HPS DAQ Operations Manual v1.1

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1   System Description

The HPS experiment data acquisition (DAQ) handles the acquisition of data for the two sub-detectors: the SVT, and the ECal. HPS employs two DAQ architectures: the SVT is readout with Advanced Telecom Communications Architecture (ATCA) hardware while the ECal use VXS based hardware. The trigger system receives input from the ECal, and distributes a trigger signal to all detector subsystems to read out a selected event. Figure 1 gives a schematic block diagram of the DAQ system. For the ECal, every VXS crate contains a Readout Controller (ROC) that collects digitized information, processes it, and sends it on to the Event Builder (EB). The ROC is a single blade Intel-based CPU module running DAQ software under CentOS Linux OS. For the SVT ATCA system, a multi-ROC setup runs on embedded processors situated on the ATCA main board. The EB assembles information from the SVT and ECal ROCs into a single event which is passed to the Event Recorder (ER) that writes it to a RAID5-based data storage system. The DAQ network system is a Foundry router providing high-speed connections between the DAQ components and to the JLab computing facility.

2   DAQ Control

2.1   Starting the DAQ from scratch

1. Log into `clondaq3` as `clasrun`.
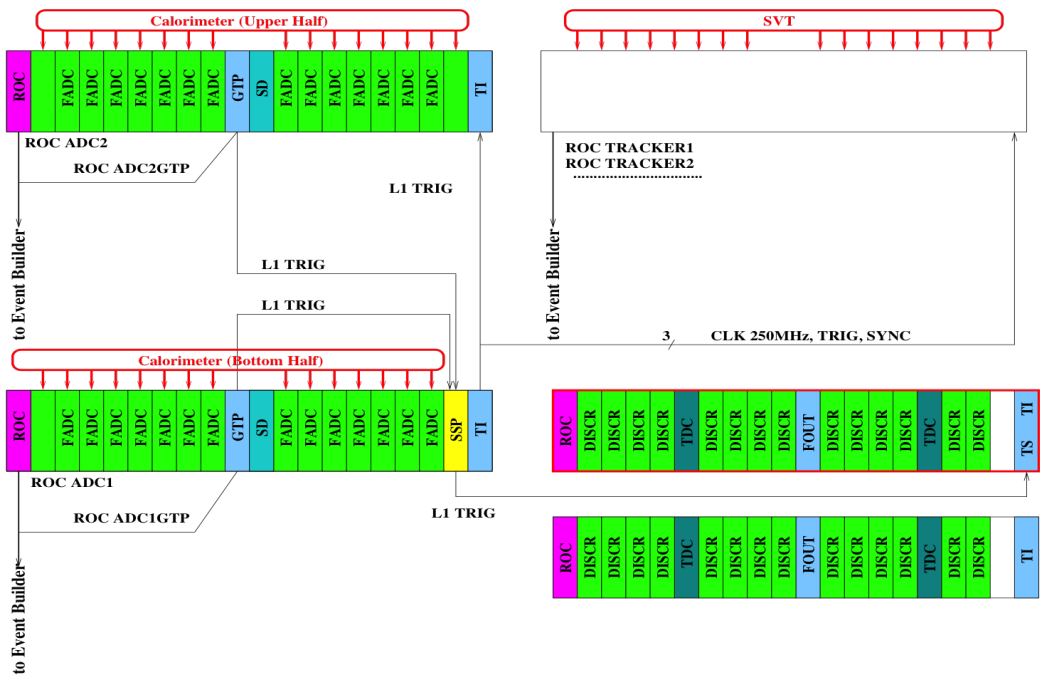
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Figure 1: Schematic overview of the DAQ and trigger system.

2. To start all DAQ processes, open a terminal:
   ```
   cd $CLAS
   hpsdaq3_start
   ```
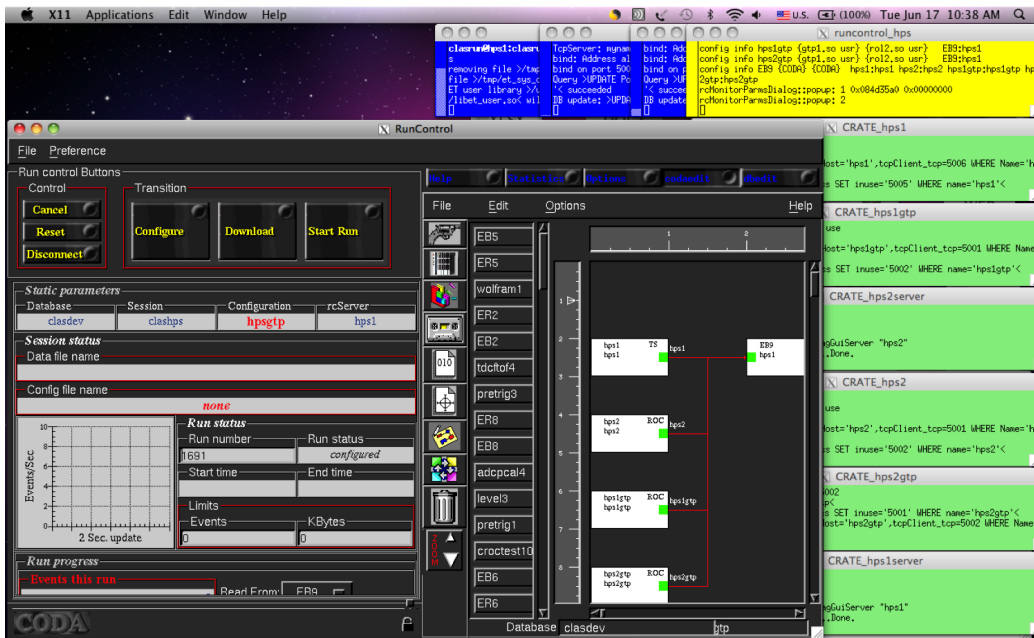   This opens up all windows needed on the current workspace. The workspace should look like Fig. 2.

Figure 2: CODA workspace.

2.2 Troubleshooting

2.2.1 DAQ won't start

Make sure that all CODA processes are killed before running the start script above.

2.3 Start and stop a run

1. Beamline checklist

(a) Beam conditions are ready for running (see beam line manual for more details).

2. ECal Checklist

   (a) Check that ECal is ready to go (see ECal manual for more details).

3. SVT Checklist

   (a) SVT position is appropriate for the run. **Check with shift leader if not sure.**

   (b) SVT Flange boards and SVT Front end boards (FEBs) are powered with currents as specified.
   If not, restart the FEBs turning on in the order: **DIG, ANAP and then ANAN**. Then power all the flange channels. Go to the "svtDpmLinkStatus" GUI and check that the FEB link errors are not incrementing. If they do, try to cycle the flange board power (wait 10-20s between cycles). You may need up to 4 cycles.

   (c) SVT DAQ is in a state ready to run:
      i. No link errors.
      ii. All DPMs are in "Ready" state.
      iii. All DPMs are in "Stopped" CODA state.
         If the DAQ was stopped from a previous run the allowed CODA states are "Download" or "Prestart".

4. **If continuing with same the same run configuration from a stopped run continue to 9.**

5. Go to the `RunControl` GUI: click `connect`, a new GUI window opens.

6. Click on `DAQ Configuration` and choose the `hps3` configuration. Click OK.

7. Check that run number, data filename and run configuration filename shown on `RunControl` GUI are correct. The "download" button should appear.

8. Press `Download`.

(a) Wait until the "Prestart" button appears and `RunControl` GUI reports that Download was completed. This might takes up to 30s to complete.

(b) Go to the `svtDpmRunState` GUI and check that all DPM's are in "Download" state.

(c) When `Prestart` button shows up the DAQ is ready to take data.

9. Press `Prestart` and wait between 5 and 10s and no errors are reported.

(a) Go to the `svtDpmRunState` GUI and check that all DPM's are in "Prestart" state.

(b) Go to the `svtHybSync` GUI and check that all hybrids are in "sync" i.e. the `SyncDetected` variable should be `0xf` for all hybrids.

10. Press `Go` to start the run.

(a) Check that the run status is 'running' and that triggers are issued.

(b) Verify SVT DAQ started run properly:

 i. Go to the `svtDpmRunState` GUI and
    A. Check that all DPM's are in "Go" state
    B. Check that the `TrigCount` is incrementing for both DPM and DTMs and are similar.
    C. Check that the `EventCount` is incrementing.

2.4   Stopping a run

1. Go to the `RunControl` GUI and press `End Run` to stop data taking.

2. Verify the SVT DAQ ended in a good state:

(a) Go to the `svtDpmRunState` GUI and:

 i. Check that the CODA run state is `Stopped` for all DPMs.
 ii. Check that the `TrigCount` and `EventCount` variables for DPMs and DTMs are identical.

2.5 Stopping and restarting the DAQ

2.5.1 SVT DAQ

Rebooting the "COBs"
Open a terminal on `clondaq3`.
`cd CLAS/slac_svt/svtdaq/daq/rceScripts`
`./reboot_cob`
Wait until finished, can be up to 20s.

What is the best way of checking that the DPMs are ok at boot up ?
Restart the control servers
Open a terminal on `clondaq3`.
`cd CLAS/slac_svt/svtdaq/daq/rceScripts`
`./rem_restart`
Wait until finished, can be up to 20s.

What is the best way of checking that the server started ok?

2.5.2 Stopping and restarting CODA

If DAQ problems occur and restarting the run do not work all DAQ processes
can be restarted by typing:

1. `hpsdaq3_exit` in a terminal on `clondaq3`
   Wait for script to finish and check that no coda processes are running
   in the machine.

2. `hpsdaq3_start` in a terminal on `clondaq3`

This will cleanup all processes and you can restart by following the pro-
cedures above.

2.5.3 Reboot ECal or master TI crates

Sometimes hardware reset needed to bring the ECal DAQ system back to
normal. For HPS there are four VME/VXS crates: `hps11`, `hps12`, `hps1` and
`hps2`. These can be power cycled to try and get back into the normal state.
Crate `hps11` is a master, so it have to be rebooted first, followed by others.
To reboot, do the following in a terminal on `clondaq3`:

1. Type command `roc_reboot hps11` in a terminal.

2. Type command `roc_reboot crate_id` in the same terminal where `crate_id` is `hps12`, `hps1` or `hps2`.