iRPC DAQ for dummies

L.Mirabito
C.Combaret
G.Baulieu

1 Configuration files

1.1 The configuration

The data acquisition system is controlled by a description file (gifpp_tdc_1) that is given bellow. It should not be modified to run withe coaxial chamber only.

Few parameters are important

1. TDCSERVER: the state of the DB to be used and the network
2. MDCCSERVER: the device name
3. WRITER: the directory where data are stored

There is 5 computers to control all processes:

1. lyosdhcal8: It controls the Event builder (WRITER) and the global run control application (FDAQ)
2. lyocmsrpi02,03,04,05: Five raspberry pi that controls the TDCs (TDCSERVER) and for lyocmsrpi02 the trigger board (MDCCSERVER)

The account of those computers are *acqilc* for lyosdhcal8 and *pi* for the raspberry. The raspberry can be access without password from lyosdhcal8. Please require the password of lyosdhcal8 to Maxime Gouzewitch.


```
{
  "HOSTS": {
    "lyocmsrpi02": [
      {
        "ARGS": [],
        "ENV": [
          "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
          "LD_LIBRARY_PATH=/usr/lib:/usr/local/lib:/opt/dhcal/levbdim/lib:/opt/dhcal/lib:/opt/dhcal/DQM4HEP/lib:/opt/dhcal/dim/linux:/opt/dhcal/DQM4HEP/l
          "CONFDB_WEB=cmsLyon/RPC_2008@ilcconfdb.ipnl.in2p3.fr",
          "WEBPORT=41000"
        ],
```

```
    "NAME": "TDCSERVER",
    "PARAMETER": {
      "publish": "tcp://lyosdhcal8:5556",
      "tdc": {
        "db": {
          "mode": "WEB",
          "state": "FE1_24CH_27"
        },
        "network": "192.168.10."
      },
      "type": 0
    },
    "PROGRAM": "/opt/dhcal/bin/lydaq_daemon_TdcCms"
  },
  {
    "ARGS": [],
    "ENV": [
      "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
      "DIM_DNS_NODE=lyosdhcal8",
      "LD_LIBRARY_PATH=/usr/lib:/usr/local/lib:/opt/dhcal/levbdim/lib:/opt/dhcal/lib:/opt/dhcal/DQM4HEP/lib:/opt/dhcal/dim/linux:/opt/dhcal/DQM4HEP/l
      "WEBPORT=42000"
    ],
    "NAME": "MDCCSERVER",
    "PARAMETER": {
      "device": "MDCC01",
      "spilloff": 10000000,
      "spillon": 500,
      "spillregister": 4
    },
    "PROGRAM": "/opt/dhcal/bin/lydaq_daemon_Mdcc"
  }
],
"lyocmsrpi03": [
  {
    "ARGS": [],
    "ENV": [
      "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
      "LD_LIBRARY_PATH=/usr/lib:/usr/local/lib:/opt/dhcal/levbdim/lib:/opt/dhcal/lib:/opt/dhcal/DQM4HEP/lib:/opt/dhcal/dim/linux:/opt/dhcal/DQM4HEP/l
      "CONFDB_WEB=cmsLyon/RPC_2008@ilcconfdb.ipnl.in2p3.fr",
      "WEBPORT=41000"
    ],
    "NAME": "TDCSERVER",
    "PARAMETER": {
      "publish": "tcp://lyosdhcal8:5556",
      "tdc": {
        "db": {
          "mode": "WEB",
          "state": "FE1_24CH_27"
        },
        "network": "192.168.10."
      },
      "type": 0
    },
    "PROGRAM": "/opt/dhcal/bin/lydaq_daemon_TdcCms"
  }
],
"lyocmsrpi04": [
  {
    "ARGS": [],
    "ENV": [
      "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
      "LD_LIBRARY_PATH=/usr/lib:/usr/local/lib:/opt/dhcal/levbdim/lib:/opt/dhcal/lib:/opt/dhcal/DQM4HEP/lib:/opt/dhcal/dim/linux:/opt/dhcal/DQM4HEP/l
      "CONFDB_WEB=cmsLyon/RPC_2008@ilcconfdb.ipnl.in2p3.fr",
      "WEBPORT=41000"
    ],
    "NAME": "TDCSERVER",
    "PARAMETER": {
      "publish": "tcp://lyosdhcal8:5556",
      "tdc": {
        "db": {
          "mode": "WEB",
          "state": "FE1_24CH_27"
        },
        "network": "192.168.10."
      },
      "type": 0
```

```
      },
      "PROGRAM": "/opt/dhcal/bin/lydaq_daemon_TdcCms"
    }
  ],
  "lyocmsrpi05": [
    {
      "ARGS": [],
      "ENV": [
        "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
        "LD_LIBRARY_PATH=/usr/lib:/usr/local/lib:/opt/dhcal/levbdim/lib:/opt/dhcal/lib:/opt/dhcal/DQM4HEP/lib:/opt/dhcal/dim/linux:/opt/dhcal/DQM4HEP/l
        "CONFDB_WEB=cmsLyon/RPC_2008@ilcconfdb.ipnl.in2p3.fr",
        "WEBPORT=41000"
      ],
      "NAME": "TDCSERVER",
      "PARAMETER": {
        "publish": "tcp://lyosdhcal8:5556",
        "tdc": {
          "db": {
            "mode": "WEB",
            "state": "FE1_24CH_27"
          },
          "network": "192.168.10."
        },
        "type": 0
      },
      "PROGRAM": "/opt/dhcal/bin/lydaq_daemon_TdcCms"
    }
  ],
  "lyosdhcal8": [
    {
      "ARGS": [],
      "ENV": [
        "DIM_DNS_NODE=lyosdhcal8",
        "LD_LIBRARY_PATH=/usr/lib:/usr/local/lib:/opt/dhcal/levbdim/lib:/opt/dhcal/lib:/opt/dhcal/root/lib:/opt/dhcal/dim/linux:/opt/dhcal/lcio/v02-00/
        "WEBPORT=45000"
      ],
      "NAME": "FDAQ",
      "PARAMETER": {
        "s_ctrlreg": "0x895A0040"
      },
      "PROGRAM": "/opt/dhcal/bin/lydaq_daemon_Control"
    },
    {
      "ARGS": [],
      "ENV": [
        "LD_LIBRARY_PATH=/usr/lib:/usr/local/lib:/opt/dhcal/lib:/opt/dhcal/lcio/v02-00/lib/:/opt/dhcal/root/lib:$LD_LIBRARY_PATH",
        "WEBPORT=51000"
      ],
      "NAME": "WRITER",
      "PARAMETER": {
        "dif": 1,
        "directory": "/data/local/GIFPP",
        "processor": [
          "binarywriter",
          "lydaq_pluggins_monitor"
        ],
        "shmpath": "/dev/shm/monitor",
        "stream": [
          "tcp://*:5556"
        ]
      },
      "PROGRAM": "/opt/dhcal/bin/lydaq_daemon_Builder"
    }
  ]
 },
 "NAME": "gifpp_tdc_1"
}
```

1.2 The rc file

The rc file is named *.daqrc* and it should contain the 2 alias with a pointer to the name of the DAQ configuration (for DAQ and slow control)

```
alias slccontrol="export DAQLOGIN=cmsLyon:RPC_2008;
export DAQURL=https://ilcconfdb.ipnl.in2p3.fr/config-content/slow_dome_cassette_2;
/opt/lydaq/apps/bin/fdaq.py"

alias daqcontrol="export DAQLOGIN=cmsLyon:RPC_2008;
export DAQURL=https://ilcconfdb.ipnl.in2p3.fr/config-content/gifpp_tdc_1;
/opt/lydaq/apps/bin/fdaq.py"
```

2 Starting from scratch

2.1 Check job control on all computer

On all computer of the DAQ/Slow Control:

```
sudo /opt/dhcal/bin/ljcd status
```

if it's not running

```
sudo /opt/dhcal/bin/ljcd start
```

2.2 Initialise Job control

```
daqcontrol --jc-create
```

3 Controlling processes

3.1 start all processes

```
daqcontrol --jc-start
```

3.2 status

```
daqcontrol --jc-status
```

Typical output per Host

```
acqilc@lyosdhcal8:~$ daqcontrol --jc-status
 15655       TDCSERVER               lyocmsrpi05         S (sleeping)
  2512       TDCSERVER               lyocmsrpi04         S (sleeping)
 25623            FDAQ                lyosdhcal8         S (sleeping)
 25624          WRITER                lyosdhcal8         S (sleeping)
 15955       TDCSERVER               lyocmsrpi03         S (sleeping)
 16118       TDCSERVER               lyocmsrpi02         S (sleeping)
 16119      MDCCSERVER               lyocmsrpi02         S (sleeping)
```

On each host the log of the process is stored on */tmp/fsmjobPID#pid.log*. Please have a look to the TDCSERVER one at least.

You can create xterm with all TDCSERVER log by typing:

```
acqilc@lyosdhcal8:~$ ./spylog
```

3.3 kill all processes

```
daqcontrol --jc-kill
```

4 controling the DAQ

4.1 Services control

```
daqcontrol --daq-create
daqcontrol --daq-discover
daqcontrol --daq-service
```

4.2 DAQ initialisation

```
daqcontrol --daq-init;
```

You should check that all TDC processes has initialised sockets to the FEBs. In the log you will see message of the foolowing type:

```
  INFO  LocalDAQ - ****** CMD: INITIALISE
_type =0
On obtinet
```

```
192.168.10.5
192.168.10.100
192.168.10.5 is 50aa8c0  TDC5.in2p3.fr
192.168.10.100 is 640aa8c0  local4.in2p3.fr
 TDC socket added 192.168.10.5:10002
 New TDC Mezzanine ^E 84584640
```

4.3 Chips configuration

```
daqcontrol --daq-configure;
```

You MUST change the DBSTATE used with respect to the one stored in the configuration file:

```
 daqcontrol --daq-download --dbstate=FE1_24CH_30
daqcontrol --daq-configure;
```

4.4 Calibration run (expert only)

```
daqcontrol --daq-scurve --first=440 --last=550 --chan=255 --step=1
```

- –*first/last* specifies the scan of VTHTime interval
- –*chan* 1023:all channels one by one, 255: all channels together, otherwise only the specified channel.
- –*step* the step of the scan

4.5 Cosmic run

First set everything up

```
# run with correct settings
daqcontrol --daq-download --dbstate=FE1_24CH_30
daqcontrol --daq-configure
# set spill window 2.5 ms with 10% dead time
daqcontrol --trig-spillof --clock=10000
```

```
daqcontrol --trig-spillon --clock=100000
#effective threshold on all boards
daqcontrol --daq-setvth --vth=507
# Trigger mode
daqcontrol --trig-spillreg --value=4
```

And the you can start

```
daqcontrol --daq-start
daqcontrol --trig-resume
```

Check the number of event

```
daqcontrol --daq-evbstatus
      Run      Event
   739103      44015
```

Or stop

```
daqcontrol --daq-stop
```

4.6 Physic run

4.6.1 First set everything up

```
# run with correct settings
daqcontrol --daq-download --dbstate=FE1_24CH_30
daqcontrol --daq-configure
# set running mode with startof spill and 5 s of data taking
daqcontrol --trig-spillreg --value=2
daqcontrol --trig-setreg --address=7 --value=200000000
#effective threshold on all boards
daqcontrol --daq-setvth --vth=507
```

4.6.2 And then you can start

```
daqcontrol --daq-start
# resume the trigger
daqcontrol --trig-resume
```

4.6.3 Check the DB state

```
acqilc@lyosdhcal8:~$ daqcontrol --daq-dbstatus
      Run      State
   740192 FE1_24CH_30
```

4.6.4 Check the TDC readout

```
acqilc@lyosdhcal8:~$ daqcontrol --daq-tdcstatus
DIF    SLC  EVENT         BCID DETID
#   7  62356  62356  15643025060   120
#   6  62356  62356  15643025060   120
#   5  62356  62356  15643025060   120
#   8  62060  62356  15643025060   120
```

4.6.5 Check the event builder status

```
acqilc@lyosdhcal8:~$ daqcontrol --daq-evbstatus
       Run      Event
    740192      28630
```

4.6.6 Or stop

```
daqcontrol --daq-stop
```

4.6.7 Reconfiguration before next run in one go

```
# run with correct settings
daqcontrol --daq-download --dbstate=FE1_24CH_30
daqcontrol --daq-configure
```

```
# set running mode with startof spill and 5 s of data taking
daqcontrol --trig-spillreg --value=2
daqcontrol --trig-setreg --address=7 --value=200000000
#effective threshold on all boards
daqcontrol --daq-setvth --vth=507
```

4.7 Restart full system

```
daqcontrol --jc-kill
daqcontrol --jc-start
daqcontrol --daq-create
daqcontrol --daq-discover
daqcontrol --daq-service
daqcontrol --daq-initialise

daqcontrol --daq-download --dbstate=FE1_24CH_30
daqcontrol --daq-setvth --vth=507
daqcontrol --daq-configure
daqcontrol --trig-spillof --clock=10000
daqcontrol --trig-spillon --clock=100000
daqcontrol --trig-spillreg --value=2
daqcontrol --trig-setreg --address=7 --value=200000000
```

4.7.1 Remarks for graphic interface addict

All those commands are accessible from the web page http://daqcontrol.ipnl.in2p3.fr the account is cmsLyon and the password is the same as acqilc. The only missing buttons are those related to commands given in section 4.6.7. If you preffer to use web interface, do not forget to set the correct DBSTATE, reconfigure and set the correct threshold with *daqcontrol*

You should also set properly the trigger mode and the spill length (in 25 ns unit). For experts that want to implement their own control, please have a look in *fdaq.py* (DO NOT MODIFY IT) in /opt/lydaq/apps/bin/ that implements all daqcontrol requests.

5 Data analysis and monitoring

Please contact Konstantin Shchablo.

6 One more thing

Good luck ;-)