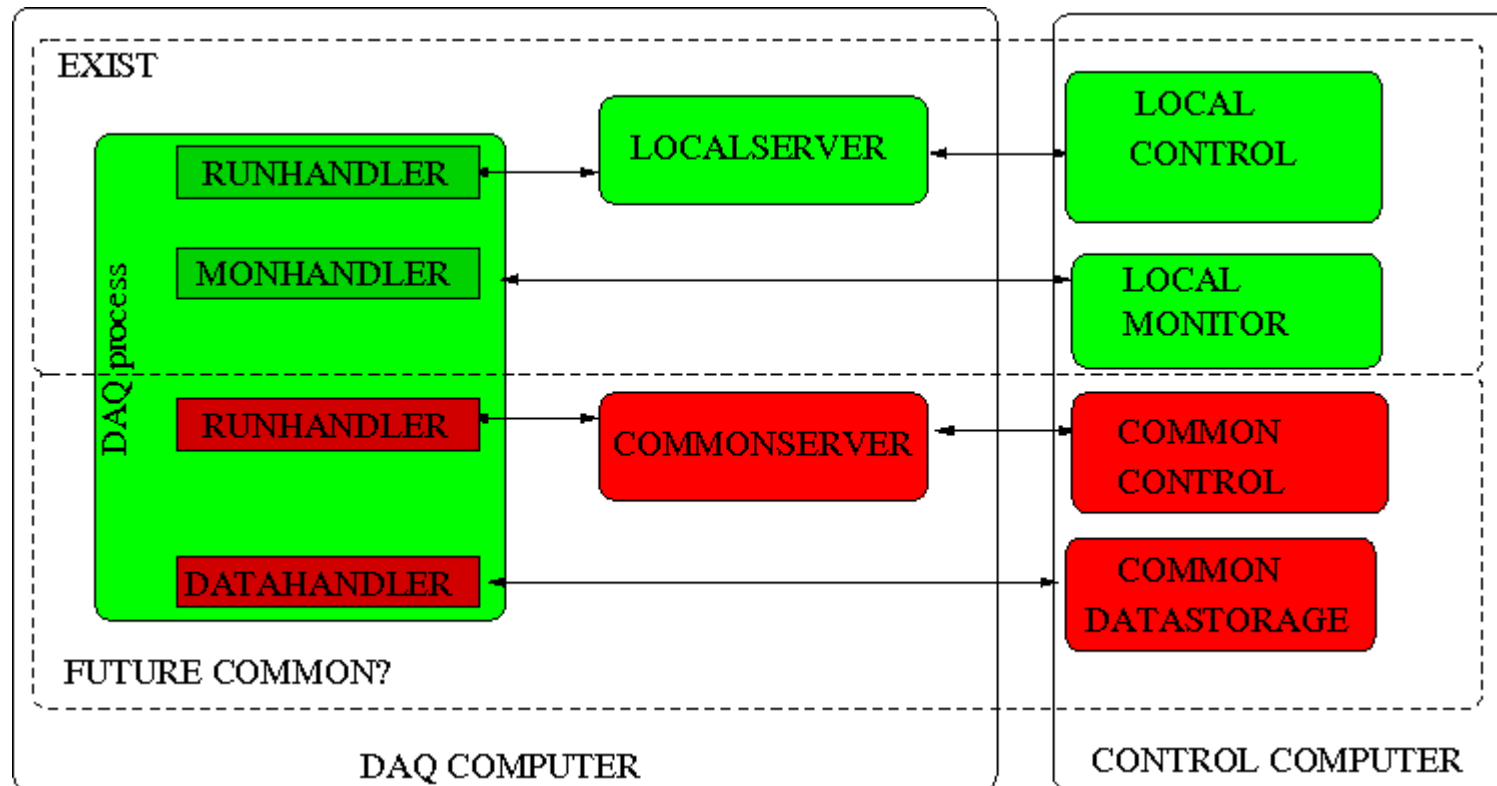
Improvements have been done during this time.

Used in Japan with 1 RCU + GEM + small TPC.

Used in Lund for system tests.

Some improvements in run control planned.

FUTURE?



DBOX – TLU trigger? fully implemented if any combined running

Some work was done to integrate DAQ process with EUDAQ, but lack of time/manpower and problem with ALICE C-code interrupted it.

Control? implement a commonserver that can communicate with the DAQ process one side, as the localserver do, and with a common control on the other side.

Event data transfer? Currently as local storage and sending raw binary data over network.