DZero Controls: DAQ Tutorial

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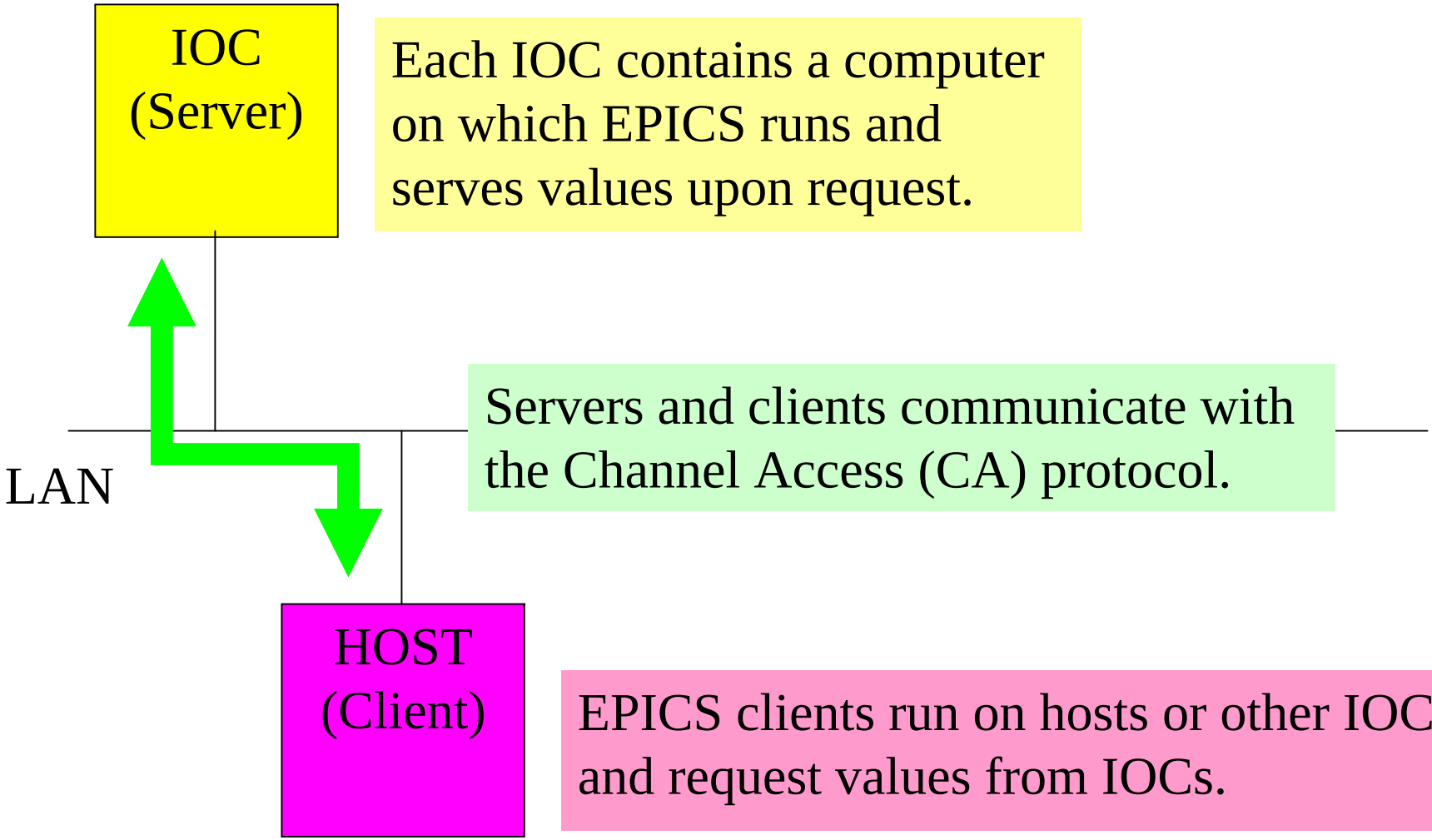
Control System

- Built on Experimental Physics and Industrial Control System (EPICS)
  - www.aps.anl.gov/epics
  - Main development at Argonne and Los Alamos
- Controls group added support for DZero specific hardware
  - Field bus – MIL1553B
  - High voltage
  - Sequencers
  - Rack monitor – multi-purpose I/O

EPICS Architecture



Each IOC contains a computer on which EPICS runs and serves values upon request.

Servers and clients communicate with the Channel Access (CA) protocol.

EPICS clients run on hosts or other IOCs and request values from IOCs.

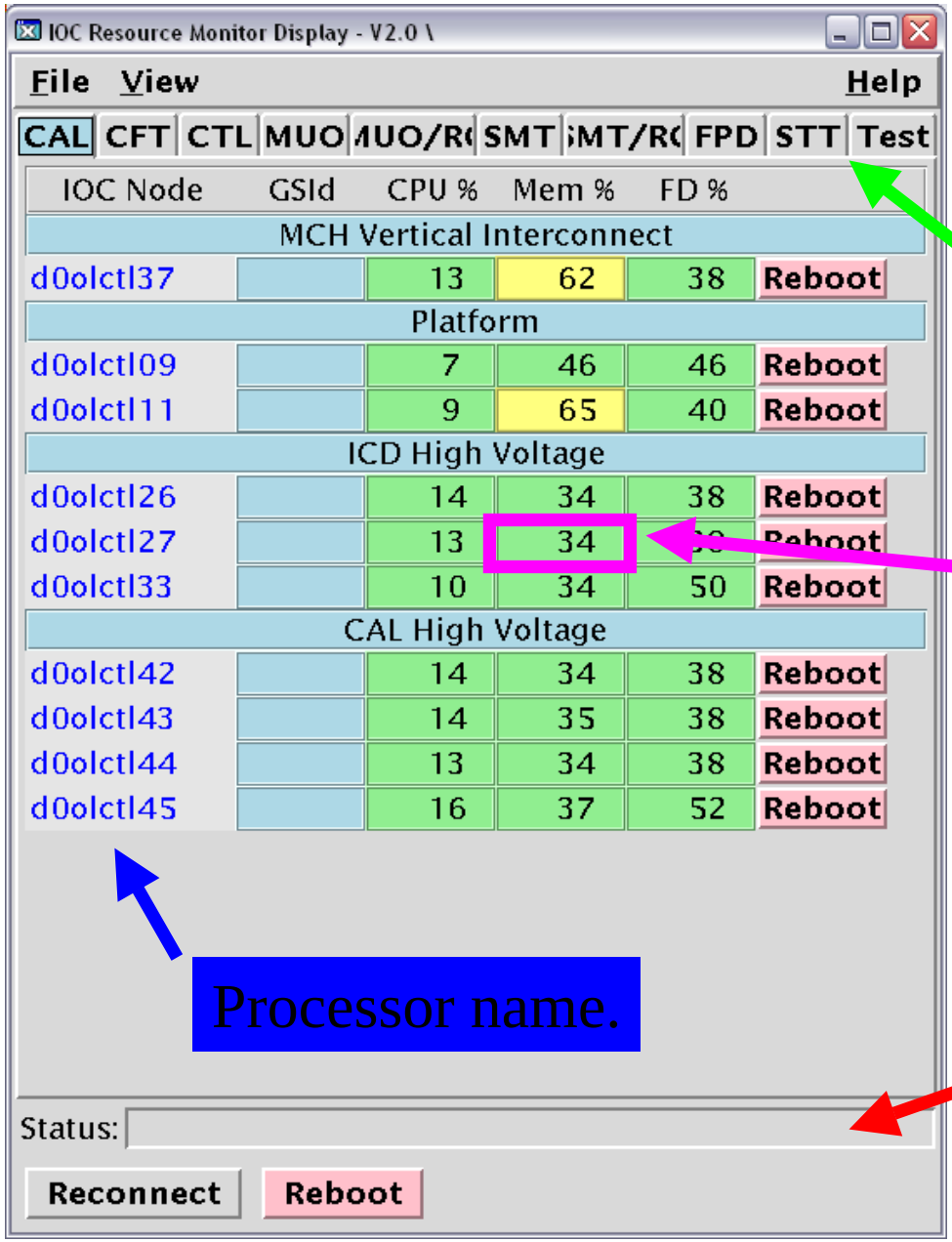
IOC Contents

- When the IOC boots it reads an EPICS database file that specifies the data available
- In EPICS each process variable (PV)(data point) is called a record
- Each PV has a unique name
- Clients request information by name so all PV names in the system are unique
- There is a different database file for each IOC that matches the hardware configuration

IOC Monitoring

- Processor in IOC
  - setup d0online
  - start_daq ioc
  - /online/config/ctl/d0.ioc
- Rack environment
  - setup d0online
  - start_daq pfmrm – platform
  - Configuration file: /online/config/ctl/pfm.rmi
  - start_daq mchrmi – movable counting house
  - Configuration file: /online/config/ctl/mch.rmi

IOC Resource Monitor Display

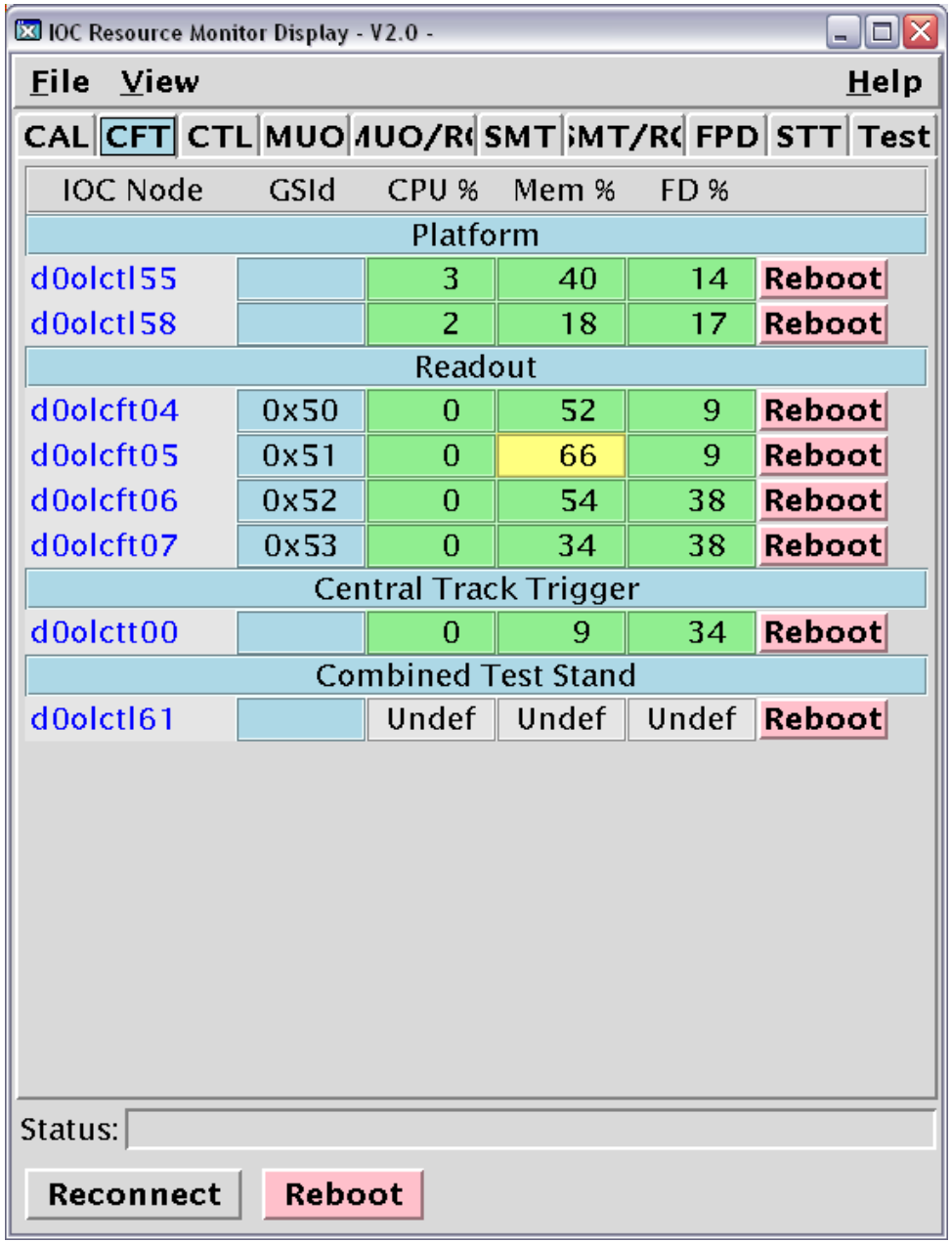


Left click each tab to move between displays.

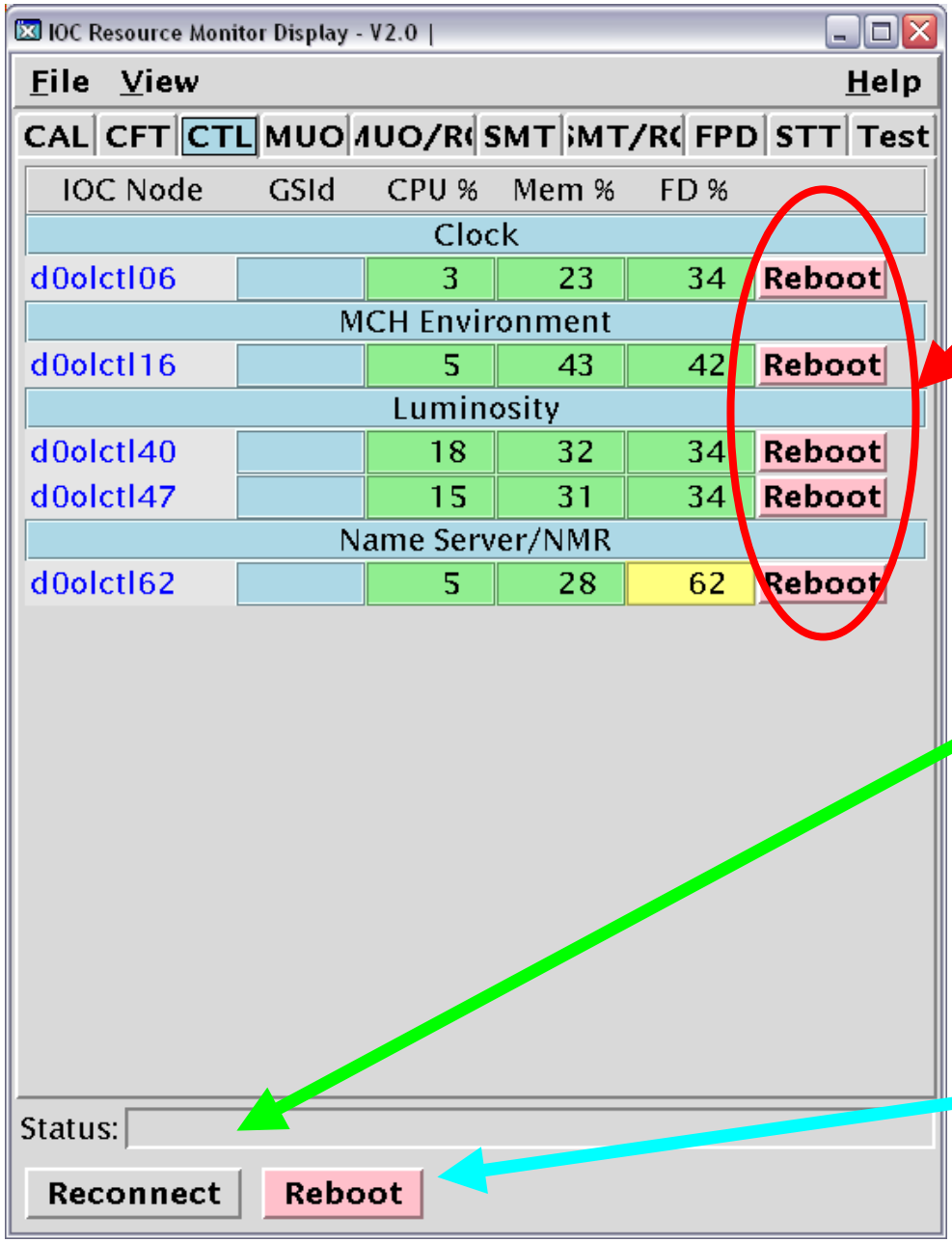
Each box is a PV

Processor name.

Look for status information.



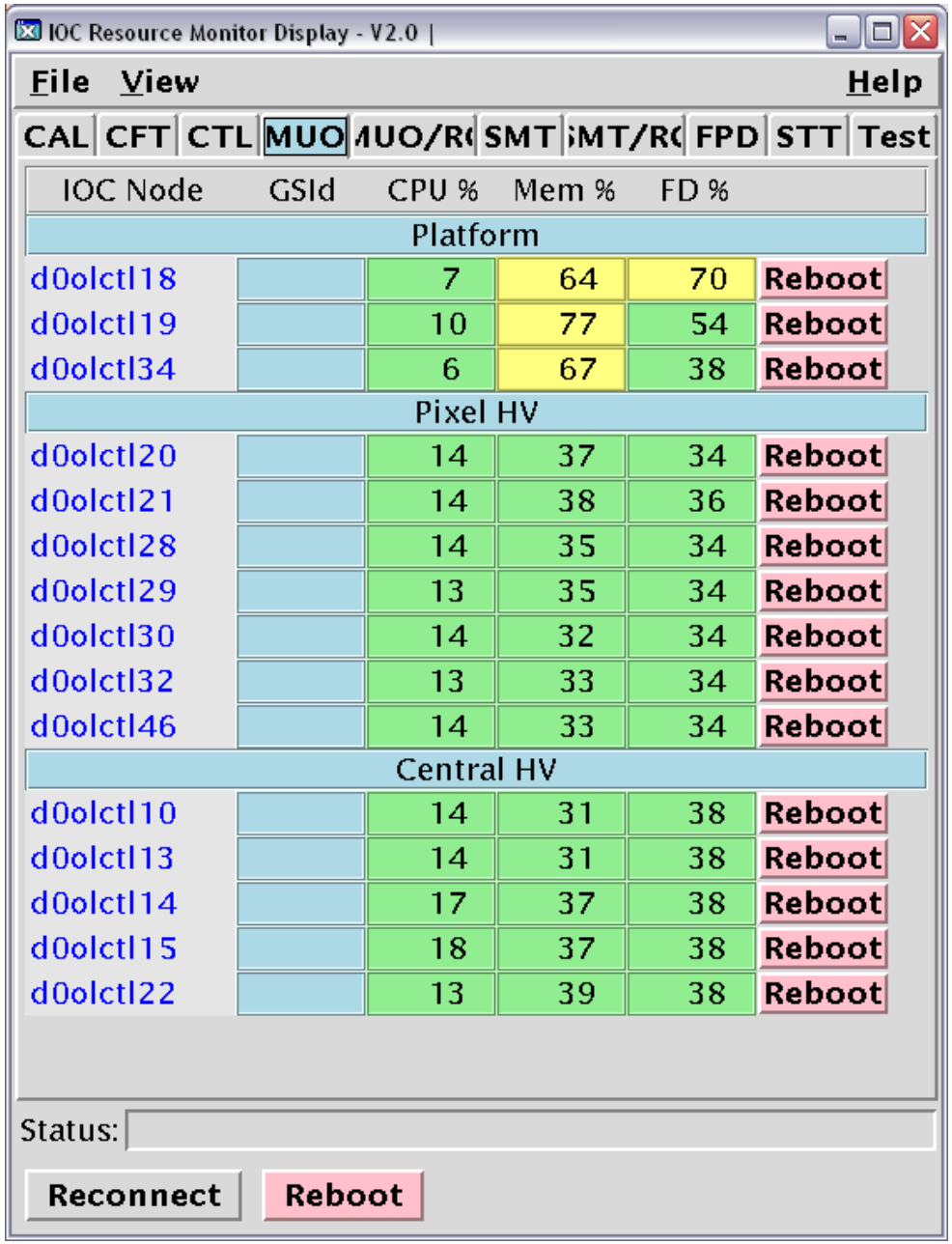
- GSId = global sector ID
- CPU % = percentage of cpu used for the last 10 seconds
- Mem % = percentage of memory usage for the last 10 seconds
- FD % = percentage of file descriptor usage for the last 10 seconds
- Each client connected uses a file descriptor



Reboot each processor individually.

Create new connections to obtain the IOC info.

Reboot all processors on this page.



Green identifies values that are in range.

Yellow identifies values that should be monitored.

Red identifies values that require attention.

Purples identifies values that are invalid.

All alarm conditions, yellow, red, and purple, appear in the alarm display.

IOC Resource Monitor Display - V2.0 -

File View Help

CAL | CFT | CTL | MUO | MUO/R | SMT | SMT/R | FPD | STT | Test

IOC Node	GSId	CPU %	Mem %	FD %
MDT				
d0olctl76	0x31	Undef	Undef	Undef
d0olctl75	0x30	Undef	Undef	Undef
PDT				
d0olctl72	0x34	Undef	Undef	Undef
d0olctl79	0x38	Undef	Undef	Undef
d0olctl71	0x3A	Undef	Undef	Undef
d0olctl73	0x35	Undef	Undef	Undef
d0olctl74	0x39	Undef	Undef	Undef
d0olctl70	0x36	Undef	Undef	Undef
Pixel				
d0olctl84	0x33	Undef	Undef	Undef
d0olctl83	0x32	Undef	Undef	Undef
Scintillator				
d0olctl81	0x3B	Undef	Undef	Undef
d0olctl82	0x37	Undef	Undef	Undef
L1				
d0olctl77	0x16	Undef	Undef	Undef
d0olctl78	x017	Undef	Undef	Undef
d0olctl79	0x18	Undef	Undef	Undef
d0olctl80	0x19	Undef	Undef	Undef

Status:

Reconnect Reboot

Undef indicates no PV present in an IOC.

The muon group has removed all the PVs for monitoring their IOCs so everything Undef is expected for now.

IOC Resource Monitor Display - V2.0 |

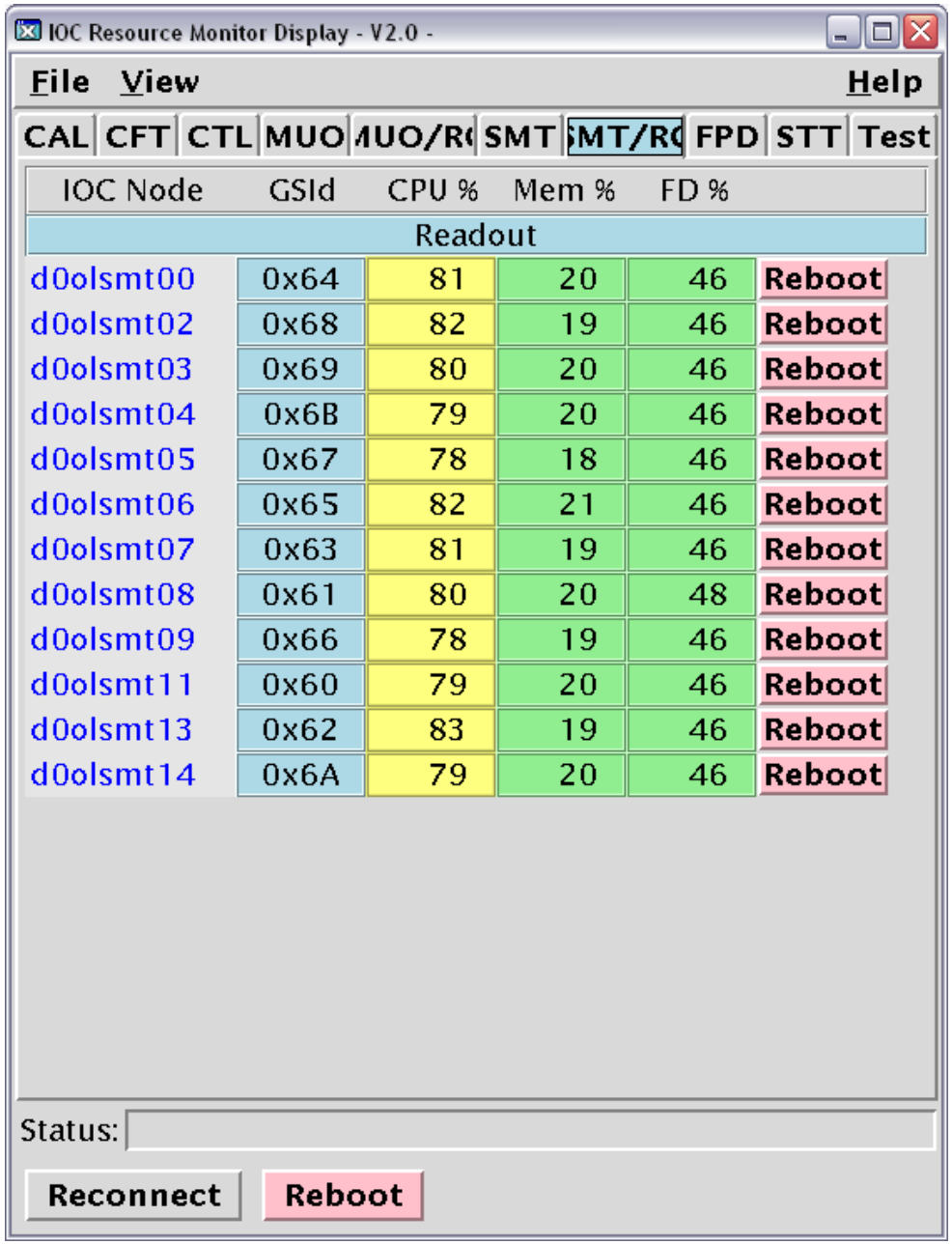
File View Help

CAL | CFT | CTL | MUO | MUO/R | SMT | SMT/R | FPD | STT | Test

IOC Node	GSId	CPU %	Mem %	FD %	
Platform					
d0olctl57		2	22	42	Reboot
d0olctl56		2	22	44	Reboot
d0olctl60		1	22	46	Reboot
d0olctl59		2	22	42	Reboot
North Bias Voltage					
d0olctl23		14	41	46	Reboot
d0olctl52		14	37	46	Reboot
d0olctl51		15	42	50	Reboot
d0olctl53		15	37	44	Reboot
d0olctl35		10	37	44	Reboot
South Bias Voltage					
d0olctl08		15	40	52	Reboot
d0olctl48		15	41	46	Reboot
d0olctl49		14	41	46	Reboot
d0olctl25		15	39	46	Reboot
d0olctl36		11	37	46	Reboot
Radiation Monitor					
d0olsmt12		52	44	44	Reboot

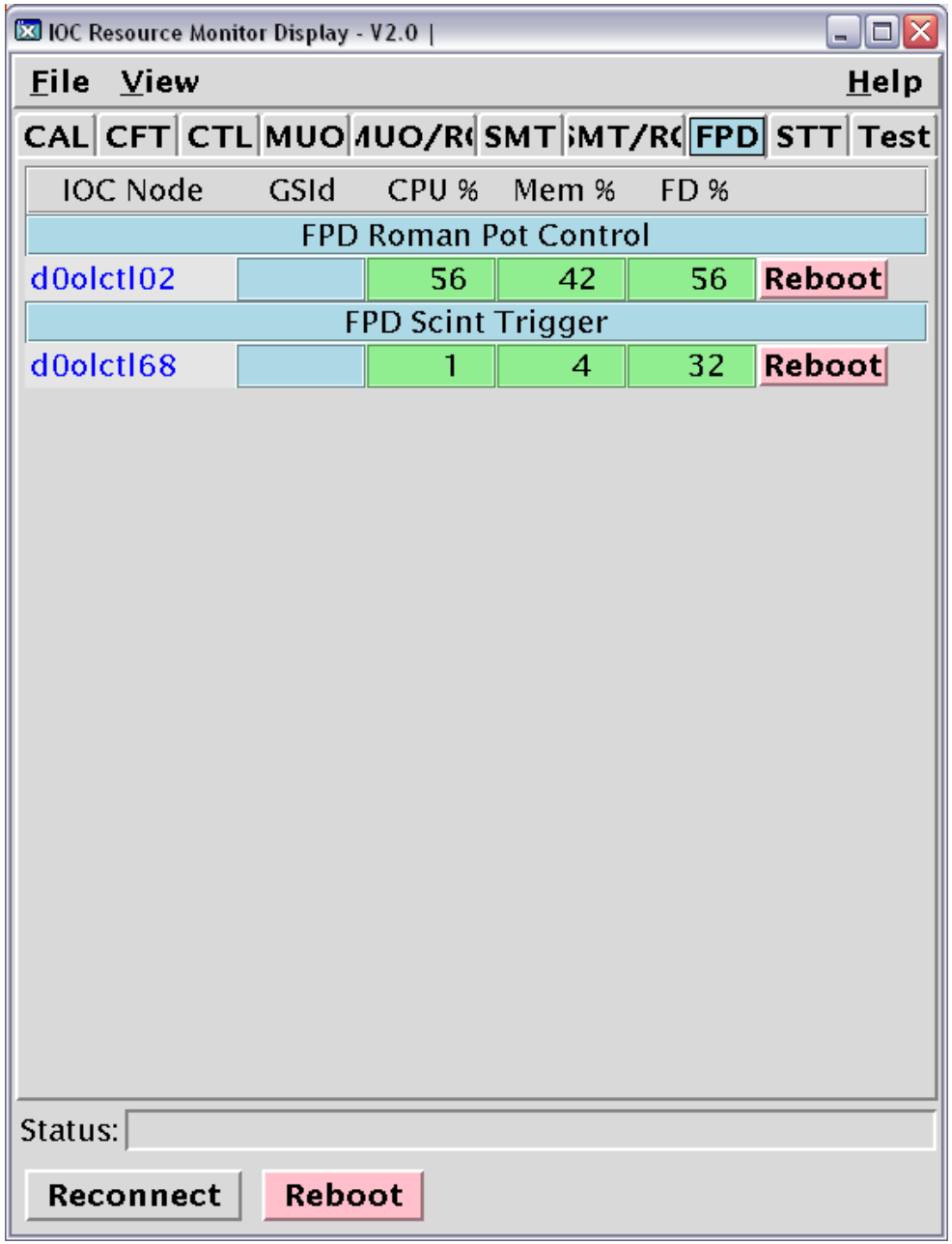
Status:

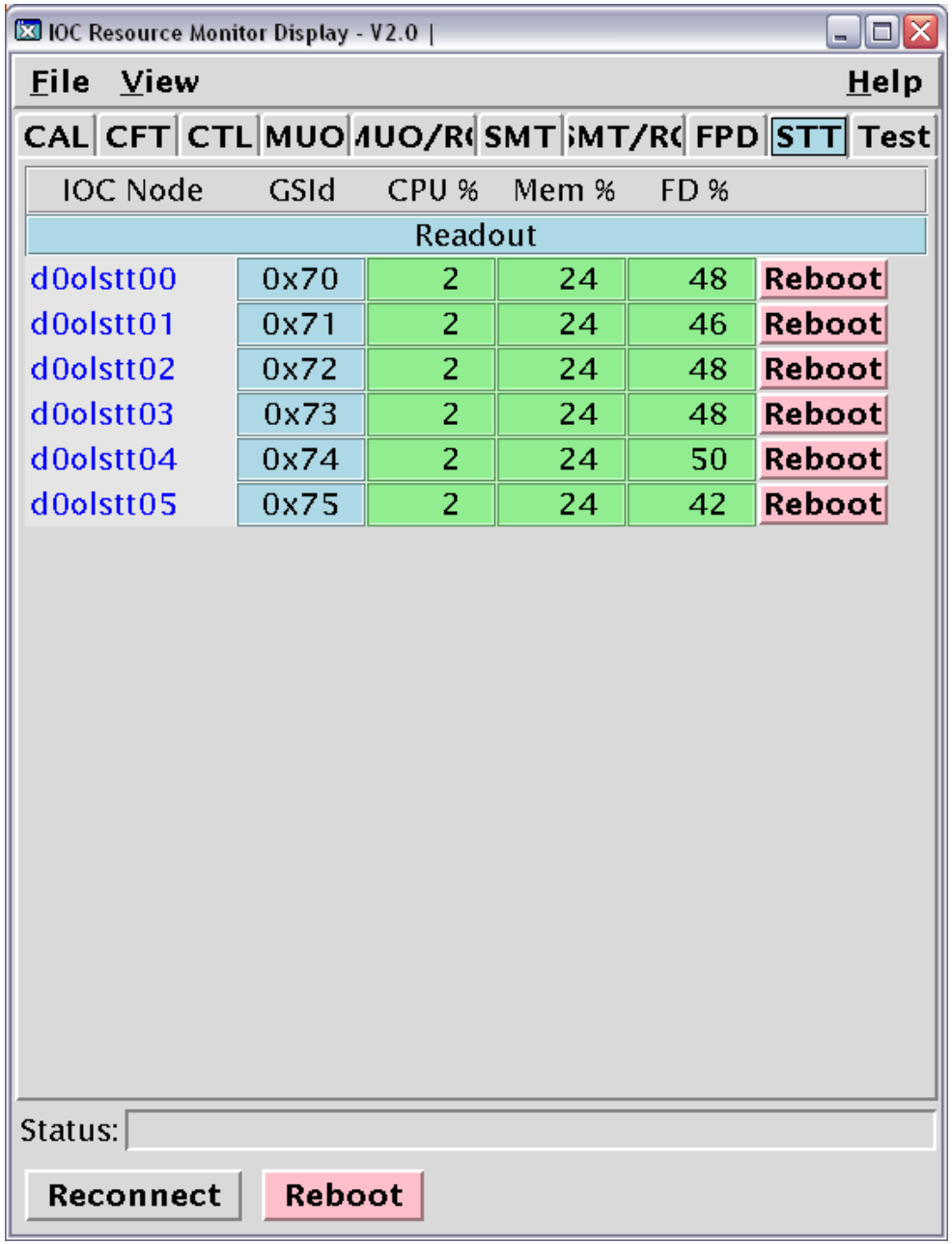
Reconnect Reboot



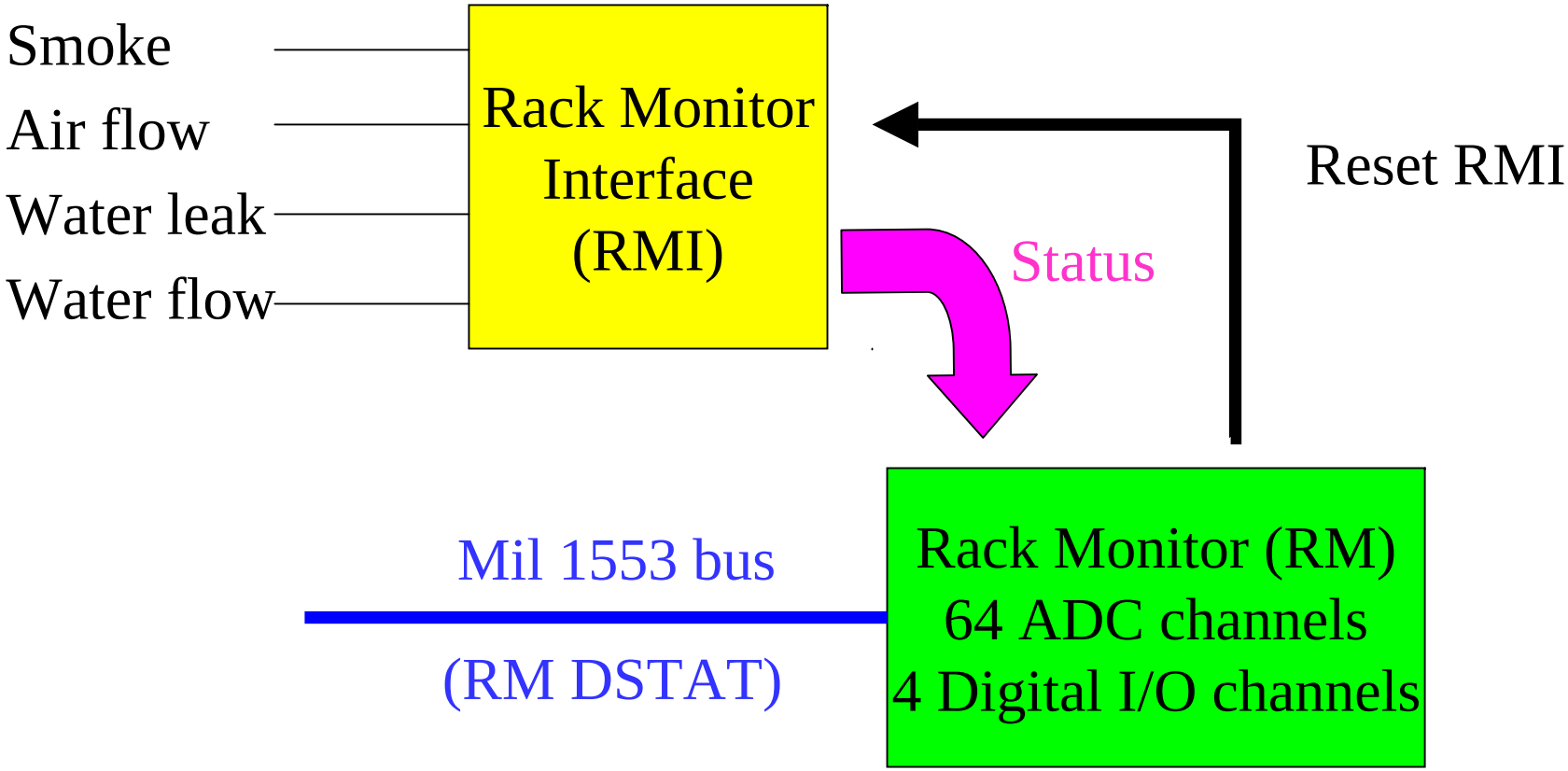
When monitoring is turned on the CPU usage is yellow at about 80%.

During zero bias running the cpu usage is green.

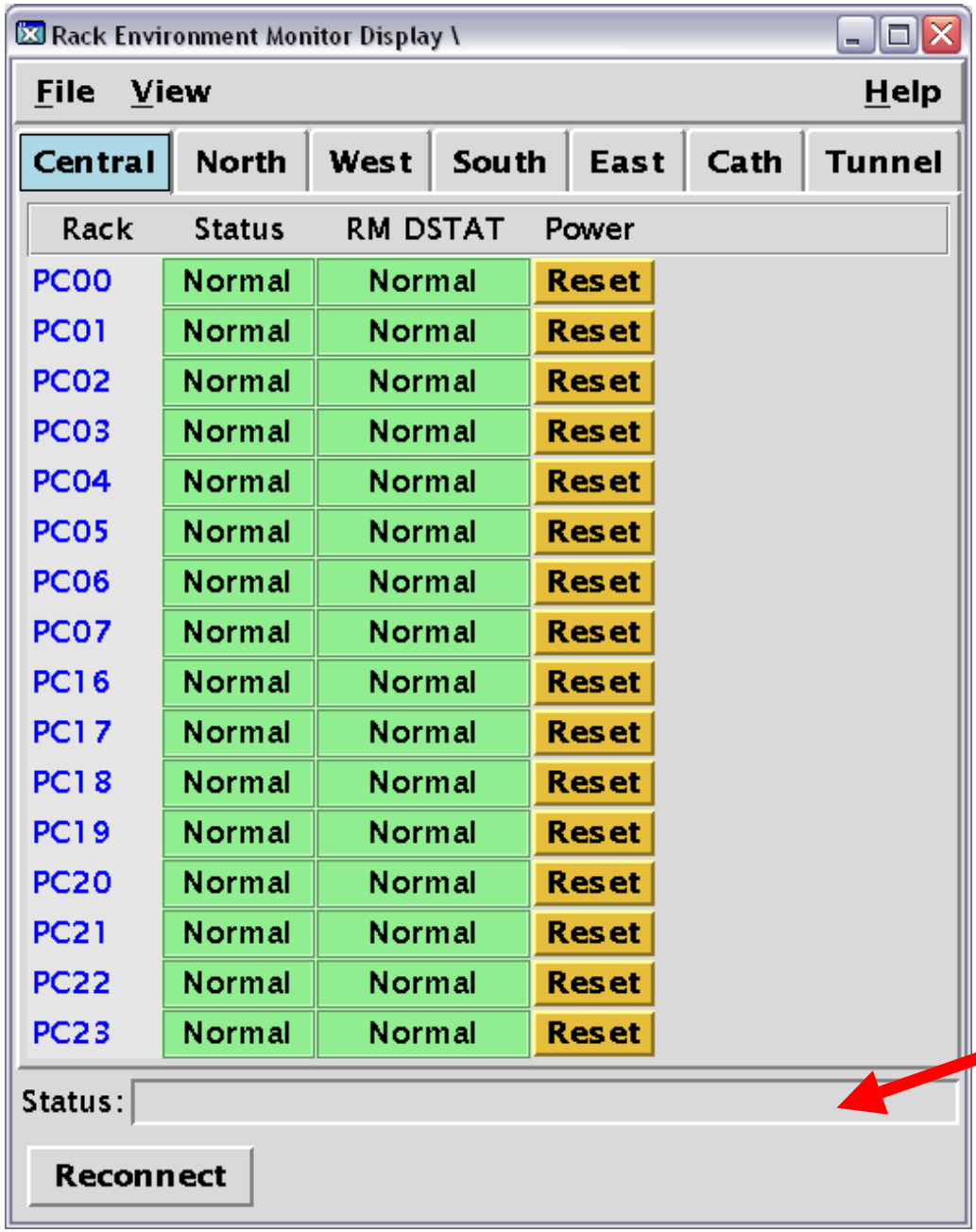

IOC Resource Monitor Display - V2.0 |
File
View
Help
CAL
CFT
CTL
MUO
MUO/R
SMT
SMT/R
FPD
STT
Test
IOC Node
GSId
CPU %
Mem %
FD %
FPD Roman Pot Control
d0olctl02
56
42
56
Reboot
FPD Scint Trigger
d0olctl68
1
4
32
Reboot
Status:
Reconnect
Reboot


IOC Resource Monitor Display - V2.0 |
File
View
Help
CAL
CFT
CTL
MUO
MUO/R
SMT
SMT/R
FPD
STT
Test
IOC Node
GSId
CPU %
Mem %
FD %
Readout
d0olstt00 0x70 2 24 48 Reboot
d0olstt01 0x71 2 24 46 Reboot
d0olstt02 0x72 2 24 48 Reboot
d0olstt03 0x73 2 24 48 Reboot
d0olstt04 0x74 2 24 50 Reboot
d0olstt05 0x75 2 24 42 Reboot
Status:
Reconnect
Reboot

Rack Monitoring



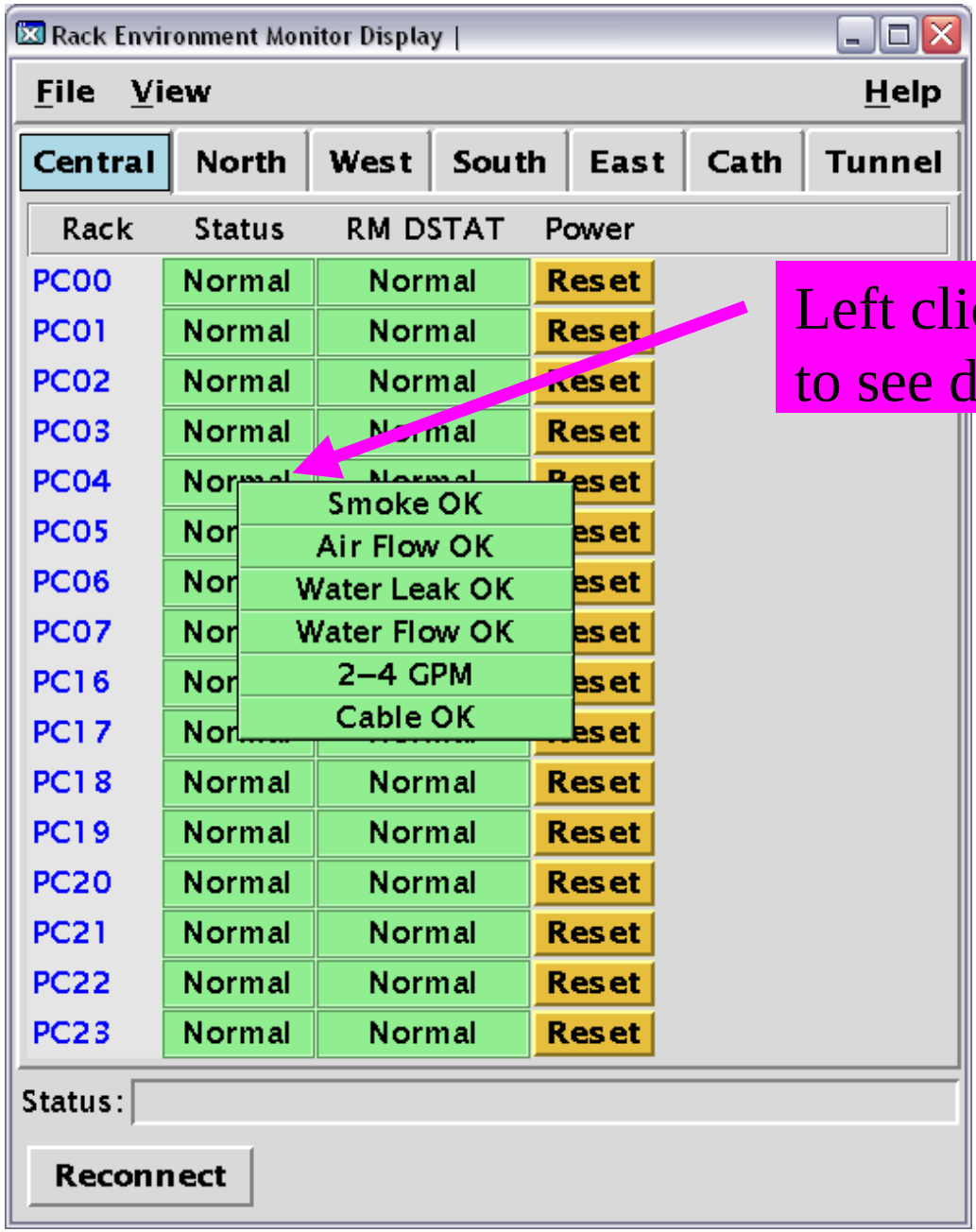
Platform Rack Monitoring



- Status = state of the rack
- RM DSTAT = was the readback successfull.

Reset the rack monitor Interface.

Look for status information.



Left click a status box to see details.