

# HPS DAQ Status

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## DAQ: overview

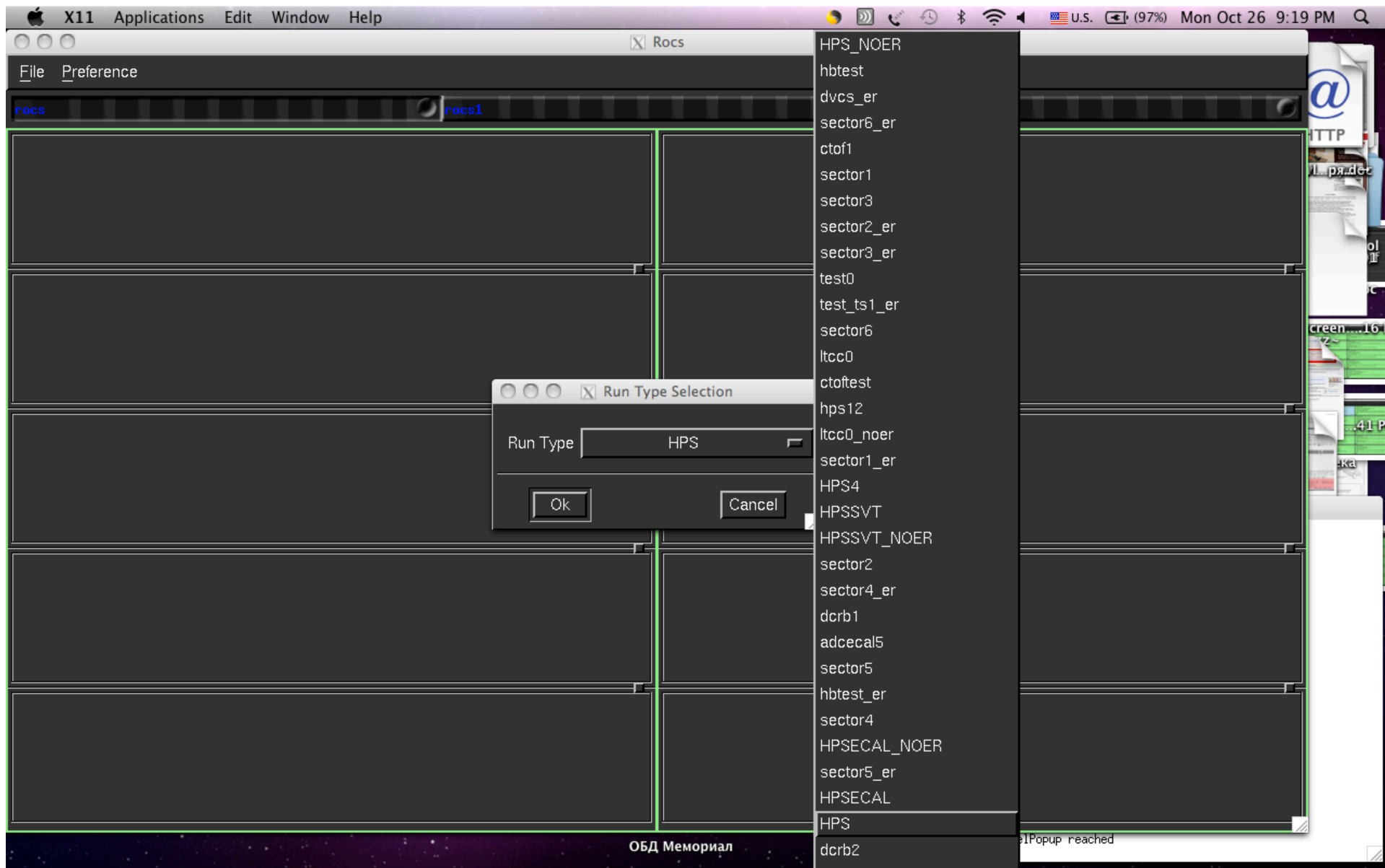
- DAQ software upgrade: new process managing etc
- Migration from 32bit RHEL5 to 64bit RHEL7
- Hardware upgrades
- Remaining work

# CODA software (cosmic run)

The screenshot displays the CODA software interface during a cosmic run. The interface is divided into several sections:

- Process Windows:** A grid of windows showing the status of various processes. On the left, hps processes (hps11 to hps2gtp) show cleanup and update status. On the right, dpm processes (dpm0 to dpm7) show network and thread exit status.
- RunControl Panel:** The central panel contains:
  - Run control Buttons:** Cancel, Reset, Disconnect, Prestart, Abort, Start Run.
  - Static parameters:** Database (clasdev), Session (clashps), Configuration (HPSECAL), rcServer (clondaq5.jlab.org).
  - Session status:** Data file name (/data/hps/hpsecal), Config file name (/usr/local/clas12/release/0.2/parns/trigger/HPS/ECAL/hps\_cosmic.cnf).
  - Run status:** Run number (5968), Run status (downloaded), Start time (Jun 23 08:50:20), End time (Jun 23 09:00:16).
  - Limits:** Events (0), KBytes (0).
  - Run progress:** Events this run (1970), Read From (ER20).
  - Rates Table:**

	Events/S	Rate (KB/S)
Integrated	3.3418	301.6244
Differential	5.0000	554.0280
  - Log:** A scrollable log showing transition and end status messages.
- Terminal Window:** Shows the command prompt and execution of `cosmic2tape.sh 5967`, listing files to be archived to tape.



File Preference

rocs rocs1 rocs2

```

hps11::hps11 TS
TcpServer: myname >hps11<
bind: Address already in use
bind on port 5002
Query >UPDATE Ports SET Host='hps11',tcpClient_tcp=5001 WHERE Name='hps11'< succeeded
DB update: >UPDATE process SET inuse='5002' WHERE name='hps11'<
[]

hps1::hps1 ROC
TcpServer: myname >hps1<
bind: Address already in use
bind on port 5002
Query >UPDATE Ports SET Host='hps1',tcpClient_tcp=5001 WHERE Name='hps1'< succeeded
DB update: >UPDATE process SET inuse='5002' WHERE name='hps1'<
[]

hps2::hps2 ROC
TcpServer: myname >hps2<
bind: Address already in use
bind on port 5002
Query >UPDATE Ports SET Host='hps2',tcpClient_tcp=5001 WHERE Name='hps2'< succeeded
DB update: >UPDATE process SET inuse='5002' WHERE name='hps2'<
[]

hps1gtp::hps1gtp ROC
TcpServer: trying port 5003
TcpServer: bind: Address already in use
TcpServer: bind on port 5004
TcpServer: myname >hps1gtp<
Query >UPDATE Ports SET Host='hps1gtp',tcpClient_tcp=5004 WHERE Name='hps1gtp'< succeeded
[]

hps2gtp::hps2gtp ROC
TcpServer: bind: Address already in use
TcpServer: bind on port 5004
DB update: >UPDATE process SET inuse='5003' WHERE name='hps2gtp'<
TcpServer: myname >hps2gtp<
Query >UPDATE Ports SET Host='hps2gtp',tcpClient_tcp=5004 WHERE Name='hps2gtp'< succeeded
[]

dpm0::dpm0 ROC
TcpServer: bind: Address already in use
TcpServer: bind on port 5002
TcpServer: myname >dpm0<
DB update: >UPDATE process SET inuse='5001' WHERE name='dpm0'<
Query >UPDATE Ports SET Host='dpm0',tcpClient_tcp=5002 WHERE Name='dpm0'< succeeded
[]

dpm1::dpm1 ROC
TcpServer: bind: Address already in use
TcpServer: bind on port 5002
TcpServer: myname >dpm1<
DB update: >UPDATE process SET inuse='5001' WHERE name='dpm1'<
Query >UPDATE Ports SET Host='dpm1',tcpClient_tcp=5002 WHERE Name='dpm1'< succeeded
[]

dpm2::dpm2 ROC
TcpServer: myname >dpm2<
bind: Address already in use
bind on port 5002
Query >UPDATE Ports SET Host='dpm2',tcpClient_tcp=5001 WHERE Name='dpm2'< succeeded
DB update: >UPDATE process SET inuse='5002' WHERE name='dpm2'<
[]

dpm3::dpm3 ROC
TcpServer: myname >dpm3<
Query >UPDATE Ports SET Host='dpm3',tcpClient_tcp=5001 WHERE Name='dpm3'< succeeded
bind: Address already in use
bind on port 5002
DB update: >UPDATE process SET inuse='5002' WHERE name='dpm3'<
[]

dpm4::dpm4 ROC
TcpServer: myname >dpm4<
bind: Address already in use
bind on port 5002
Query >UPDATE Ports SET Host='dpm4',tcpClient_tcp=5001 WHERE Name='dpm4'< succeeded
DB update: >UPDATE process SET inuse='5002' WHERE name='dpm4'<
[]

```

Rocs

File Preference

rocs rocs1 rocs2

```
dpm5::dpm5 ROC
TcpServer: bind: Address already in use
TcpServer: bind on port 5002
TcpServer: myname >dpm5<
DB update: >UPDATE process SET inuse='5001' WHERE name='dpm5'<
Query >UPDATE Ports SET Host='dpm5',tcpClient_tcp=5002 WHERE Name='dpm5'< succee
ded
[]
```

```
dpm6::dpm6 ROC
TcpServer: bind: Address already in use
TcpServer: bind on port 5002
TcpServer: myname >dpm6<
DB update: >UPDATE process SET inuse='5001' WHERE name='dpm6'<
Query >UPDATE Ports SET Host='dpm6',tcpClient_tcp=5002 WHERE Name='dpm6'< succee
ded
[]
```

```
dpm7::dpm7 ROC
TcpServer: bind: Address already in use
TcpServer: bind on port 5002
TcpServer: myname >dpm7<
DB update: >UPDATE process SET inuse='5001' WHERE name='dpm7'<
Query >UPDATE Ports SET Host='dpm7',tcpClient_tcp=5002 WHERE Name='dpm7'< succee
ded
[]
```

```
dpm8::dpm8 ROC
TcpServer: bind: Address already in use
TcpServer: bind on port 5002
TcpServer: myname >dpm8<
DB update: >UPDATE process SET inuse='5001' WHERE name='dpm8'<
Query >UPDATE Ports SET Host='dpm8',tcpClient_tcp=5002 WHERE Name='dpm8'< succee
ded
[]
```

```
dpm9::dpm9 ROC
TcpServer: bind: Address already in use
TcpServer: bind on port 5002
TcpServer: myname >dpm9<
DB update: >UPDATE process SET inuse='5001' WHERE name='dpm9'<
Query >UPDATE Ports SET Host='dpm9',tcpClient_tcp=5002 WHERE Name='dpm9'< succee
ded
[]
```

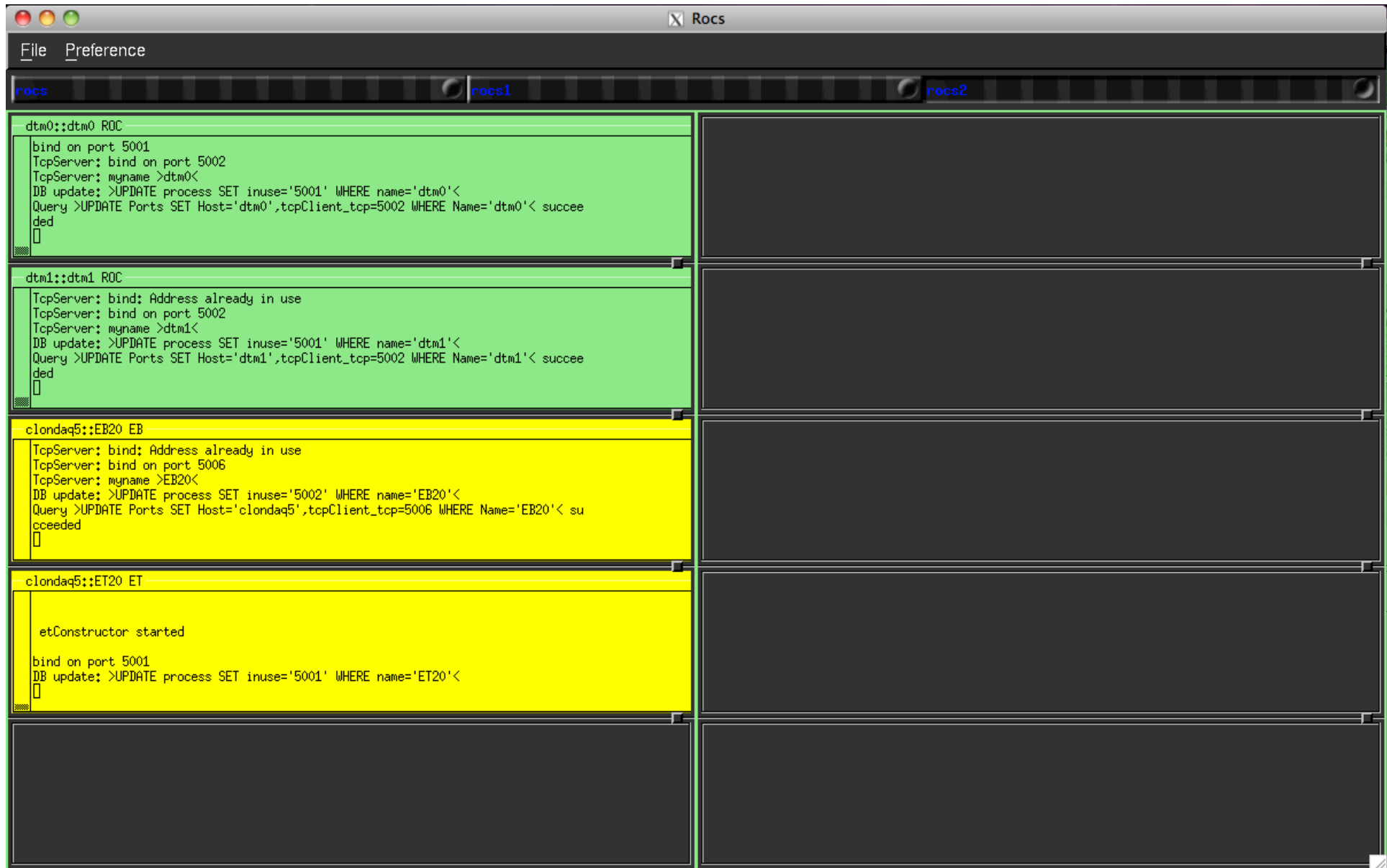
```
dpm10::dpm10 ROC
TcpServer: myname >dpm10<
Query >UPDATE Ports SET Host='dpm10',tcpClient_tcp=5001 WHERE Name='dpm10'< succ
eeded
bind: Address already in use
bind on port 5002
DB update: >UPDATE process SET inuse='5002' WHERE name='dpm10'<
[]
```

```
dpm11::dpm11 ROC
TcpServer: myname >dpm11<
Query >UPDATE Ports SET Host='dpm11',tcpClient_tcp=5001 WHERE Name='dpm11'< succ
eeded
bind: Address already in use
bind on port 5002
DB update: >UPDATE process SET inuse='5002' WHERE name='dpm11'<
[]
```

```
dpm12::dpm12 ROC
TcpServer: myname >dpm12<
bind: Address already in use
bind on port 5002
Query >UPDATE Ports SET Host='dpm12',tcpClient_tcp=5001 WHERE Name='dpm12'< succ
eeded
DB update: >UPDATE process SET inuse='5002' WHERE name='dpm12'<
[]
```

```
dpm13::dpm13 ROC
TcpServer: myname >dpm13<
bind: Address already in use
bind on port 5002
Query >UPDATE Ports SET Host='dpm13',tcpClient_tcp=5001 WHERE Name='dpm13'< succ
eeded
DB update: >UPDATE process SET inuse='5002' WHERE name='dpm13'<
[]
```

```
dpm14::dpm14 ROC
TcpServer: trying port 5001
TcpServer: bind: Address already in use
TcpServer: bind on port 5002
TcpServer: myname >dpm14<
Query >UPDATE Ports SET Host='dpm14',tcpClient_tcp=5002 WHERE Name='dpm14'< succ
eeded
[]
```



The screenshot displays the RunControl application window. On the left, there are control buttons for 'Cancel', 'Reset', 'Configure', and 'Download'. Below these are sections for 'Static parameters' (Database: clasdev, Session: clastest, Configuration: HPS, rcServer: clonpc14.jlab.org) and 'Session status'. A 'runConfigDialog\_popup' window is open, showing a file selection process with a filter set to '/usr/cls12/release/0.3/parms/trigger/\*.trg'. The dialog lists various trigger files under the 'HPS' directory, including ECAL, LED, and various TRIGGER files. The 'Selection' field shows the path '/usr/cls12/release/0.3/parms/trigger/'.

The main interface features a vertical toolbar with buttons for TS, ROC, EB, ET, ETT, ER, CODA FILE, BIN FILE, and MON. To the right, a data flow diagram is visible, showing a sequence of components: hps11 (TS), hps1 (ROC), hps2 (ROC), hps1gtp (ROC), hps2gtp (ROC), dprm0 (ROC), dprm1 (ROC), dprm2 (ROC), and dprm3 (ROC). These are connected to a central component 'EB20 clondaq5 EB clondaq5' and an output component 'ET20 clondaq5 ET clondaq5'. The diagram is overlaid on a grid with a vertical axis labeled 'Events/Sec' ranging from 0 to 10.



RunControl

File Preference

Run control Buttons

Control: Cancel, Reset

Transition: Configure, Download

Static parameters

Database	Session	Configuration	rcServer
clasdev	clastest	HPS	clonpc14.jlab.org

Session status

Data file name

Config file name

*/usr/local/rel/0.3/parms/trigger/clasdev.cnf*

Run status

Run number	Run status
11060	configured
Start time	End time

Limits

Events	KBytes
0	0

Run progress

Events this run: 0 Read From: EB20

Rates	Events/S	Rate (KB/S)
Integrated		
Differential		

WARN : dpm0 has not reported status for 116 seconds  
 WARN : dtm1 has not reported status for 116 seconds  
 WARN : dtm0 has not reported status for 116 seconds

CODA

Help Statistics Options codaedit dbedit rocs

File Edit Options Help

TS EB5  
 ROC ER5  
 EB wolfram1  
 ER2  
 ET EB2  
 ETT tdcftof4  
 ER pretrig3  
 CODA FILE ER8  
 BIN FILE EB8  
 MON adpcal4  
 level3  
 pretrig1  
 croctest10  
 EB6  
 ER6  
 clastrig2  
 croctest2  
 dvcs2  
 dvcstrig  
 pretrig2

File Preference

rocs rocs1 rocs2

<pre>hps11::hps11 TS TcpServer: myname &gt;hps11&lt; bind: Address already in use bind on port 5002 Query &gt;UPDATE Ports SET Host='hps11',tcpClient_tcp=5001 WHERE Name='hps11'&lt; succ eeded DB update: &gt;UPDATE process SET inuse='5002' WHERE name='hps11'&lt;</pre>	<pre>dpm0::dpm0 ROC do nothing here do nothing here do nothing here do nothing here do nothing here No FEB config file extracted!? <b>clasrun@dpm0:clasrun</b></pre>
<pre>hps1::hps1 ROC UDP_standard_request &gt;sta:hps1 downloaded&lt; UDP_standard_request &gt;sta:hps1 downloaded&lt; UDP_standard_request &gt;sta:hps1 downloaded&lt; UDP_cancel: cancel &gt;sta:hps1 downloading&lt; codaUpdateStatus: updating request done codaExecute done</pre>	<pre>dpm1::dpm1 ROC do nothing here do nothing here do nothing here do nothing here do nothing here No FEB config file extracted!? <b>clasrun@dpm1:clasrun</b></pre>
<pre>hps2::hps2 ROC UDP_standard_request &gt;sta:hps2 downloaded&lt; UDP_standard_request &gt;sta:hps2 downloaded&lt; UDP_standard_request &gt;sta:hps2 downloaded&lt; UDP_cancel: cancel &gt;sta:hps2 downloading&lt; codaUpdateStatus: updating request done codaExecute done</pre>	<pre>dpm2::dpm2 ROC do nothing here do nothing here do nothing here do nothing here do nothing here No FEB config file extracted!? <b>clasrun@dpm2:clasrun</b></pre>
<pre>hps1gtp::hps1gtp ROC UDP_standard_request &gt;sta:hps1gtp downloaded&lt; UDP_standard_request &gt;sta:hps1gtp downloaded&lt; UDP_standard_request &gt;sta:hps1gtp downloaded&lt; UDP_cancel: cancel &gt;sta:hps1gtp downloading&lt; codaUpdateStatus: updating request done codaExecute done</pre>	<pre>dpm3::dpm3 ROC do nothing here do nothing here do nothing here do nothing here do nothing here No FEB config file extracted!? <b>clasrun@dpm3:clasrun</b></pre>
<pre>hps2gtp::hps2gtp ROC UDP_standard_request &gt;sta:hps2gtp downloaded&lt; UDP_standard_request &gt;sta:hps2gtp downloaded&lt; UDP_standard_request &gt;sta:hps2gtp downloaded&lt; UDP_cancel: cancel &gt;sta:hps2gtp downloading&lt; codaUpdateStatus: updating request done codaExecute done</pre>	<pre>dpm4::dpm4 ROC do nothing here do nothing here do nothing here do nothing here do nothing here No FEB config file extracted!? <b>clasrun@dpm4:clasrun</b></pre>

RunControl

File Preference

Run control Buttons

Control: Cancel, Reset

Transition: Configure

Static parameters

Database: clasdev, Session: clastest, Configuration: **HPS**, rcServer: clonpc14.jlab.org

Session status

Data file name: /data/hps/hps

Config file name: /usr/local/relas12/release/0.3/parms/trigger/clasdev.cnf

Run status

Run number: 11060, Run status: [ ]

Start time: [ ], End time: [ ]

Limits

Events: 0, KBytes: 0

Run progress

Events this run: 0, Read From: ER61

Rates	Events/S	Rate (KB/S)
Integrated	0	0.0
Differential	0	0.0

File Edit Options Help

TS EB5, ROC ER5, EB wolfram1, ET ER2, ETT EB2, ER tdcctof4, CODA FILE ER8, BIN FILE EB8, MON adpcal4, pretrig1, croctest10, EB6, ER6, clastrig2, croctest2, dvcs2, dvcsstrig

Events/Sec

2 Sec. update

CODA

Rocs

File Preference

rocs rocs1 rocs2

```

dtm0::dtm0 ROC
TcpServer: bind: Address already in use
TcpServer: bind on port 5002
TcpServer: myname >dtm0<
DB update: >UPDATE process SET inuse='5001' WHERE name='dtm0'<
Query >UPDATE Ports SET Host='dtm0',tcpClient_tcp=5002 WHERE Name='dtm0'< succee
ded

```

```

dtm1::dtm1 ROC
TcpServer: bind: Address already in use
TcpServer: bind on port 5002
TcpServer: myname >dtm1<
DB update: >UPDATE process SET inuse='5001' WHERE name='dtm1'<
Query >UPDATE Ports SET Host='dtm1',tcpClient_tcp=5002 WHERE Name='dtm1'< succee
ded

```

```

clondaq5::EB20 EB
TcpServer: myname >EB20<
DB update: >UPDATE process SET inuse='5009' WHERE name='EB20'<
hname befor >clondaq5.jlab.org<
hname after >clondaq5<
Query >UPDATE Ports SET Host='clondaq5',tcpClient_tcp=5010 WHERE Name='EB20'< su
cceeded

```

```

clondaq5::ETT51 ETT
TcpServer: bind on port 5008
TcpServer: myname >ETT51<
DB update: >UPDATE process SET inuse='5005' WHERE name='ETT51'<
hname befor >clondaq5.jlab.org<
hname after >clondaq5<
Query >UPDATE Ports SET Host='clondaq5',tcpClient_tcp=5008 WHERE Name='ETT51'< succee
ded

```

```

clondaq6::ER61 ER
TcpServer: bind on port 5002
TcpServer: myname >ER61<
DB update: >UPDATE process SET inuse='5001' WHERE name='ER61'<
hname befor >clondaq6.jlab.org<
hname after >clondaq6<
Query >UPDATE Ports SET Host='clondaq6',tcpClient_tcp=5002 WHERE Name='ER61'< succee
ded

```

```

clondaq5::ET20 ET
bind: Address already in use
bind: Address already in use
bind: Address already in use
bind: Address already in use
bind on port 5012
DB update: >UPDATE process SET inuse='5012' WHERE name='ET20'<

```

```

clondaq6::ET61 ET
bind: Address already in use
bind: Address already in use
bind: Address already in use
bind on port 5004
DB update: >UPDATE process SET inuse='5004' WHERE name='ET61'<

```

## DAQ: achieved performance

- 100kHz event rate - FADCs only
- 80kHz event rate – FADCs and TDCs
- 18kHz event rate – full system (FADCs+TDCs+SVT)
- 200MB/s data rate
- Livetime about 90%
- Transfer to the tape: 146MB/sec/tape

## DAQ: performance future improvements

- FADCs does not propagate busy condition, have to set it conservatively high, will try to fix it
- SVT readout improvement is in progress
- TCP performance will be improved for ET clients and for transfer to tape, allowing to place Event Builder and Event Recorder on different machines and run DAQ and move-to-silo in the same time and increase transfer to tape rate **800MB/s were achieved in lab test**

## DAQ: achieved reliability

- 'coda\_eb killed' problem
- Run startup problems: fiber 'not connected', fiber 'disabled', 'hps1gtp not reporting' etc
- Crashes reported during data taking at high rate
- Run ending problems
- Linux on HPS12 VXS crate dying occasionally

## DAQ: reliability improvements

- Moving to 64-bit Linux will fix 'coda\_eb killed' problem and provide more CPU cores, more memory and better networking; one server (clondaq4) is 64-bit and DAQ under testing, **clondaq4/5/6 servers and workstations are 64-bit RHEL7 (couple machines will remain 32-bit RHEL5)**
- Run startup problems being actively investigated using HPS setup and other test setups in JLAB; 'not connected' problem seems fixed (most annoying), others are in progress
- High rate crashed and end run failures will be investigated, we can reproduce them without beam using special trigger configuration files

# Network/Computing

- All routers, switches and servers were installed and worked as expected
- 9 workstations in counting room are operational
- Connection to the computer center's tapes works as expected
- New Arista router with 40GBit ports purchased, installation in progress
- Second Event Recorder server with 21TB disk space purchased and installed (clondaq6)
- All DAQ servers (clondaq3/4/5/6) will be connected to router using 40GBit ethernet
- Database servers are moving to new machines
- New file server will be purchased and installed this year
- Two 40GBit links will be run to Computer Center (tape, online monitoring)

# Conclusion

- DAQ is operational
- CODA software was improved, commissioning under way
- Computing/network upgrade is in final stage, will be complete this year
- Remaining performance and reliability issues being addressed, DAQ performance can be limited by tape recording speed, negotiable with Computer Center
- Online monitoring can be run on counting room machines or on CC farm if designated, two 40Gbit uplinks allows to send full data stream to CC