HPS DAQ overview

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Run preparations – SLAC setup

Two TIpcie boards and one TIpcie-new board were shipped to SLAC, along with VME TI board; VME crate with CPU was already at SLAC

Setup built at SLAC includes VME crate as master and two Linux servers with TIpcie cards as slaves

CODA software was installed at SLAC with appropriate libraries, some modifications were made for Ubuntu (JLAB runs RHEL/CentOS, not Ubuntu) and for newer gcc

DAQ without SVT runs at 60kHz random pulser and 95% live, it indicates that all 3 TI cards communicates correctly

New TI card was not ready at that time

Office of Nuclear Physics — Exploring Nuclear Matter - Quarks to Stars

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Run preparations – EEL setup

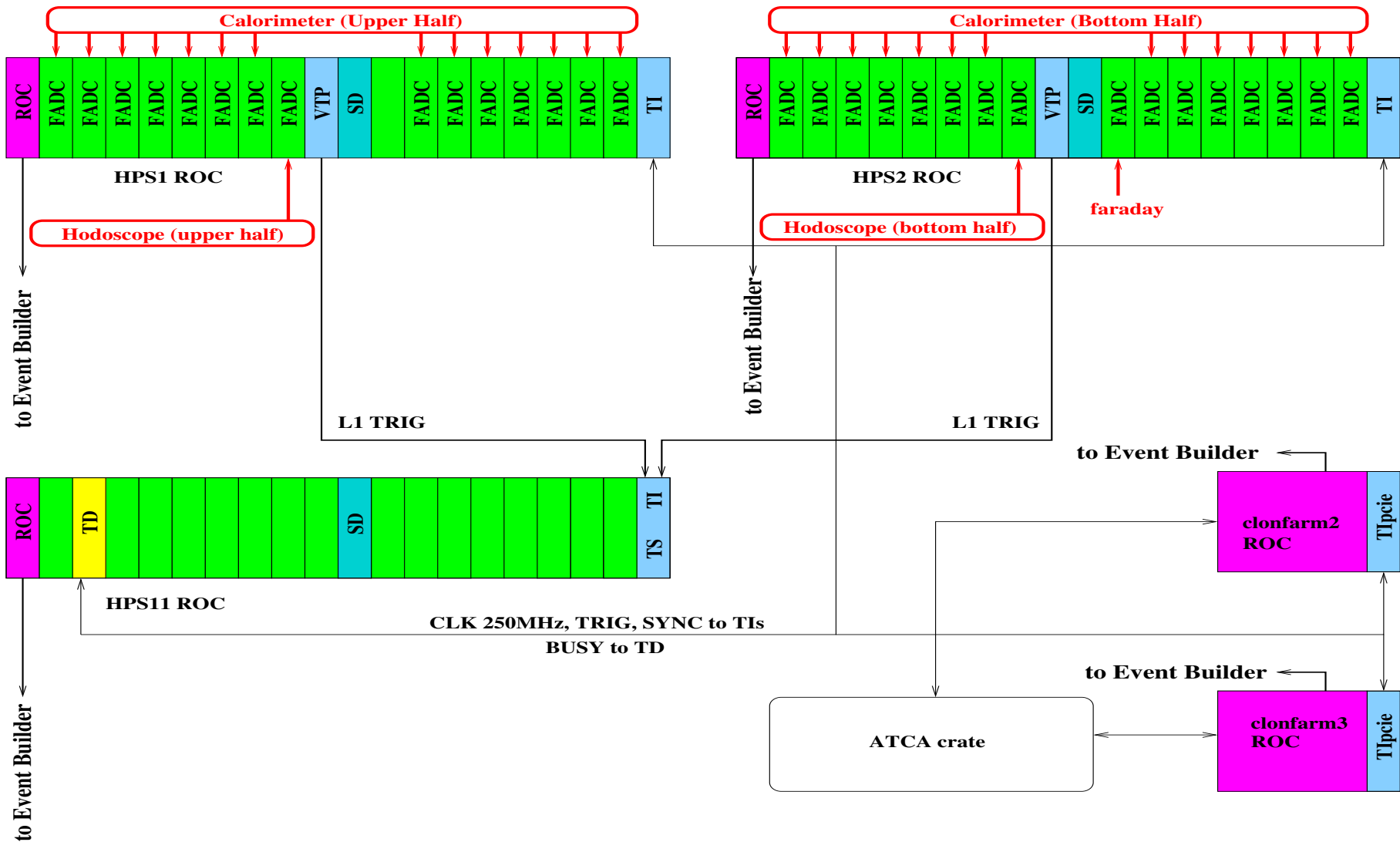Full SVT readout system was reproduced in JLAB EEL building

2 servers (clon10new and clonfarm1) were moved from counting room, VXS crate was installed as well, network switch installed

SVT was installed in adjacent clean room

DAQ system with real SVT was tested, worked as expected

New TI card test was started in the very end, only master mode library was available, never finished; old TIs were used in production run

HPS DAQ/Trigger Front-End Electronics

Calorimeter (Upper Half)

| ROC | FADC | FADC | FADC | FADC | FADC | FADC | FADC | FADC | VTP | SD | FADC | FADC | FADC | FADC | FADC | FADC | FADC | TI |

HPS1 ROC

Hodoscope (upper half)

to Event Builder

L1 TRIG

Calorimeter (Bottom Half)

| ROC | FADC | FADC | FADC | FADC | FADC | FADC | FADC | FADC | VTP | SD | FADC | FADC | FADC | FADC | FADC | FADC | FADC | TI |

HPS2 ROC

faraday

Hodoscope (bottom half)

to Event Builder

L1 TRIG

| ROC | TD | | | | | SD | | | | | TS | TI |

HPS11 ROC

CLK 250MHz, TRIG, SYNC to TIs
BUSY to TD

to Event Builder

to Event Builder

| clonfarm2 ROC | TIpcie |

to Event Builder

| ATCA crate |

| clonfarm3 ROC | TIpcie |

3 VXS crates, 2 servers, 1 ATCA crate, 7 Readout Controllers

HPS DAQ in Hall B

- Calorimeter Readout: 442 channels of 12bit 250MHz Flash ADCs

- Hodoscope Readout: 32 channels of 12bit 250MHz Flash ADCs

- CPU/VTP/TS/SD/TD trigger and signal distribution boards

- 3 VXS crates

- 2 servers (clonfarm2/3) with TIpcie cards for SVT readout

- SVT readout (front-end and ATCA blades)

Back-end computing and software is CLAS12 facility: network, computing (clondaq7), clonfarm1 fileserver was used for SVT readout mounts because of nfs version incompatibility of the new clonfs1, DAQ software, data monitoring, messaging system, realtime database

HPS DAQ Performance

31 kHz event rate

400 MB/s data rate

>85% livetime

DAQ Status

2021 HPS run DAQ system worked as expected, no major problems were observed

Most downtime was related to the clock switch between internal and external modes, leading to repeated run starting procedures, have to be addressed

TIpcie-new modules were not ready for this run, will be commissioned later

We are planning to keep JLAB part of the HPS DAQ & Trigger system untouched, ready for future usage