



RunControl

W. Badgett
CDF RunControl
2011.08.09

How to start,
configure and
operate
CDF RunControl

51 22 : 59 : 55



What is a "Run" ?

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What is a "*Run*" ?

A *run* is a time period of acquiring data where the experimental conditions are constant, or nearly so



What is "RunControl" ?

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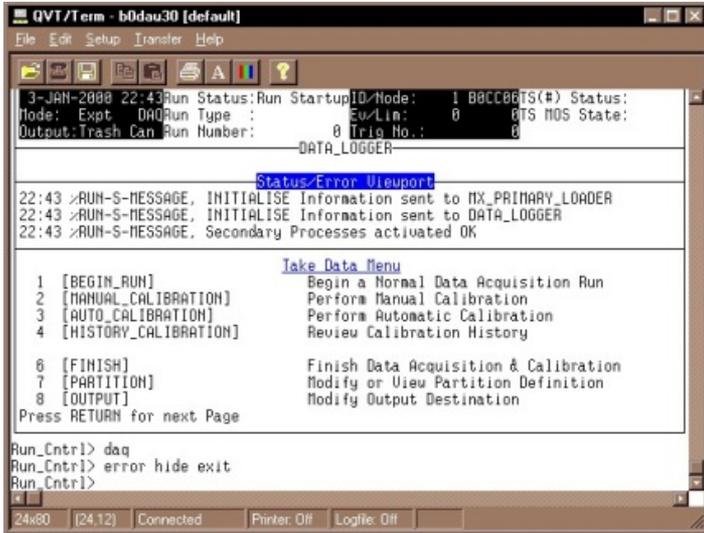
What is "*RunControl*" ?

RunControl is a software application that coordinates the experimental trigger and data acquisition activity, and defines and conducts "*Runs*"

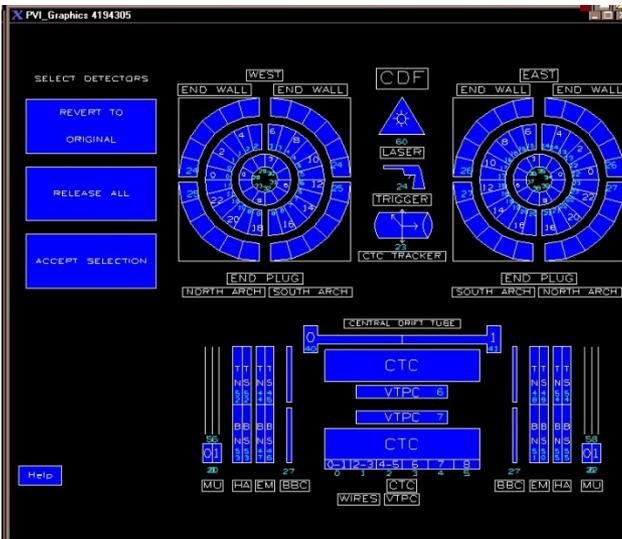


RunControl thru the years

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CDF Run 0, Run I 1989-1995
Vax/VMS Fortran
Text interface on VT100



First attempt at Graphical User Interface, resource selector

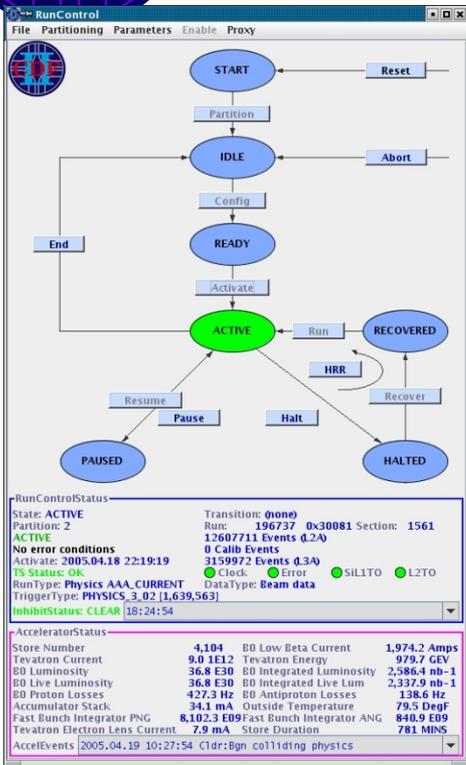


RunControl thru the years

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Zeus TCL/TK GUI (1995) with State Machine inspires CDF Run II Java, "Object Oriented" 2001 - 2011



CMS Web based interface, java and tomcat 2006 - ?

Shepherding? Recycling!

The CMS RunControl web interface shows a status table for various subsystems and a detailed control panel for the 'Running' state.

Subsystem	PIXEL	ES	ECAL	CASTOR	DT	CSC	RPC	TRG	SCAL	DAQ	DOM	DCS
State	Running	Connected										
Time	00:04.6	00:03.1	00:03.8	00:00.5	00:00.3	00:06.3	00:00.2	00:00.8	00:00.3	00:17.5	00:09.9	00:08.0

Running 00:27.3

DCS/LHC flag state force
 ES_HV_ON FROM DCS
 PIX_HV_ON FROM DCS
 TX_HV_ON N/A FROM DCS
 PHYSICS_DECLARED FROM DCS
 LHC_RAMPING FROM DCS

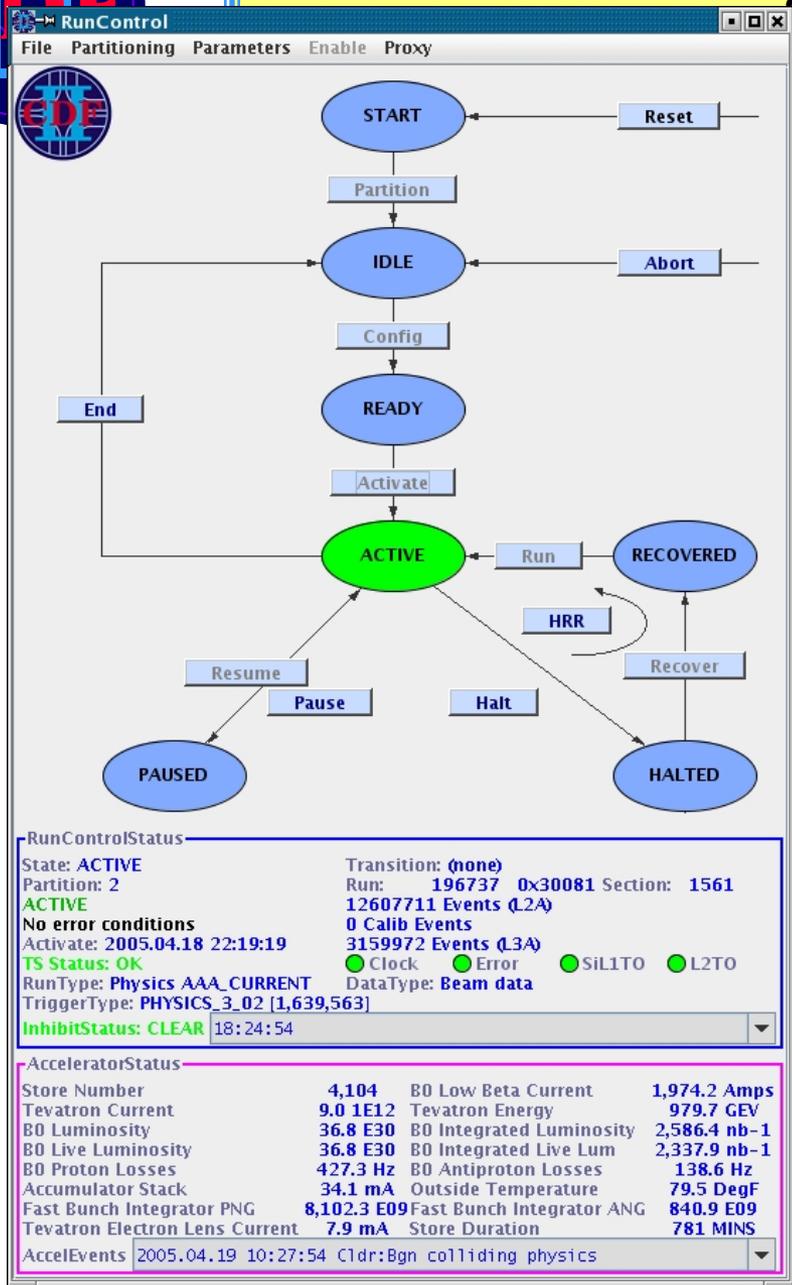
Configuration: /opt/psppub/Global/Level2/ZendM
 Run Number: 172978
 SID: 18880
 Sec Name: GLOBAL_RUN
 Global Key: /GLOBAL_CONFIGURATION_MAP/CMS/CENTRAL/GLOBAL_RUN
 HLT Key from: /opt/psppub/Global/Level2/ZendM/HLT/Key from
 Trigger mode: L1_20110806_07497_5087
 L1 Trigger Key from: /opt/psppub/Global/Level2/ZendM/HLT/Key from
 Clock source: LOCAL => M_KEY: brnl-infernal-manual
 HWCFG Key: /opt/psppub/Global/Level2/ZendM/HLT/Key from
 Level-0 Action: Tasks completed.

Subsystem controls: Run Key, Command, and Run History are visible at the bottom.



Run Control, main window

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Main Run Control Window:

- State Manager
- Configuration+Control pull-down menus
- Run Control Status
- Accelerator Status

Start Run Control:

**setup fer
rc &**

“Front End Readout”

(Ace uses *cdfdaq* account)

Just 3 steps to run!

1. *Select Partition*
 2. *Select Configuration*
 3. *Initiate Transitions to get to Active State*
- You're Running!*



Step 1

Select Partition

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The RunControl GUI shows a menu with the following items: Select Partition, Book Resources (reconcile configuration), Rebook Resources (renew already booked), Select Resources (manual interface), Set personal ClientName, Close Partition, View Partitions, Print Partitions, Rejoin Orphaned Partition, Start Error Handler, and Show Reply Ack Window. A red box highlights the 'Select Partition' menu item, and a blue box highlights the 'View Partitions' menu item. Below the menu is a state transition diagram with states: READY, ACTIVE, RECOVERED, HALTED, and IDLE. Transitions include: Activate (READY to ACTIVE), Run (RECOVERED to ACTIVE), Recover (HALTED to RECOVERED), HRR (RECOVERED to RECOVERED), Resume (IDLE to ACTIVE), Pause (ACTIVE to IDLE), and Halt (ACTIVE to HALTED).

Select partition

Select or view resources manually (via GUI)
(enabled after partition selected)

Each RunControl Session must allocate one Partition

Each front-end crate belongs to no more than one Partition

Partitions allow resource locking and prevent collisions between different sessions via the *ResourceManager*

Normally just once per RunControl session

If you close partition or restart RunControl, tell the Consumer Operator to restart all Consumers!

State: IDLE	Transition: (none)	Section:
Start-up: (none)	Start-up: (none)	
DL: (none)	DL: (none)	
No error conditions	No Calib Events yet	
Active: (none)	Antiproton Losses (LBA) yet	
TS: (none)	Antiproton Losses (LBA) yet	
RunType: Physics DAQTEST	Error: (none)	<input type="radio"/> SIL1TO <input type="radio"/> L2TO
TriggerType: null (0,0,0)	Data type: DAQ Testing	
AcceleratorStatus	4,666 B0 Low Beta Current	0.5 Amps
Tevatron Current	-0.1E12 Tevatron Energy	-0.1 GEV
B0 Luminosity	0 E30 B0 Integrated Luminosity	3.1 nb-1
B0 Live Luminosity	0 E30 B0 Integrated Live Lum	0 nb-1
B0 Proton Losses	0 Hz B0 Antiproton Losses	0 Hz
Accumulator Stack	0 mA Outside Temperature	43.2 DegF
Fast Bunch Integrator PNG	0 E09 Fast Bunch Integrator ANG	0 E09
Tevatron Electron Lens Current	0 mA Store Duration	4,322.7 MINS
AccelEvents	2006.04.21 15:18:50 Tev:Low beta quench	



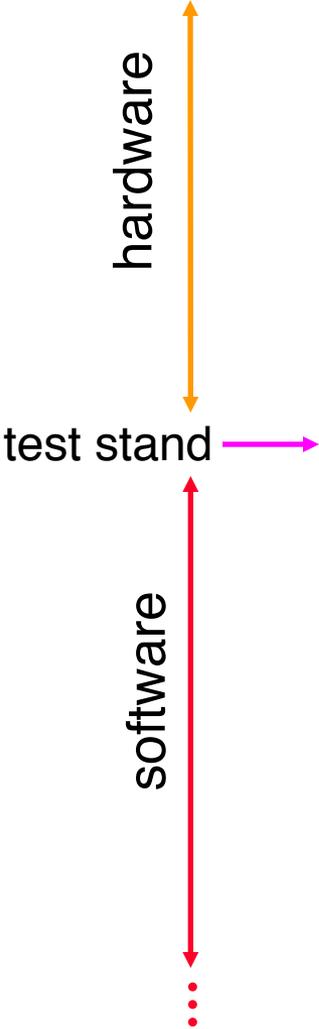
PartitionSelector

Step 1

Select Partition:

- Cyan is free
- Yellow is owned by another
- Green is yours
- Mouse over to display owner and hardware/software status

•0–7 hardware partitions
 •8 test stand partition
 •9–15 software partitions



Partition Selector

0 (active)
1 (active)
2 (current)
3 (free)
4 (free)
5 (free)
6 (free)
7 (free)
8 (free)
9 (free)
10 (free)
11 (free)
12 (free)
13 (free)
14 (free)
15 (free)
16 (active)

Software >

Cancel

RunControl

File	Partitioning	Parameters	Enal
Select Partition			
Book Resources (reconcile cor			
Rebook Resources (renew alre			
Select Resources (manual inte			
Set personal ClientName			
Close Partition			



ResourceSelector

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CDF Resource Selector Partition 4

File	Resources	Partition		
10	cdfdaq	b0dap30.fnal.gov	2068	SuperAce x2080
Booked resource VRB				
Released resource VRB				
Booked resource MUTR				
Released resource MUTR				
Booked resource CLC				
Booked resource L2CL				
Active partitions:				
4	badgett	b0dap26.fnal.gov	25197	badgett
10	cdfdaq	b0dap30.fnal.gov	2068	SuperAce x2080
Booked resource L2GL				

ResMgr>

CCAL	PCAL	WCAL	FCAL	COT
CALTDC	CMU	CMP	CMX	IMU
MUSC	CLC	SVX	XFT	SVT
MUTR	L1CL	L1GL	L2CL	L2GL
SCALERS	L1	L2	L3	PRESCALE
VRB	INH	CALIB	TEST	

RunControl

File	Partitioning	Parameters	Enable	P
Select Partition				
Book Resources (reconcile configura				
Rebook Resources (renew already b				
Select Resources (manual interface)				
Set personal ClientName				
Close Partition				

- Select Resources:
- Cyan is entirely free
 - Red is entirely owned by another partition
 - Blue is partially owned by another partition
 - Yellow is partially yours
 - Green is entirely yours
 - Mouse over to display owner
 - Click to book/unbook; Right-click for more info, details



RunControlDisplay

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pa...	state	transition	runNu...	nEvents	stateManager	clientName	useFr...	runType	message	ignorel...	time
0	START		214964	1178	DAQ	cdfdaq@b0control21.fna...	1	Physics	In START 0 DA...	0	2006.04.25 18:46:10
1	Config t...	Config	214965	21	DAQ	andrew@b0gateway.fnal....	0	Physics	In Config 1 DA...	1	2006.04.25 18:46:05
2	ACTIVE		214966	378	DAQ	badgett@b0desktop08.f...	0	Physics	In ACTIVE 2 D...	1	2006.04.25 18:46:06
3						cdf_xf...@b0gateway.fnal....					
4						cdf_xft@b0gateway.fnal....					
5						flanagan@b0desktop03....					
6						cdfdaq@b0gateway.fnal....					
7						torretta@b0desktop10.i...					
16						cdfdaq@b0control20.fna...					

Partition 0 2006.04.25 18:46:30

```

File
PartitionId: <0>
  Free: false
  Detached: false
  Software: false
  Permanent: true
  CreationTime: 2006-04-25 18:43:25.0
  DetachTime: 2006-04-25 18:28:55.0
  ClientName: anna.
  NodeName: b0control21.fnal.gov
  UserName: cdfdaq
  ProcessId: 8265
  OwnerAddress: /_b0control21.fnal.gov_ffffffffcc
  TriggerSupervisor: TRIGGER_SUPERVISOR_0
  NCrates: 153
  Crate: CCAL_00
  Crate: CCAL_01
  Crate: CCAL_02
  Crate: CCAL_03
  Crate: CCAL_04
  Crate: CCAL_05
  Crate: CCAL_06
  Crate: CCAL_07
  Crate: CCAL_08
  Crate: CCAL_09
  Crate: CCAL_10
  Crate: CCAL_11
  Crate: CCAL_12
  Crate: CCAL_13
  
```

Close To Top To Bottom

RunControl

- File
- Partitioning
- Parameters
- Enable
- Debug Statements
- Launch RunControlDisplay**
- Launch Scripts
- Run Java's Garbage Collection
- Exit

Or to start:
setup for
rcd &

Displays all activate
partitions and their current
activity; click on partition
for list of resources owned
by that partition



Selecting a RunConfiguration

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Step 2

After selecting a configuration, you're ready to initiate transitions and take a run!

The screenshot shows the RunControl software interface. At the top, a menu is open with the following options: Parameters, Enable Proxy, Select Run Configuration, Edit or View Run Settings, Print Run Configuration, Add Comment to e-Log and Run Database, Refresh from Hardware Database, Reset Luminosity, Stop Luminosity, Manually Override State Mgr Condition, and Issue Panic. A red box highlights the menu, and a red arrow points from a text box to the 'Select Run Configuration' option. A blue arrow points from another text box to the 'Edit or View Run Settings' option. Below the menu is a state transition diagram with states: END, READY, ACTIVE, PAUSED, RECOVERED, and HALTED. Transitions include Activate, Run, HRR, Recover, Resume, Pause, and Halt. At the bottom, there are status panels for RunControlStatus, AcceleratorStatus, and AccelEvents.

RunControlStatus

State: START
Partition: 1
START
No error conditions
Activate:
TS Status: OK
RunType: Physics AAA_CURRENT
TriggerType: PHYSICS_4_00 [4,817,640]
InhibitStatus CLEAR

Transition: (none)
Run: (none)
Section:
No Events (L2A) yet
No Calib Events yet
No Events (L3A) yet
Clock Error SIL1TO L2TO
Data Type: Beam data

AcceleratorStatus

Store Number	4,851	B0 Low Beta Current	1,944.7 Amps
Tevatron Current	7.5 1E12	Tevatron Energy	980.2 GEV
B0 Luminosity	26.8 E30	B0 Integrated Luminosity	7,566.5 nb-1
B0 Live Luminosity	26.2 E30	B0 Integrated Live Lum	6,545.3 nb-1
B0 Proton Losses	103.9 Hz	B0 Antiproton Losses	115.5 Hz
Accumulator Stack	-0 mA	Outside Temperature	85.3 DegF
Fast Bunch Integrator PNG	6,303.4 E09	Fast Bunch Integrator ANG	1,103.9 E09
Tevatron Electron Lens Current	11 mA	Store Duration	2,008.1 MINS

AccelEvents 2006.07.24 17:28:29 Cldr:Init flying wire scan

Select predefined run configuration

Edit or view run configuration



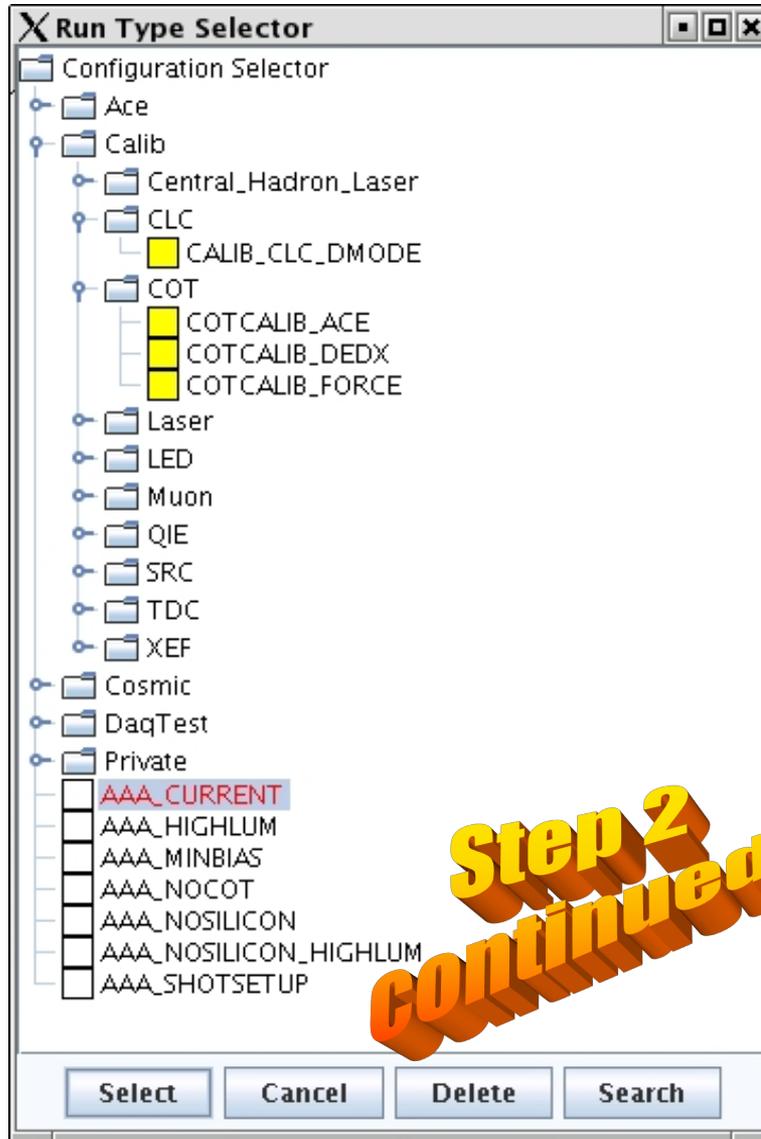
Frank sez:
"This is the ace's most important duty!"

Reset or stop luminosity counters at beginning and end of stores -- *only if automatic reset fails!*



Run Configuration Selector

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Select from predefined run configurations

- Ace directory contains all physics and test runs for the Ace, and is maintained by Ops Managers
- Cosmic directory for Cosmic Ray runs
- Calib directory contains calibration configurations, and is maintained by component experts in subdirectories
- Other directories for private testing purposes

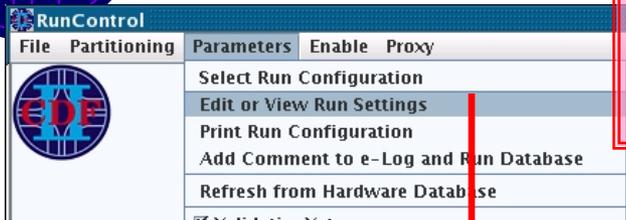
Or create your own configuration!



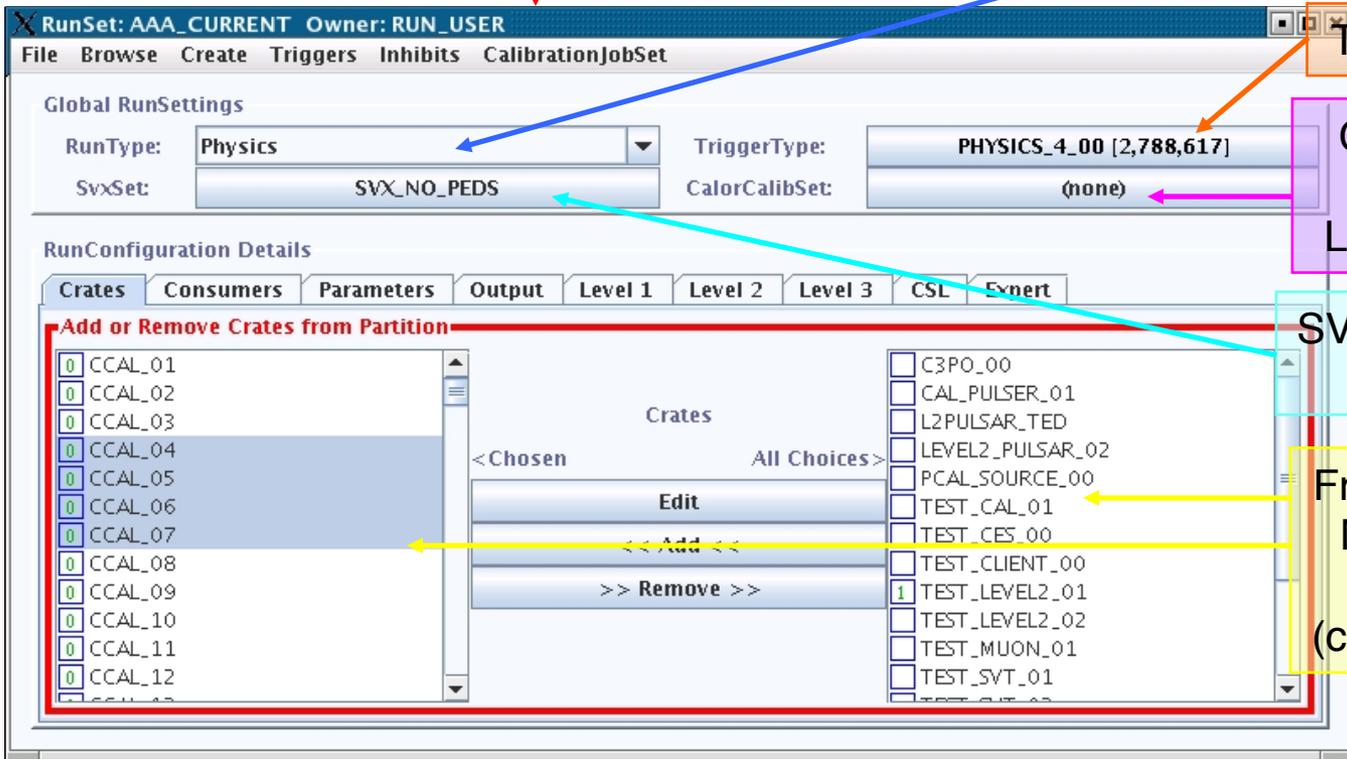
RunSettings Window, standard

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Aces should know all options on this window (note new look 'n' feel)



Global DAQ RunType



Trigger Table, coupled

CalorCalibSet, when Plug source, LED, Xenon run types

SVX Set, when SVX is used Usually FIBTEST

Front end crate selection Move to left to include or right to exclude (common DAQ Ace duty)

“Edit or View Run Settings”
from main RunControl “Parameters”
pull-down menu

The tabbed panes contain detailed information about the RunConfiguration



Consumers & Parameters

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RunSet: CALIB_QIE_FWD Owner: RUN_USER

File Browse Create Triggers Inhibits CalibrationJobSet

Global RunSettings

RunType: BSC QIE Calibration TriggerType: (none)

SvxSet: (none) CalorCalibSet: (none)

RunConfiguration Details

Crates Consumers Parameters Output Level 1 Level 2 Level 3 CSL Expert

Add or Remove Consumers from Partition

Consumers	All Choices
BSCQIEPED	CESCALIB
QIEPED_MINIPLUG	CESCALIB_INT
	CLCQIE
	NEWTOTAC
	POTQIEPED
	QIEPED
	QIEPED_DEV
	SIXPED
	SVX_X
	TOFQIEPED
	TOFTAC

< Chosen All Choices >

Edit

<< Add <<

>> Remove >>

Consumers tabbed pane shows consumers to be started during run; only applies to calibration runs

RunSet: COTCALIB_ACE Owner: RUN_USER

File Browse Create Triggers Inhibits CalibrationJobSet

Global RunSettings

RunType: COT Calibration TriggerType: (none)

SvxSet: (none) CalorCalibSet: (none)

RunConfiguration Details

Crates Consumers Parameters Output Level 1 Level 2 Level 3 CSL Expert

Specify Run and Calibration Parameter Values

Parameter	Value
Directory	/Calib/COT
Status	16776960
NEvents	1000
RunSectionInterval	50
Iteration	0
PauseInterval	0
TsCode	4
CalibPipe	0
CalibInterval	50
CalibTag	
Interval 0	100000
Interval 1	0

Parameters tabbed pane shows various run parameters and their values; mainly for expert use



TriggerControl

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The screenshot displays the 'RunConfiguration Details' interface with three overlapping windows:

- Level 1 Window:** Titled 'Set TriggerSupervisor Level 1 Mode', it features radio buttons for 'Standard (Fred)', 'Calib Fixed Period', 'Calib External Trig', 'Calib SVX', 'Calib Continuous', and 'Software'. 'Standard (Fred)' is selected.
- Level 2 Window:** Titled 'Set Level 2 TriggerSupervisor Mode and Pulsar Options', it has radio buttons for 'L2 Mode' (Auto L2 Accept, Auto L2 ALT, Auto L2 Reject, L2 Processors) and checkboxes for 'L2 Decision' (Pulsar, Pulsar B) and 'L2 Enable' (Pulsar, Pulsar B). 'L2 Processors' is selected.
- Level 3 Window:** Titled 'Include or Exclude Level 3 Subfarms', it includes 'All' and 'None' radio buttons and a grid of 20 subfarm outputs (Output 1 to Output 20). Each output has two checkboxes. Outputs 1-16 have both checkboxes checked, while outputs 17-20 have both unchecked.

- Level 1 and Level 2: choice between calibration modes or physics trigger
- Level 3: selection of active subfarms



OutputControl

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Crates Consumers Parameters **Output** Level 1 Level 2 Level 3 **EventBuilder:** CSL Expert

Set Various OutputType Options

Ethernet(SoftEvb) VRB(HardEvb) HEvb2a HEvb2b RunNumber DiagnosticBank

ExtraDBanks ReadoutLists

EventBuilder:

- Software goes through TCP/IP Ethernet links (low bandwidth) for calibrations Permanent storage on tape robot in FCC
- Hardware through dedicated hardware and gigabit switch, high bandwidth

Crates Consumers Parameters Output Level 1 Level 2 Level 3 **CSL** Expert

Set Consumer-Server/Logger Options

DataType

Beam data [1] Cosmic Ray [2] Calibration Run [3]

DAQ Testing [4] DAQ Testing, torture test [5] DAQ Testing, not to disk [6]

LookArea

Default Files [3] All Files [2] No Files [1]

TapeOption

Default Files to Tape [3] All Files to Tape [2] No Files to Tape [1]

LookArea: Temporary disk cache on fcdflnx2

DataType: Beam data if and only if we have luminosity

TapeOption: Permanent storage on tape robot in FCC



Run Settings, expert options

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The screenshot shows the RunSet: AAA_CURRENT interface. The 'File' menu is open, highlighting 'Enable Expert Options'. The 'Settings' tab is active, displaying a grid of expert options. A red arrow points from the 'File' menu to the 'Enable Expert Options' checkbox. A green box highlights the 'Expert' tab and the 'Settings' section. A purple box highlights the text 'You may be asked to take special runs, e.g. MyronMode with L1Early, or without ReadoutLists, which are only available in the expert options'.

Settings	Settings	Settings
<input type="checkbox"/> MyronMode	<input type="checkbox"/> L1Early	<input type="checkbox"/> IgnoreError
<input type="checkbox"/> IgnoreXtrp	<input type="checkbox"/> IgnoreSvt	<input type="checkbox"/> IgnoreCluster
<input type="checkbox"/> EnableFP	<input checked="" type="checkbox"/> EnableValidationVeto	<input type="checkbox"/> EnableTurbo
<input type="checkbox"/> EnableSparky	<input type="checkbox"/> EnableFakeData	<input type="checkbox"/> HaltOnFlyingWires
<input type="checkbox"/> DisableCrates	<input type="checkbox"/> DisableL1Calib	<input type="checkbox"/> StartOnB0
<input type="checkbox"/> IgnoreBC	<input checked="" type="checkbox"/> DacFromHdb	<input checked="" type="checkbox"/> LoadDacs
<input type="checkbox"/> LoadEtAlgo	<input type="checkbox"/> LoadEtTable	<input type="checkbox"/> XftDiagnosticMode

Expert options can be enabled from the *File* pull-down menu

Many expert options are triggered by the selection of other options or the addition of crates

You may be asked to take special runs, e.g. **MyronMode** with **L1Early**, or without **ReadoutLists**, which are only available in the expert options



Trigger Inhibits

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RunSet: AAA_CURRENT Owner: RUN_USER

File Browse Create Triggers **Inhibits** CalibrationJobSet

Global RunSettings

RunType: Physics TriggerType: PHYSICS_4_00 [2,788,617]

SvxSet: SVX_NO_PEDS CalorCalibSet: (no)

RunConfiguration Details

Crates Consumers Parameters Output Level 1 Level 2 Level 3 CSL Expert

Add or Remove Crates from Partition

- FIB_SVX_06
- HADRON_TIMING_00
- IMU_00
- IMU_01
- INHIBITS_00
- LEVEL1_CAL_00
- LEVEL1_CAL_01
- LEVEL1_CAL_02
- LEVEL1_CAL_03
- LEVEL1_CAL_04
- LEVEL1_CAL_05
- LEVEL1_GLOBAL_00

Crates

< Chosen All Choices >

Edit

- C3PO_00
- CAL_PULSER_01
- L2PULSAR_TED
- LEVEL2_PULSAR_02
- PCAL_SOURCE_00
- TEST_CAL_01
- TEST_CES_00
- TEST_CLIENT_00
- TEST_LEVEL2_01
- TEST_LEVEL2_02
- TEST_MUON_01
- TEST_SVT_01

Inhibits normally used only during physics (colliding beam) runs, otherwise set IgnoreInhibit to true

Inhibit sources are tied to the crates and components you have chosen, and are selected automatically

In an emergency, you may have to disable misbehaving inhibit signals from the main InhibitDisplay GUI **before the run is activated**

To control the inhibit system, you must have the INHIBITS_00 (b0inh00) crate in your configuration

Inhibits cause data taking to stop: watch event rates, RunControl display and main InhibitDisplay



Trigger Inhibit on RunControl

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RunControlStatus

State: **START** Transition: (none)
 Partition: 2 Run: 196737 0x30081 Section: 1561
ACTIVE 12607711 Events (L2A)
 No error conditions 0 Calib Events
 Activate: 2005.04.18 22:19:19 3159972 Events (L3A)
TS Status: OK ● Clock ● Error ● SiL1TO ● L2TO
 RunType: Physics AAA_CURRENT Datatype: Beam data
 TriggerType: PHYSICS_2_02 [1,639,563]
InhibitStatus: SET 10:11:27 SVX00 Trip SVX01 Trip

AcceleratorStatus

Store Number	4,104	B0 Low Beta Current	1,974.2 Amps
Tevatron Current	9.0 1E12	Tevatron Energy	979.7 GeV
B0 Luminosity	36.8 E30	B0 Integrated Luminosity	2,586.4 nb ⁻¹
B0 Live Luminosity	36.8 E30	B0 Integrated Live Lum	2,337.9 nb ⁻¹
B0 Proton Losses	427.3 Hz	B0 Antiproton Losses	138.6 Hz
Accumulator Stack	34.1 mA	Outside Temperature	79.5 DegF
Fast Bunch Integrator PNG	8,102.3 E09	Fast Bunch Integrator ANG	840.9 E09
Tevatron Electron Lens Current	7.9 mA	Store Duration	781 MINS

AccelEvents 2005.04.19 10:27:54 Cldr:Bgn colliding physics

In this case, the Inhibit is **SET**, indicating data taking has stopped

Click on the pop-up to get a history of trips

The guilty components here are TRIP:SVX00 and TRIP:SVX01

RunControl crate: **INHIBITS_00** *b0inh00*

Jonatron sez:
"Selecting the Inhibitions is the Ace's most important duty!"



This is the "new" Inhibit system from ...December 2003...



Inhibit System Control

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InhibitDisplay

LastUpdate: 2006.04.26 10:14:46 Inhibit: Ignored Partition Number: 0 Node: b0control21.fnal.gov RunStatus: State: ACTIVE Run: 214995

B Field	BMU East Trip	BMU HV:PC	BMU West Trip	BSC: PC	BSU HV:PC	CENTRAL HV:iFix	CES HV:PC	CES HV:iFix	CES LV:iFix
CES Trip	CLC,MP Trip	CCL: PC	CMP HV:PC	CMP HV:iFix	CMP Trip	CMU HV:PC	CMU HV:iFix	CMU00 West Trip	CMU01 East Trip
CMX HV:PC	CMX HV:iFix	CMX Trip	COT Control	COT HV:PC	COT HV:iFix	COT LV	COT00 Trip	COT01 Trip	COT02 Trip
COT03 Trip	COT04 Trip	COT05 Trip	COT06 Trip	COT07 Trip	CPR,CCR Trip	CPR,CCR: PC	CSP CCU HV:PC	CSP CSX:iFix	Flying Wire
Hadron LED	IMU HV:iFix	IMU LV:iFix	ISL HV:iFix	ISL00 Trip	ISL01 Trip	ISL02 Trip	ISL03 Trip	ISL04 Trip	ISL05 Trip
ISL06 Trip	ISL07 Trip	ISL08 Trip	MP: PC	Muon LV:iFix	PCAL01 Trip	PCAL02 Trip	PCAL03 Trip	PCAL04 Trip	PCAL05 Trip
PCAL06 Trip	PCAL07 Trip	PCAL08 Trip	PCAL09 Trip	PCAL10 Trip	PCAL11 Trip	PCAL12 Trip	PES LV:iFix	PLUG HV:iFix	RP: PC
SVX HV:iFix	SVX00 Trip	SVX01 Trip	SVX02 Trip	SVX03 Trip	SVX04 Trip	SVX05 Trip	SVX06 Trip	SVX07 Trip	TOF HV:iFix
TOF LV:iFix	TOF00 Trip	TOF01 Trip	TOF02 Trip	TSU HV:PC	VM Power:iFix	Xenon Off			

InhibitDisplay Help

Green	source is enabled and not asserting inhibit
Red	source is enabled and is asserting inhibit
Yellow	source is disabled; the black lettering indicates the user manually disabled it
Yellow	source is disabled; the gray lettering indicates that component is not in the partition
Gray	source is offline and cannot currently be used due to a hardware fault (completely non-functional - ignore)

Close

Inhibit Muon LV:iFix

```

InhibitSignal Channel
Name           Muon LV:iFix
Channel        141
ComponentList  CMU,CMX,CMP,BMU
OnlineFlag     true
Description    Muon Low Voltage from iFix
GlobalFlag     false
Muon LV:iFix is enabled
Muon LV:iFix is not inhibited
Muon LV:iFix is in the partition
  
```

Disable Cancel

•Enable and disable inhibits after **Config** but before **Activate** transition, while in the **Ready** state

RunControl crate: **INHIBITS_00** *b0inh00*



TriggerType Selection

The screenshot shows the RunSet: AAA_CURRENT interface. The 'Triggers' menu is open, showing options: 'List L2 Tag Sets', 'List L3 Tag Sets', and 'Level 1,2 Special Trigger Types (decoupled from L3)'. The 'RunType' is set to 'Physics' and 'SvxSet' is 'SVX_NO_PEDS'. The 'CalorCalibSet' is '(none)'. The 'RunConfiguration Details' section shows 'Crates' and 'Parameters' tabs. A list of crates is visible on the left, including 'FIB_S...', 'HADRON_TIMING_00', 'IMU_00', 'IMU_01', 'INHIB...', 'LEVEL1_CAL_01', 'LEVEL1_CAL_02', 'LEVEL1_CAL_03', 'LEVEL1_CAL_04', 'LEVEL1_CAL_05', 'LEVEL1_GLOBAL_00', and 'LEVEL1_GLOBAL_01'. A list of trigger tables is on the right, including 'C3PO_00', 'CAL_PULSER_01', 'L2PULSAR_TED', 'LEVEL2_PULSAR_02', 'PCAL_SOURCE_00', 'TEST_CAL_01', 'TEST_CES_00', 'TEST_CLIENT_00', 'TEST_LEVEL2_01', 'TEST_LEVEL2_02', 'TEST_MUON_01', and 'TEST_SVT_01'. The 'TEST_LEVEL2_01' checkbox is checked.

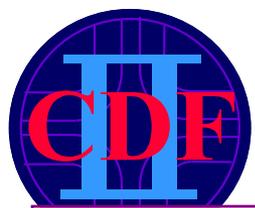
Select decoupled tables here for testing, cosmics, minbias, l2torture
Decoupled table specify only L1 and L2

Select *coupled* TriggerTable here for normal physics running

Coupled tables are fully specified from Level 1, Level 2 through Level 3

Synonyms:
TriggerType =
TriggerTable =
PhysicsTable

DAQ Ace will often be asked to change the TriggerTable!



Coupled TriggerTables

Your Ops Manager will tell you which one to use and which are for special test runs (see white board)

Click here for coupled physics tables

File Browse Create Triggers Inhibits CalibrationJobSet

Global Run Settings

RunType: Physics

SvxSet: SVX_NO_PEDS

TriggerType: PHYSICS_4_00 [2,788,617]

CalorCalibSet: (none)

Trigger Type Selector L1+L2+L3 Coupled

Select a *single* row of parameters from the list of choices below

PHYSICSTABLE	TAG	L2	L3	DESCRIPTION	CREATED
PHYSICS_4_00	3	798	626	PHYSICS_4_00 v3	2006.02.21
PHYSICS_4_00	2	788	617	PHYSICS_4_00 v2	2006.02.14
PHYSICS_TEST_BPHYS_4_00	2	795	625	PHYSICS_TEST_BPHYS_4_00 v2	2006.02.18
TEST_CSL_MB_XING_PUFF	1	735	603	TEST_CSL_MB_XING_PUFF v1 using 5.1.3_level3c and increased...	2005.10.31

Select None Cancel

Coupled Trigger Tables are used for real physics (colliding beams) running

You will often see PHYSICS_TEST_... tables that experts may request to run at the end of stores



Guillelmo sez:
"Selecting a TriggerTable that does not crash Level 3 is the Ace's most important duty!"

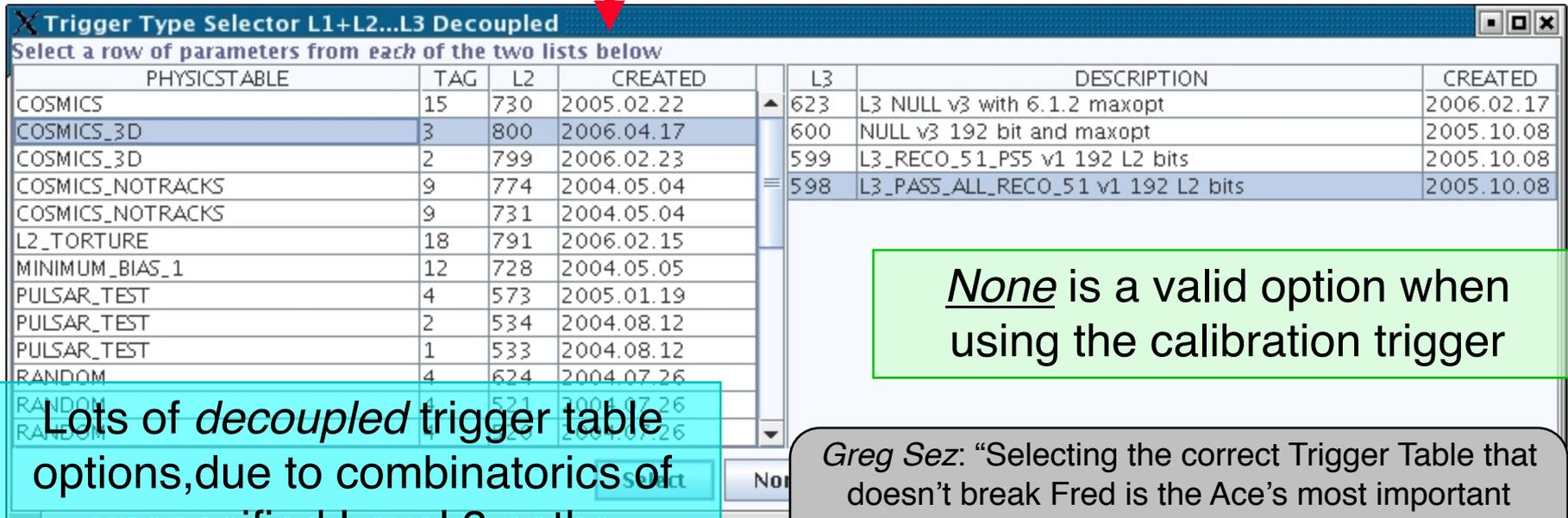


Decoupled Trigger Tables

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2011.08.09



Click here for decoupled trigger tables



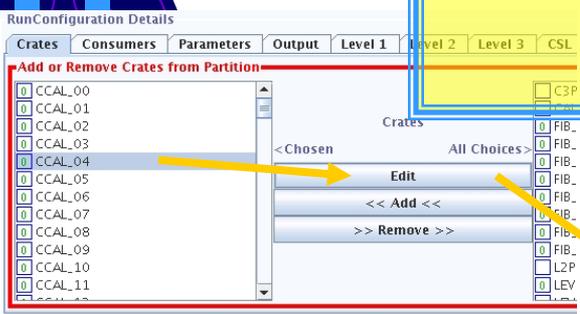
None is a valid option when using the calibration trigger

Lots of *decoupled* trigger table options, due to combinatorics of unspecified Level 3 paths

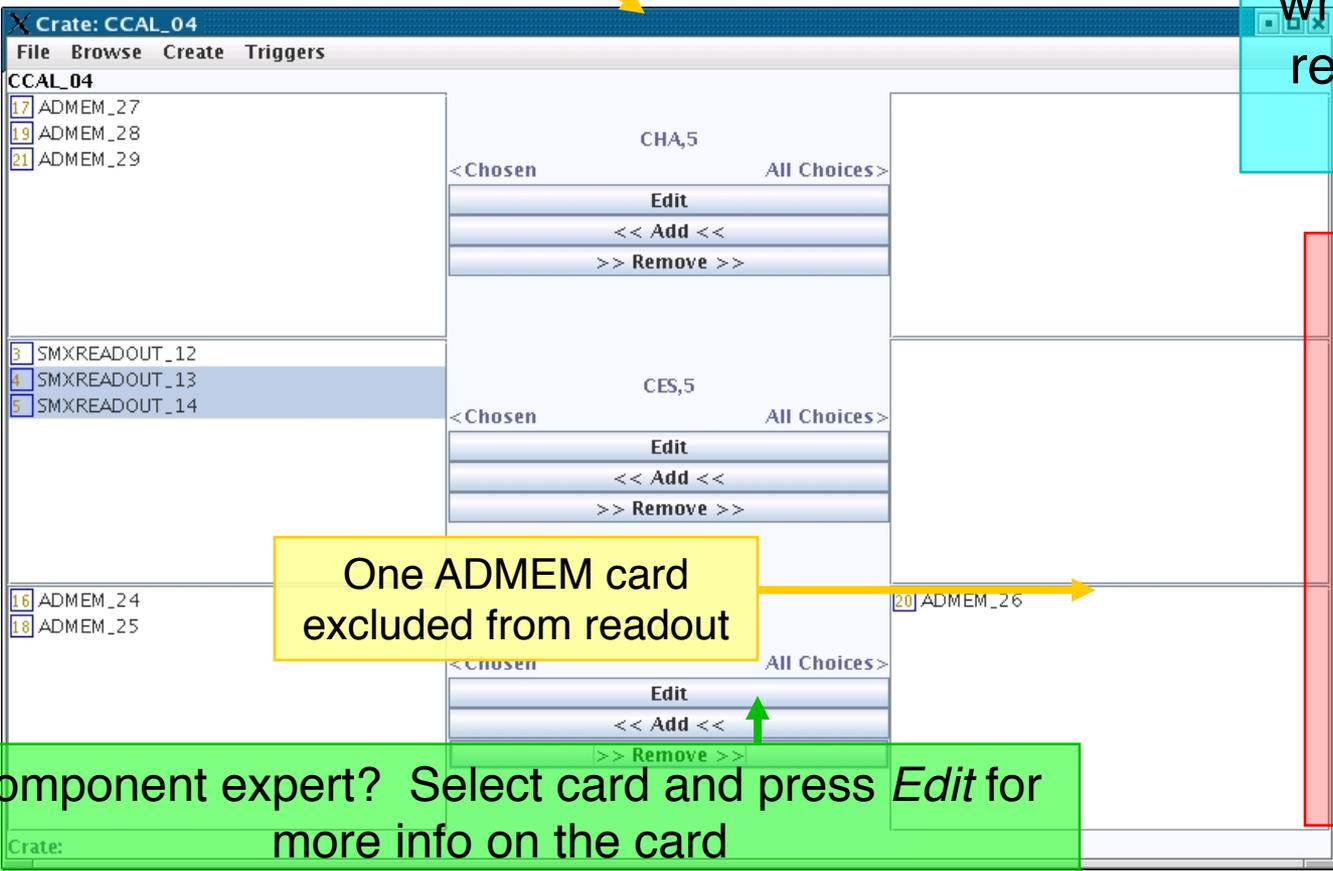
Greg Sez: "Selecting the correct Trigger Table that doesn't break Fred is the Ace's most important duty!" (plus bringing Greg Krispy Kreme doughnuts to make him very, very fat)



CrateEditor



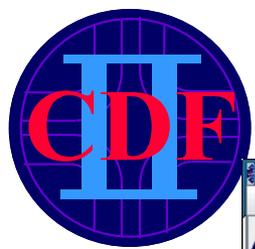
CrateEditor shows which cards will be read out, grouped by bank



One ADMEM card excluded from readout

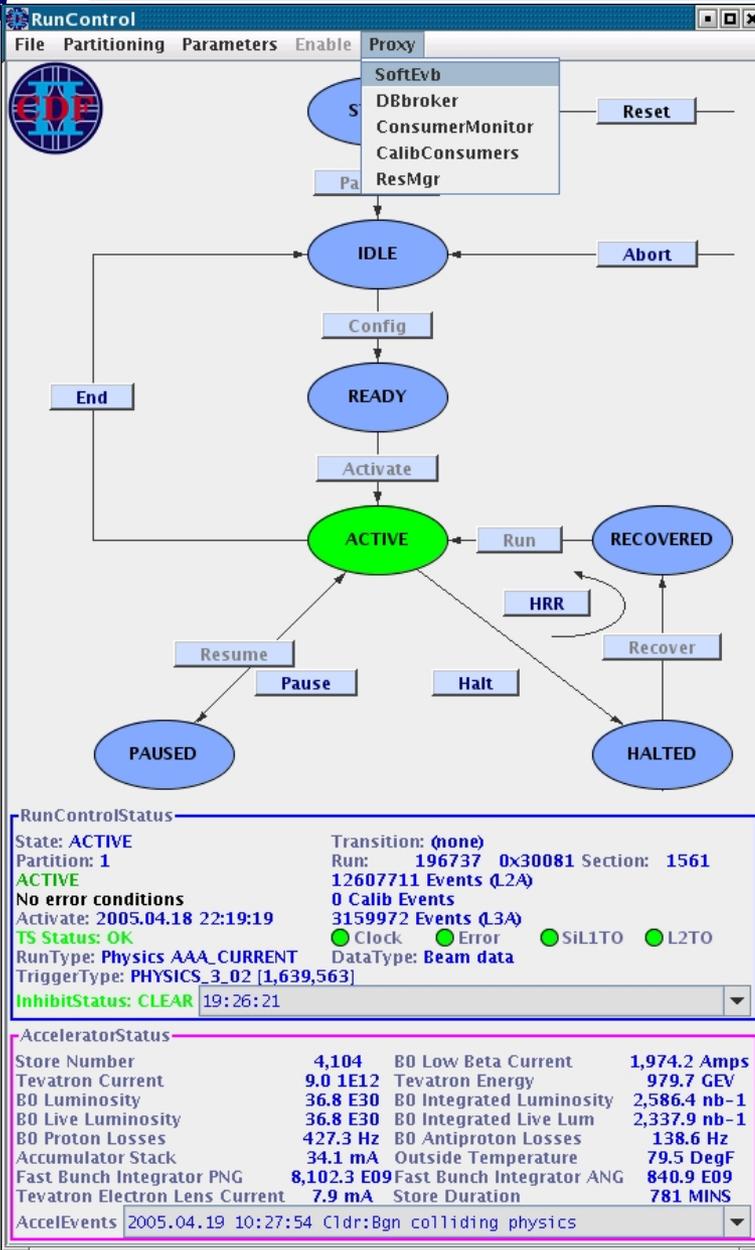
Cards can be removed from readout, but only in **emergencies**
Notify expert *immediately* if you remove a card!

Component expert? Select card and press *Edit* for more info on the card
Use caution when changing database connection, be sure to change it back to *RUN_USER*



Proxy Control Menu

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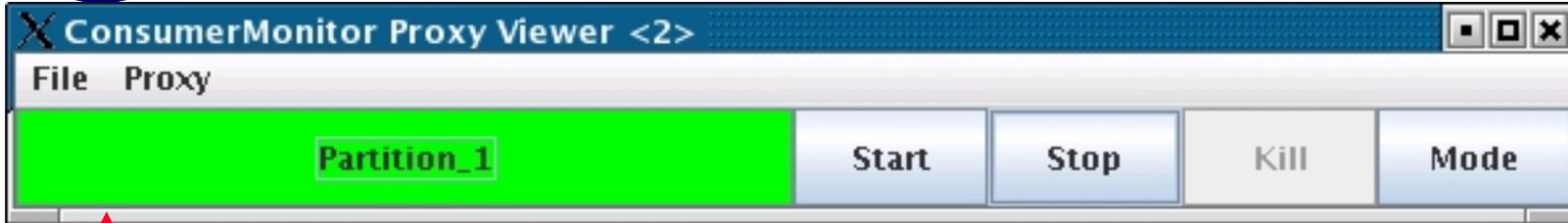
The Proxy gives you control over remote data acquisition processes:

- Software Event Builder
- Database Broker (for SVX)
- Consumer Monitor
- Calibration Consumers
- Resource Manager
- Physics Consumers (to be implemented)



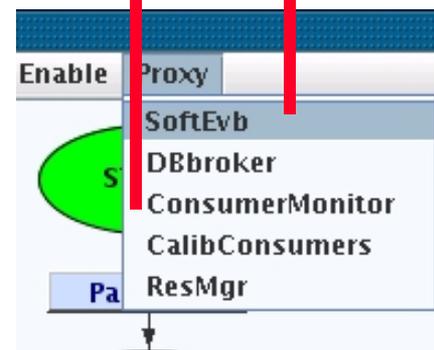
SoftEvb Proxy Viewer

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If you don't get responses from the Software Event Builder during transitions, then check the SoftEvb Proxy, and stop and/or restart if needed

Status colors:
• Green: Up and running
• Cyan: not running
Click on main button for detailed information

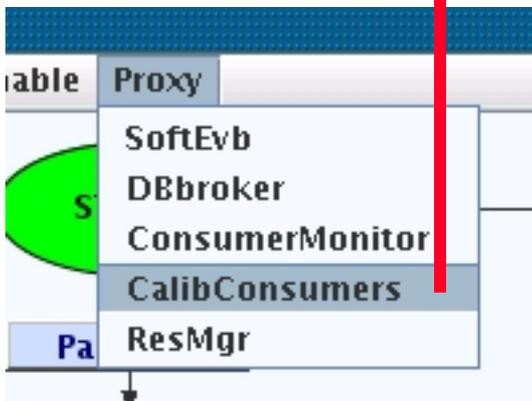




CalibConsumer Proxy

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Consumer Name	Start	Stop	Kill	Mode
QIE_0	Start	Stop	Kill	Mode
CLCQIE_0	Start	Stop	Kill	Mode
TOFQIE_0	Start	Stop	Kill	Mode
CESCALIB_0	Start	Stop	Kill	Mode
LED_0	Start	Stop	Kill	Mode



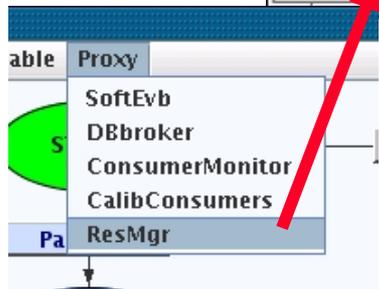
Use the Calibration Consumer Proxy to see if your calibration consumer is still running



ResourceManager Proxy

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Service Name	Start	Stop	Kill	Mode
ResMgr_Prd	Start	Stop	Kill	Mode
ResMgr_Int	Start	Stop	Kill	Mode
ResMgr_Dev	Start	Stop	Kill	Mode
DBMon_Prd	Start	Stop	Kill	Mode
DBMon_Int	Start	Stop	Kill	Mode
DBMon_Dev	Start	Stop	Kill	Mode
DBMon_OffPrd	Start	Stop	Kill	Mode
HMon_Prd	Start	Stop	Kill	Mode
HMon_Int	Start	Stop	Kill	Mode
HMon_Dev	Start	Stop	Kill	Mode
SVX_BootLoader	Start	Stop	Kill	Mode
MerlinWarningLogger	Start	Stop	Kill	Mode

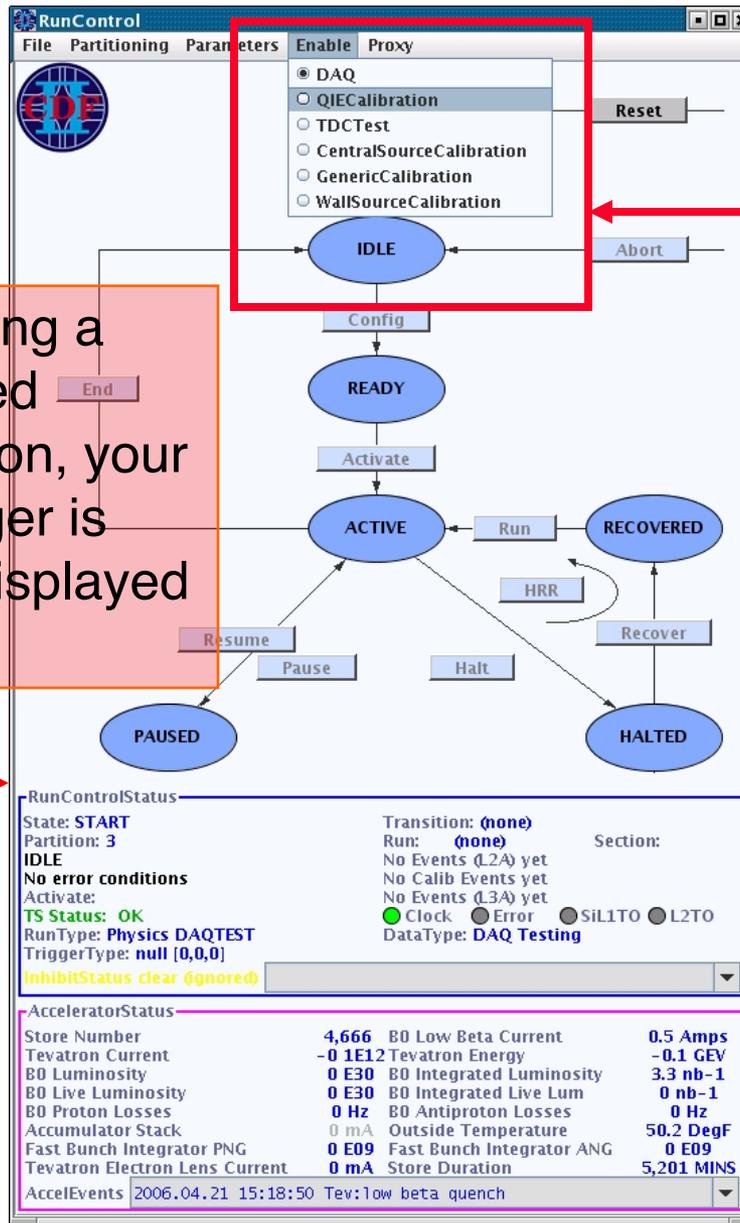


Having a problem with *Sticky Partitions*?
Try restarting the ResMgr_Prd
You can't hurt anything!



StateManager Selection

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After selecting a predefined RunConfiguration, your StateManager is automatically displayed (new!)

- Select State Manager:
- Usually **DAQ**, default on startup
 - **GenericCalibration** for calibrations unless specific menu item for given run type: e.g., **QIE Calibration**
 - Source and TDC testing are primarily for experts

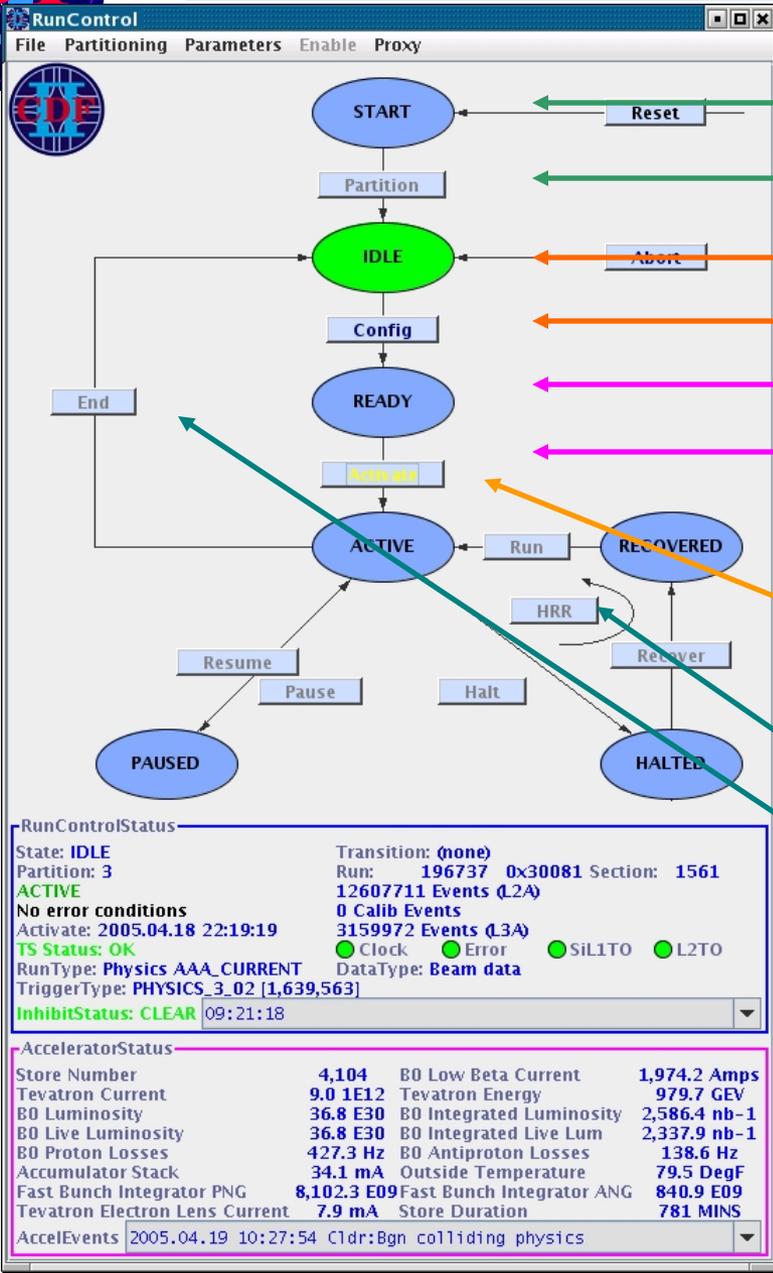
The State Manager determines the flow of control when cycling through runs

StateManager name



Transition Sequencing

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At **Start** state, select all desired clients and *Partition*

At **Idle** state, configuration must be fixed, then *Config*

At **Ready** state just about prepared to take data, then *Activate*

Note use of *click-ahead* (shift key plus mouse click) so that Activate will automatically engage when it becomes available

To fix problems, try ***Halt Recover Run***
When *Active* and ready to finish run, ***End***

Abort and ***Reset*** always available to get you out of sticky situations
Use sparingly!



Transitions – Summary

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- **Partition**: Select front end crates and clients for the run; configure trigger and return crosspoints
- **Config/Setup**: Configure crates and clients with info that could change run by run, without adding or subtracting RC clients (slowest transition)
- **Activate**: Final step to enable system to take data (fast)
- **End**: Normal end of run, produces end of run summaries
- **Abort**: Return to Idle when no other option available
- **Pause/Resume**: Briefly stop data taking (HV trips, flying wires, inhibits)
- **Halt/Recover/Run**: Fast system error recovery, first option to use when an error occurs during data taking
- **Reset**: Return to Start state from Idle, or when no other options are available



Calibration State Managers

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QIE Calibration State Manager

Calibrating: Transitory “fall-through” state, will drop to *Done* when all front end crates are complete

Know where Calibration Consumer log files are kept:
~cdfdaq/consumers/log

CalibLoad special option to do full download of AdMem FRAMs, by expert request only

QIE Calibration may be done in software partition, no hardware triggers are generated

The RunControl interface displays a state machine diagram with the following states and transitions:

- START** (blue oval) → **Partition** (blue rectangle) → **IDLE** (blue oval)
- IDLE** → **end** (blue rectangle) → **IDLE** (blue oval)
- IDLE** → **Abort** (blue rectangle) → **IDLE** (blue oval)
- IDLE** → **setup** (blue rectangle) → **READY** (blue oval)
- READY** → **activate** (blue rectangle) → **CALIBRATING** (green oval)
- CALIBRATING** → **DONE** (blue oval)
- DONE** → **calib_load** (blue rectangle) → **LOADED** (blue oval)
- LOADED** → **Reset** (blue rectangle) → **START** (blue oval)

Below the diagram, the RunControlStatus panel shows:

```

RunControlStatus:
State: CALIBRATING
Partition: 10
UNDEFINED
No error conditions
Activate:
TS Status:
RunType: QIE Calibration ACE_QIE
TriggerType: null [0,0,0]
InhibitStatus:
Transition: (none)
Run: 214991 0x347cf Section:
No Events (L2A) yet
No Calib Events yet
No Events (L3A) yet
Legend: ● Clock ● Error ● SIL1TO ● L2TO
DataType: Calibration Run
  
```

The AcceleratorStatus panel shows the following data:

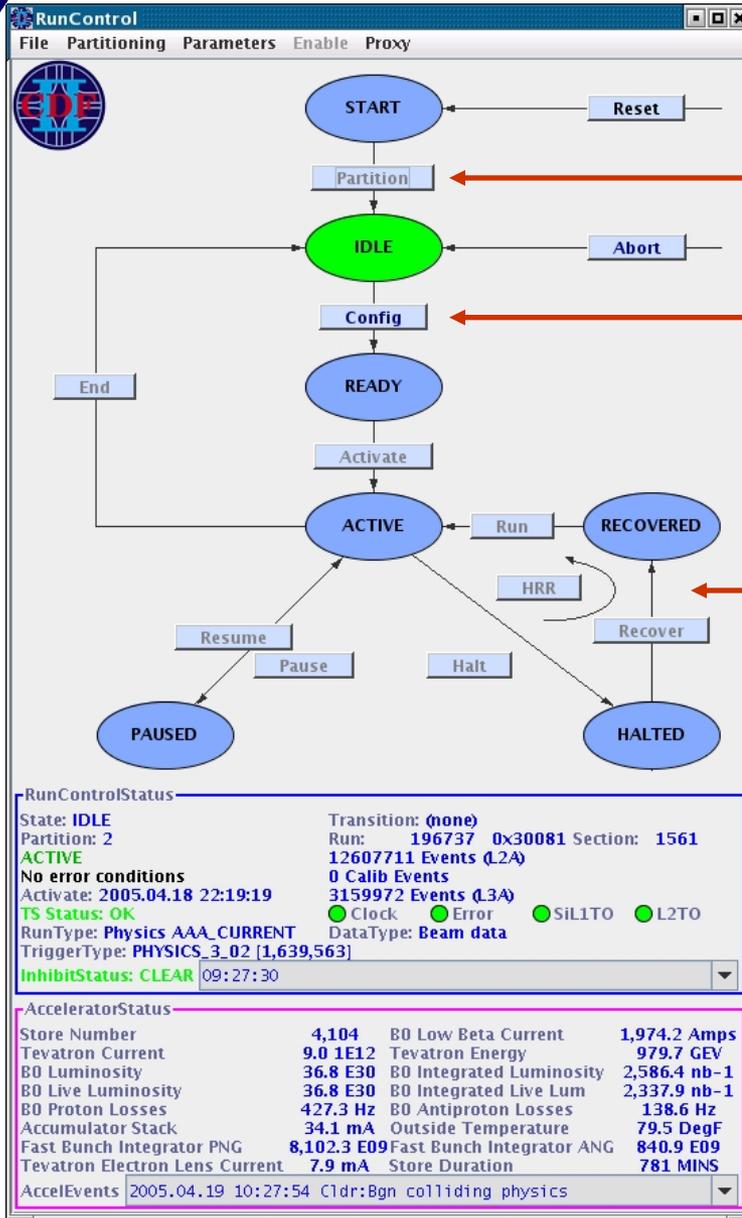
Store Number	4,666	B0 Low Beta Current	0.5 Amps
Tevatron Current	-0 1E12	Tevatron Energy	-0.1 GEV
B0 Luminosity	0 E30	B0 Integrated Luminosity	3.3 nb-1
B0 Live Luminosity	0 E30	B0 Integrated Live Lum	0 nb-1
B0 Proton Losses	0 Hz	B0 Antiproton Losses	0 Hz
Accumulator Stack	0 mA	Outside Temperature	50.7 DegF
Fast Bunch Integrator PNG	0 E09	Fast Bunch Integrator ANG	0 E09
Tevatron Electron Lens Current	0 mA	Store Duration	5,207 MINS

AccelEvents: 2006.04.21 15:18:50 Tev:low beta quench



RunControl in action

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Partition: choose front end crates and other virtual clients to participate in the run

Config: configure hardware and software for desired run typeh

HaltRecoverRun: quickly reset the entire DAQ and trigger system for fast recovery, minimize dead time; Normally use express HRR button

StateManager

- User initiates *transitions* between different *states*
- Goal is to stay in the *Active* state until run is complete, taking recovery actions as necessary



Sample Transition Errors

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```
Invalid <3>
File 2006.04.26 09:29:41
Strange (but not necessarily fatal) Run Configuration
Not using all available L3 SubFarms (cfff,3fc7)
Using L2 Processors without crate MUON_TRIGGER_00
Missing crates requires L2AutoAccept/L2Prescale non-zero
Overriding Trigger Table with auto L2 accept, prescale
Crate CCAL_04 missing from run
Crate CCAL_05 missing from run
Crate MUON_TRIGGER_00 missing from run
Crate PCAL_04 missing from run
```

During your Run Control session, you will sometimes see warning messages pop up. This example tells you are missing some important crates during a beam physics run

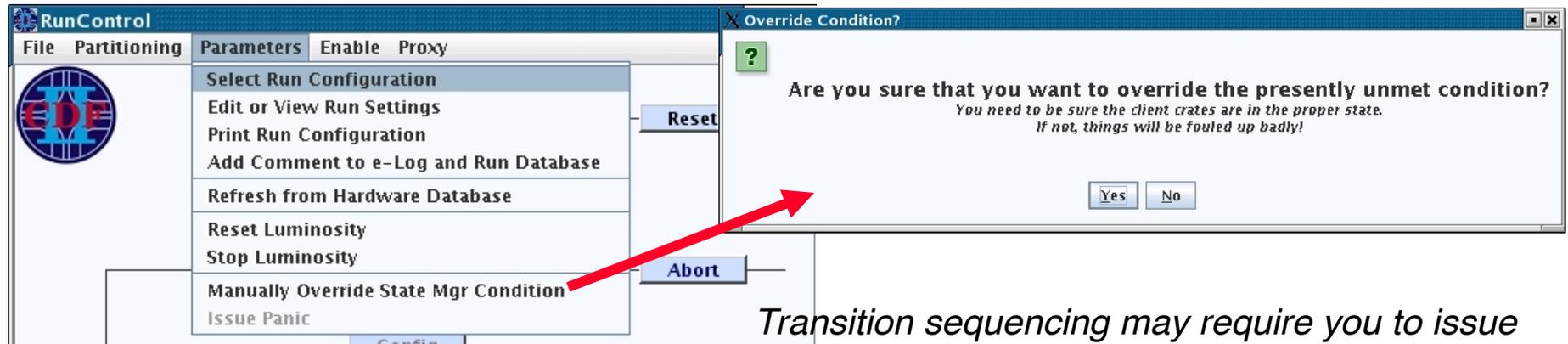
Do ***NOT*** ignore any of these messages!!!

If you do not understand a message, contact the appropriate expert immediately



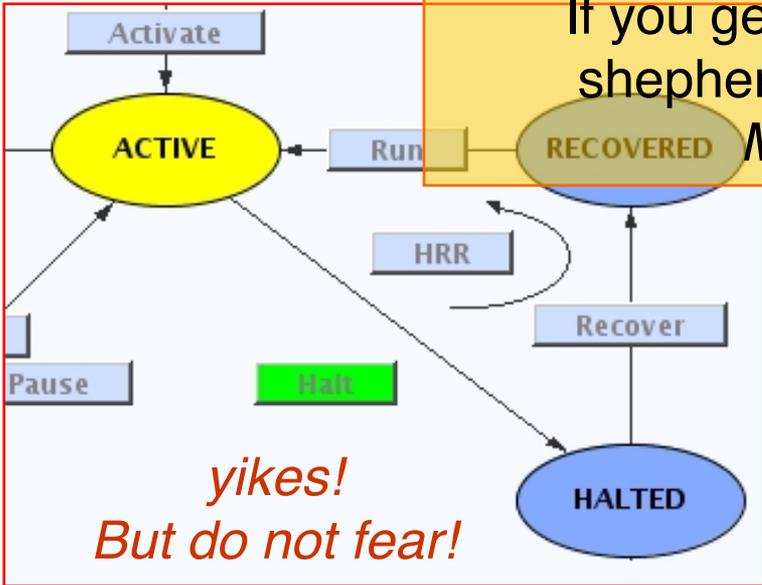
RunControl Panic Situations

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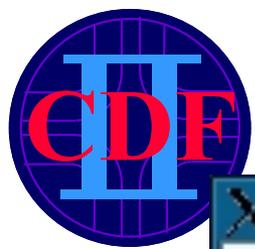
Transition sequencing may require you to issue multiple overrides before system unlocks

If you get “stuck”, and things look hopeless, and shepherding doesn’t help, then there is always *Manually Override Mgr Condition*



*yikes!
But do not fear!*

Use with caution!
Desynchronizes the system, so you must ABORT/RESET/PARTITION after



Reply & Acknowledgments Window

Partition 1:	
	b0puls01
b0tsi00	b0tsi01
b0tsi02	csi
errlog	sevb
slow	

- Which clients have not yet been sent a transition?
- Which clients have received a transition message, but have not yet responded to the transition?
- Which clients have responded successfully to the transition?
- Which client is in error?

This window indicates the transition status of clients:

- White RC has *not* sent transition yet, letters **greyed** out
- Yellow RC has sent transition, *waiting* for acknowledgment, **blue** letters
- Green Client sent successful acknowledgment
- Red Client reported an error during transition – check error log

Click on the client button for more info and the client's **LocalClientController**

If you understand no other slides, please at least understand this one!

Learn the Colors!



LocalClientController

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b0puls01 LocalClientController

File

Press button to issue a local transition

Partition
Config
Activate
End
Abort
Reset
Pause
Resume
Halt
Recover
Run
VmeBusScan
FrontEndConsole
Reboot, Reset and Shepherd Crate

Subject: /frontEnd/cal/pulser/00
 Name: CAL_PULSER_01
 SentMessage: true
 HasResponded: true
 WasSuccessful: true
 IgnoreState: false
 IgnoreReply: false
 Last Command: 2006.04.26 09:44:10
 Last Reply: 2006.04.26 09:44:11
 Latency: 00:00:00.82 (0.82)
 Last Result: SUCCESS
 Last Transition: Config
 Actual State: READY
 Target State: READY
 Local Target: READY
 Crate: CAL_PULSER_01 (b0puls01)
 Description: Cal Pulser Crate
 Rack Position: 1RR18D-2
 Tracer Slot: 2
 Conditions: (clear)

Transitions require confirmation

READY

File menu gives you access to the contents of the configuration messages sent to the client

You can send single transitions to a single crate by hand here

One-Touch shepherding: reset and bring crate back into line with other Run Control clients



Allows you to **shepherd** individual clients through the transitions
 Can be used if one client out of many fails a transition
 Be careful to retain the same configuration!!



Avi sez: "We need a mouse-click database!"



VmeBusScan Button

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```
b0clc00 VmeBusScan
File 2006.04.26 09:46:54
VmeBusScan
PartitionId: 1
IP: 131.225.237.138 Ethernet: 00:01:af:0c:6b:1a
SystemNumber: S12293|8163201|568480
CpuType: Motorola MVME2400-0363 - MPC 750
Slot: 2 Id: 0073 001 TRACER__V2.1A
Slot: 3 Id: 0354 003 ADMEM_V4.0 460
Slot: 4 Id: 0350 003 ADMEM_V4.0 460
Slot: 6 Id: 0356 003 ADMEM_V4.0 460
Slot: 7 Id: 0358 003 ADMEM_V4.0 460
Slot: 9 Id: 0357 003 ADMEM_V4.0 460
Slot: 10 Id: 0352 003 ADMEM_V4.0 460
Slot: 16 Id: 0328 003 ADMEM_V4.0 460
Slot: 17 Id: 0333 003 ADMEM_V4.0 470
Slot: 20 Id: 0977 008 MICHIGAN TDC ECL Rev F V
Slot: 21 Id: 0810 008 MICHIGAN TDC ECL Rev F V
```

Choosing VmeBusScan from the Local Controller window returns a scan of all cards in the front end crate

Useful for verifying the presence and basic functionality of readout cards

- Recover
- Run
- VmeBusScan**
- FrontEndConsole
- Reboot, Reset and Shepherd Crate

Some require confirmation



FrontEnd Crates Control i/o

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Ethernet port:

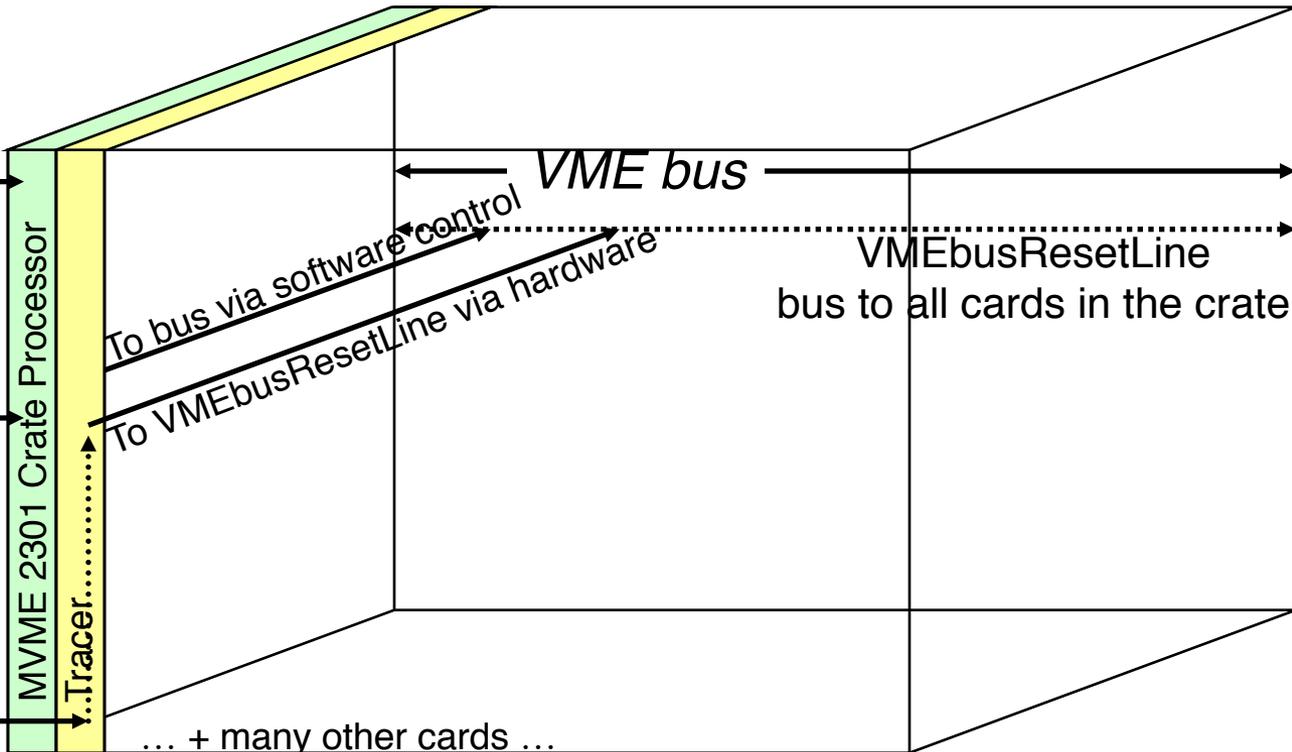
- **vxlogin** * ← TCP/IP 100 Mb/s
- RunControl transitions
- Status/Acknowledge messages
- Software Event Builder

Serial port:

- **vxcom** * (from any node) ← serial line 9600 baud
- FrontEndConsole from RunControl LocalClientController

Reset line:

- **reset_crate** * ← unidirectional pulse
- Reboot, Reset, Shepherd... from RunControl LocalClientController
- originates at *b0res00* and *b0res01* crates



From three into many...

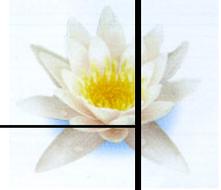
* Provide CPU name(s) as argument on Linux command line, after "setup fer"



The Five Fold Reset Path

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<u>Command</u>	<u>CPU Reset</u>	<u>VME Crate Reset</u>
Reboot, Reset and Recover Crate From the RunControl LocalClientController; uses reset line and software (VISIONdemo)	yes	yes
reset_crate After <i>setup fer</i> from unix shell; proceeds via reset line to tracer and then on to VME bus	yes	yes
VISIONdemo, 9, 10 After <i>setup fer</i> from unix shell, or after logging into crate with vxlogin or vxcom; proceeds via software on to the VME bus; TDCs may prefer this	yes	yes
vxboot After <i>setup fer</i> from unix shell; logs into crate processor and reboots via software	yes	no
reboot After logging into crate with vxlogin or vxcom, equivalent to vxboot	yes	no





CPU vs. Crate Reset

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- CPU Reset
 - Clears up any software problems or heap corruption
 - Nicer to SmartSockets *rtserver*
 - Does not touch any other card in the crate
- VME Bus Crate-wide Reset
 - Also reboots CPU
 - Resets all cards in the crate via the VME bus reset line
 - Often needed by readout cards, e.g. TDCs are a popular candidate to benefit from VME bus reset
 - May leave dangling connection to SmartSockets *rtserver*
- For persistent hardware problems, neither reset may be successful
 - Important to contact appropriate expert as soon as possible in this case, there may be a serious hardware malfunction
 - Expert may indicate that a power cycle is needed – do only under the advice of an expert



Power Cycle

- Last resort, most often in Shower Max Readout (SMXR) problems
- Abrupt power cycles can cause "stuck port" on the rtServer, which may prevent a clean reboot
- Use `vxshutdown` command before power cycle

```
xterm
vxworks root@b0desktop11.fnal.gov
Setting up vxworks -q ppc
setup-ppc: assuming PowerPC 603 processor
b0desktop11.fnal.gov> setup fer
setup-ppc: assuming PowerPC 603 processor
vb0desktop11.fnal.gov> vxshutdown

Usage: vxshutdown <hostname> <hostname> ...

Or provide an option number or mnemonic for groups of crates:
 1 [ccalnw] NorthWest CCAL   2 [ccalne] NorthEast CCAL
 3 [ccalsw] SouthWest CCAL  4 [ccalse] SouthEast CCAL
 5 [pcalw]  West PCAL        6 [pcale]  East PCAL
 7 [wcalw]  West WCAL        8 [wcale]  East WCAL
 9 [cotw]   West COT         10 [cote]  East COT
11 [muon]   Muons            12 [svt]   SVT
13 [l1tr]   L1 Trig          14 [l2pu]  L2 Pulsar
15 [xft]    XFT+XTRP         16 [clc]   CLC
17 [vrb]    DAQ VRBs        18 [tstxft] XFT Test Stand
Enter Option or list of hosts: 2
```

Can select groups of crates when power cycling central arch or plug



LocalClientController Details

b0puls01 LocalClientController

File

Press button to issue a local transition

Partition
Config
Activate
End
Abort
Reset
Pause
Resume
Halt
Recover
Run
VmeBusScan
FrontEndConsole
Reboot, Reset and Shepherd Crate

Transitions require confirmation

```

Subject: /frontEnd/cal/pulser/00
Name: CAL_PULSER_01
SendMessage: true
HasResponded: true
WasSuccessful: true
IgnoreState: false
IgnoreReply: false
Last Command: 2006.04.26 09:46:24
Last Reply: 2006.04.26 09:46:24
Latency: 00:00:00.01 (0.01)
Last Result: SUCCESS
Last Transition: Partition
Actual State: IDLE
Target State: IDLE
Local Target: IDLE
Crate: CAL_PULSER_01 (b0puls01)
Description: Cal Pulser Crate
Rack Position: 1RR180-2
Tracer Slot: 2
Conditions: (clear)
  
```

IDLE

Last transition command time, from main RunControl or this individual controller

Last known state as issued from client, with time

Target state to match the global expected state from main RunControl

Local target state to match the last local transition issued from this individual controller

Presence of these buttons while *Active* indicates a VME crate which can be recovered in the middle of a run



FrontEndConsole



After a *Reboot, Reset and Recover Crate* command, a **FrontEndConsole** appears, showing the boot process, much like **vxcom**

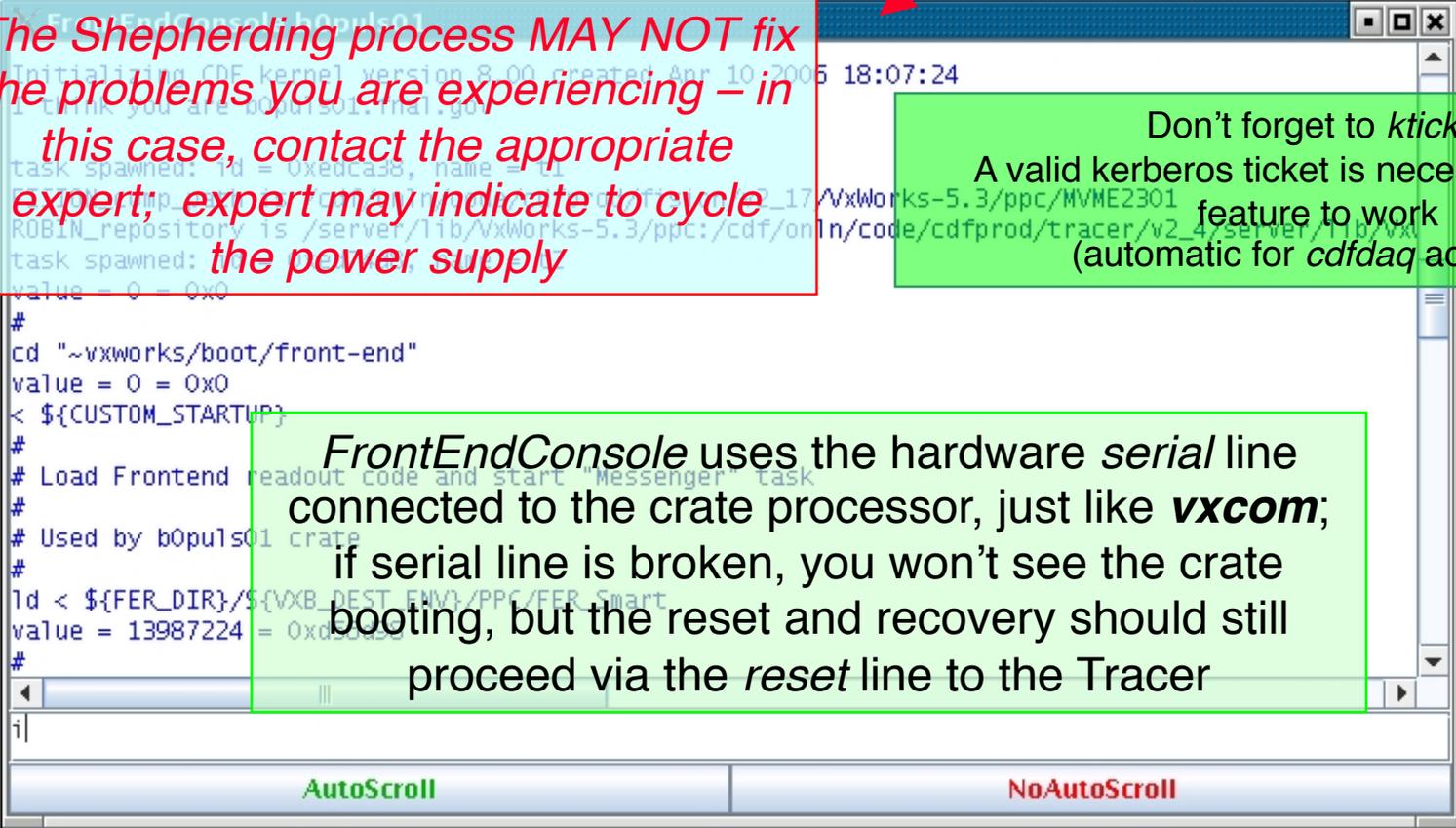
Reset and/or Shepherd choices:



The Shepherding process MAY NOT fix the problems you are experiencing – in this case, contact the appropriate expert; expert may indicate to cycle the power supply

Don't forget to *kticket*
A valid kerberos ticket is necessary for this feature to work
(automatic for *cdfdaq* account)

FrontEndConsole uses the hardware *serial* line connected to the crate processor, just like **vxcom**; if serial line is broken, you won't see the crate booting, but the reset and recovery should still proceed via the *reset* line to the Tracer





Special Needs Clients

errlog LocalClientController

File

Press button to issue a local transition

Partition	Subject: /errorLog
Config	Name: ERRLOG
Activate	SentMessage: true
End	HasResponded: true
Abort	WasSuccessful: true
Reset	IgnoreState: false
Pause	IgnoreReply: false
Resume	Last Command: 2006.04.26 09:50:08
Halt	Last Reply: 2006.04.26 09:50:08
Recover	Latency: 00:00:00.39 (0.39)
Run	Last Result: SUCCESS
VmeBusScan	Last Transition: Config
FrontEndConsole	Actual State: READY
Shepherd Special Needs Client	Target State: READY
	Local Target: READY

Transitions require confirmation

READY

Currently only the **ErrorLogger** can use this feature

SlowControl may be another customer; other clients may have individual transitions issued

Disabled buttons indicate this is not a VME crate

Special Needs Virtual RunControl clients **must be restarted** per their special instructions before shepherding



ClientMonitor

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After issuing Recover Special Needs Client, a special logging window *ClientMonitor* will appear in lieu of a *FrontEndConsole*

```
ClientMonitor errlog
Connecting, one moment please...
2006.04.26 09:51:28 Recovering client ERRLOG ...
2006.04.26 09:51:28 Issuing Reset
2006.04.26 09:51:29 Trying Partition
2006.04.26 09:51:32 Trying Partition
2006.04.26 09:51:32 Successful transition Partition
2006.04.26 09:51:32 Trying Config
2006.04.26 09:51:32 Successful transition Config
2006.04.26 09:51:32 Trying Activate
2006.04.26 09:51:32 Successful transition Activate
2006.04.26 09:51:32 Successfully shepherded client ERRLOG (errlog)
```

AutoScroll NoAutoScroll

Close the FrontEndConsole and ClientMonitor windows when they are no longer needed

How a Special Needs *ClientMonitor* looks like after a successful shepherding into the *Halted* state



Shepherding Status

W. Badgett
CDF RunControl
2011.08.09

- Some clients and crates should never be recovered in the middle of a run
 - <http://www-cdfonline.fnal.gov/ace2help/runControl/shepherding.html>
 - L1, L2, L3, HEVB, SEVB, CLC, CSL, Scalers (b0tsi03)
 - Function will be disabled in *LocalClientController* window
- Some front-end crates have reset line or serial line broken
 - All crates in collision hall working (check this!)
 - JDL promises to fix remaining (upstairs) crates someday
 - As long as reset line or serial line works, shepherding will work
 - ❖ although you may see warnings
 - ❖ no crate has both reset and serial lines broken



End of Run Status Box

W. Badgett
CDF RunControl
2011.08.09

At the end of a run you will be presented with a comment box: enter any pertinent run informations

At the end of a beam physics run, you must also decide the basic run quality. When in doubt, choose *Potentially Good*
Determines whether run is processed offline!



Error Logger

W. Badgett
CDF RunControl
2011.08.09

The screenshot shows the 'Error Handler' window with the following content:

```
File Log Options Tools Help
[Buttons: Stop, Log, Clear, AUTOMATIC HRRs enabled]
IDLE DAQ badgett@b0desktop11.fnal.gov 9:53:32 run #: 215000 (0x347d8)
Crate PCAL_11 missing from run
Crate TRIGGER_SCALERS_00 missing from run
Crate WCAL_00 missing from run
Crate WCAL_01 missing from run
Crate WCAL_02 missing from run
Crate WCAL_03 missing from run
Crate WCAL_05 missing from run
Crate WCAL_06 missing from run
Crate WCAL_07 missing from run
Crate XFT_FINDER_00 missing from run
Crate XFT_FINDER_02 missing from run
Crate XFT_FINDER_04 missing from run
Crate XFT_LINKER_01 missing from run
Crate XFT_LINKER_03 missing from run
Crate XFT_LINKER_05 missing from run
Crate XFT_XTRP_00 missing from run
IgnoreInhibit should not be set for DataType BEAM
(RC) 9:53:09 Config -> READY

Time sequence Argument sequence
Crate XFT_LINKER_01 missing from run
Crate XFT_LINKER_03 missing from run
Crate XFT_LINKER_05 missing from run
Crate XFT_XTRP_00 missing from run

Code: 0x44250800000011 Mnemonic: RUNSET_IGNORE_INHIBIT
Node Name: b0desktop11.fnal.gov; Node Id: 131.225.236.35
Process: rc.FSM.WatchConditionThread[85]; PID: -1; Time: 9:52:30 AM
Code Line: 26; Routine: rundb.RunObject.sendMerlinMessage
Parameters: IgnoreInhibit should not be set for DataType BEAM

partition 1 Listening... (0 mer.mess.)
```

Error Logger receives and interprets status and error messages from front end crates and other clients

Status, Warning and Error Messages

Client errors on Run Control?
Look here for more informations

Error Message Details,
with summary pane



DaqMon

W. Badgett
CDF RunControl
2011.08.09

Component	Status
RunControls status (rcd)	RC
VxWorks nodes (vxmon)	VxWorks
ScalerMonitor (scaler)	Rates and Deadtimes
TriggerSupervisor Status	TS
TriggerSupervisor Rate	TS Rate
Return Crosspoints (rxpt)	RXPT
EventBuilder Status	EVB
EventBuilder Health	EVB Health
Level3 (l3mon)	L3
CSL (cslmon)	Consumer-Server/Logger
MessageLogger (merlin)	Merlin
FrontEndMonitor Configuration	FEMon Config
Crate Reset (reset_crate)	SysReset
Online Database cdfonprd	Database Status
EventBuilder Proxy	Green
Level3 Proxy	Green
Consumer Server/Logger	Green
ResourceManager	Green
Online Database cdfonprd	Green
SlowControl Icdle	Red
Clock	Green
TSI+L1GL+L2PU	Green
Central Calor	Green
Plug Calor	Green
Wall Calor	Green
COT	Green
Muons+E/HTDC	Green
CLC+BSC+MNP+RSP	Green
L1 Calor Trigger	Green
L2 Calor Trigger	Green
XFT+XTRP+MuTr	Green
SVT	Green
SVX+ISL+L00	Green
Help	Cyan
Close	Cyan

Watching Run Control status is your first line of defense
Plus, many monitoring tools are available
Click on Launch Buttons on the left-hand side to start monitors

DaqMon is your gateway to many monitors, to start:
setup for daqmon

- Provides a quick glimpse status of all systems
- Click on component status buttons on the right for more information
- Help button (new)
- Can all be started from command line, too (see parentheses)



VxMon{itor}

W. Badgett
CDF RunControl
2011.08.09

CDF VxWorks System Monitor

26-Apr-2006 10:04:32

Click on the node name for detailed information

b0tsi00	T S H M U	b0tsi01	T S H M U	b0tsi02	T S H M U	b0tsi03	T S H M U	b0inh00	T S H M U	b0svx00	T S H M U	b0svx01	T S H M U	b0svx02	T S H M U	b0svx03	T S H M U																																																																																																												
b0svx04	T S H M U	b0svx05	T S H M U	b0svx06	T S H M U	b0svx07	T S H M U	b0svx08	T S H M U	b0fib00	T S H M U	b0fib01	T S H M U	b0fib02	T S H M U	b0fib03	T S H M U																																																																																																												
b0fib04	T S H M U	b0fib05	T S H M U	b0fib06	T S H M U	b0fib07	T S H M U	b0clk00	T S H M U	b0res 00	T S H M U	b0res 01	T S H M U	b0puls 00	T S H M U	b0puls 01	T S H M U																																																																																																												
b0l1cl00	T S H M U	b0l1cl01	T S H M U	b0l1cl02	T S H M U	b0l1cl03	T S H M U	b0l1cl04	T S H M U	b0l1cl05	T S H M U	b0xt00	T S H M U	b0xt01	T S H M U	b0xt02	T S H M U																																																																																																												
b0xt03	T S H M U	b0xt04	T S H M U	b0xt05	T S H M U	b0xt06	T S H M U	b0xt07	T S H M U	b0l1gl00	T S H M U	b0l2cl00	T S H M U	b0l2cl01	T S H M U	b0l2cl02	T S H M U																																																																																																												
b0l2cl03	T S H M U	b0l2cl04	T S H M U	b0l2cl05	T S H M U	b0svt00	T S H M U	b0svt01	T S H M U	b0svt02	T S H M U	b0svt03	T S H M U	b0svt04	T S H M U	b0svt05	T S H M U																																																																																																												
b0svt06	T S H M U	b0svt07	T S H M U	b0svt08	T S H M U	VxWorks Node b0tsi00 Monitor																																																																																																																							
b0ccal03	T S H M U	b0ccal04	T S H M U	b0ccal05	T S H M U	b0tsi00 Wed Apr 26 10:05:25 CDT 2006 Partition: (undefined) State: UNKNOWN																																																																																																																							
b0ccal12	T S H M U	b0ccal13	T S H M U	b0ccal14	T S H M U	<table border="1"> <thead> <tr><th>TaskName</th><th>Entry</th><th>ID</th><th>Priority</th><th>Status</th><th>Ermo</th><th>StackSize</th><th>StackCur</th><th>StackMax</th></tr> </thead> <tbody> <tr><td>tExcTask</td><td>excTask</td><td>0x1effb050</td><td>0</td><td>PEND</td><td>0x0</td><td>7984</td><td>288</td><td>624</td></tr> <tr><td>tLogTask</td><td>logTask</td><td>0x1eff8450</td><td>250</td><td>PEND</td><td>0x0</td><td>4992</td><td>272</td><td>352</td></tr> <tr><td>tNetTask</td><td>netTask</td><td>0x1edb9010</td><td>1</td><td>PEND</td><td>0x0</td><td>9984</td><td>240</td><td>1760</td></tr> <tr><td>tPortmapd</td><td>rportmapd</td><td>0x1ed15810</td><td>1</td><td>PEND</td><td>0x3d0002</td><td>9984</td><td>608</td><td>848</td></tr> <tr><td>tRlogind</td><td>rlogind</td><td>0x1ed123c0</td><td>15</td><td>PEND</td><td>0x0</td><td>7984</td><td>1088</td><td>1376</td></tr> <tr><td>t1</td><td>VISIONserver</td><td>0x1ecf8b20</td><td>100</td><td>PEND</td><td>0x0</td><td>19152</td><td>464</td><td>752</td></tr> <tr><td>t2</td><td>ROBINserver</td><td>0x1ecf8960</td><td>100</td><td>PEND</td><td>0x0</td><td>19152</td><td>464</td><td>752</td></tr> <tr><td>rtlm_main</td><td>rtlm_main</td><td>0x1ecf37a0</td><td>220</td><td>PEND</td><td>0x0</td><td>19312</td><td>480</td><td>960</td></tr> <tr><td>Messenger</td><td>FER_messenger</td><td>0x1ecdad60</td><td>200</td><td>RUN</td><td>0x3d0004</td><td>195648</td><td>1328</td><td>8160</td></tr> <tr><td>rtlm_session</td><td>rtlm_session</td><td>0x1ec893f0</td><td>189</td><td>PEND</td><td>0x0</td><td>19984</td><td>688</td><td>1216</td></tr> <tr><td>Mon_III</td><td>FER_monitorIII</td><td>0x1ec65640</td><td>220</td><td>RUN</td><td>0x1e0001</td><td>162688</td><td>208</td><td>480</td></tr> </tbody> </table>												TaskName	Entry	ID	Priority	Status	Ermo	StackSize	StackCur	StackMax	tExcTask	excTask	0x1effb050	0	PEND	0x0	7984	288	624	tLogTask	logTask	0x1eff8450	250	PEND	0x0	4992	272	352	tNetTask	netTask	0x1edb9010	1	PEND	0x0	9984	240	1760	tPortmapd	rportmapd	0x1ed15810	1	PEND	0x3d0002	9984	608	848	tRlogind	rlogind	0x1ed123c0	15	PEND	0x0	7984	1088	1376	t1	VISIONserver	0x1ecf8b20	100	PEND	0x0	19152	464	752	t2	ROBINserver	0x1ecf8960	100	PEND	0x0	19152	464	752	rtlm_main	rtlm_main	0x1ecf37a0	220	PEND	0x0	19312	480	960	Messenger	FER_messenger	0x1ecdad60	200	RUN	0x3d0004	195648	1328	8160	rtlm_session	rtlm_session	0x1ec893f0	189	PEND	0x0	19984	688	1216	Mon_III	FER_monitorIII	0x1ec65640	220	RUN	0x1e0001	162688	208	480
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b0pcal05	T S H M U	b0pcal06	T S H M U	b0pcal07	T S H M U	<p>Boot and Run Informations</p> <p>Loaded Modules:</p> <ul style="list-style-type: none"> TriggerSupervisorVme FER_SmartTS geo32 vme 																																																																																																																							
b0wcal02	T S H M U	b0wcal03	T S H M U	b0wcal04	T S H M U	<p>HeapUsage Total Heap Size: 533017392 Current Usage: 14435936 Free: 518581456 Heap is not corrupt</p>																																																																																																																							
b0cot01	T S H M U	b0cot02	T S H M U	b0cot03	T S H M U	Error Messages																																																																																																																							
b0cot10	T S H M U	b0cot11	T S H M U	b0cot12	T S H M U																																																																																																																								
b0cot19	T S H M U	b0cmu00	T S H M U	b0cmu01	T S H M U																																																																																																																								
b0muca00	T S H M U	b0xtrp00	T S H M U	b0mutr 00	T S H M U																																																																																																																								

At-a-glance summary of all front end crates in the system

Arnd sez: "Monitoring the Front End crates is the Ace's most important job"





ScalerMonitor

W. Badgett
CDF RunControl
2011.08.09

CDF Trigger Rate ScalerMonitor ScalerMonitor 2006.04.26 10:06:52

Update again! | Help | MassPrescale | ClearMassPrescale | Dump Scalers to File

Enabling Dynamic Prescaling... | Stored Run Info: State: ACTIVE, Luminosity: 0.00 E30

Level2: Pulsar B (0012pu01)

Partition: 0 | Run Number: 212133 [107] | Runtime: 3,102.0s
 Trigger Type: PHYSICS_4_00 [3,798,626] | Event Number: 57543109 | Livetime: 2,552.1s | Select Run: 212133

General | PreFred | Fred | Fred Prescaled | Fred Live | TS | L2 (0-63) | L2 (64-127) | L2 (128-191) | L3 (0-63) | L3 (64-127) | L3 (128-191) | L3 (192-255) | DynamicPrescale

	Average this run	Average last 60sec	Current	Current
Total deadtime [%]	17.75	43.02	43.64	
Inhibit / Total DT [%]	78.98	78.98	78.98	
L2 or Readout / Total DT [%]	0.13	0.13	0.13	
1 buffer / Total DT [%]	6.22	6.22	6.22	
2 buffers / Total DT [%]	10.75	10.75	10.75	
3 buffers / Total DT [%]	0.85	0.85	0.85	
L2 / Total DT [%]	3.07	3.07	3.07	
4 buffers / Total DT [%]	0.00	0.00	0.00	
Buffer 0 Use [%]		46.92	46.87	
Buffer 1 Use [%]		29.81	29.84	
Buffer 2 Use [%]		15.96	15.97	
Buffer 3 Use [%]		7.31	7.32	
Readout Lumpy		703.8	709.0	
Microsec		31.6	31.7	

	Count	Avg Rate this run	Avg Rate last 60sec	Instantaneous Rate[Hz]
L1 Accept	46,335,154	14,933.4	25.6	36,684.9
L2 Accept	1,406,644	453.3	25.6	1,077.4
L2 Reject	44,928,510	14,480.0	0.0	35,607.5
L3 Accepts	290,739	109.0		
Fred L1A	57,543,109	18,545.6	25.6	69,534.8
Calib L1A	0	0.0	0.0	0.0

Lifetime + Deadtime - Runtime = 0 ? 4,377,555,144 + 944,564,205 - 5,322,119,349 = 0
 L2A - GL2A = 0 ? 1,406,644 - 1,406,644 = 0
 L2R - GL2R = 0 ? 44,928,510 - 44,928,510 = 0
 L2A + L2R + N_Recovers + N_Runs - L1A = 0 ? 1,406,644 + 44,928,510 + 4 + 4 - 46,335,154 = 8
 Synchronization Errors 0

Version 2005.11.10

ScalerMonitor gives very important information about the trigger rates

Deadtime should be low
Trigger rates should be non-zero, but not high enough to saturate the DAQ

Controls Dynamic Prescaling

Watch trigger rates and deadtimes for a happy data acquisition system

Click on TriggerScalers from <http://www-cdfonline.fnal.gov> !



RunSummary Web Pages

W. Badgett
CDF RunControl
2011.08.09

RunSummary for run 182514

Run: 182514 (0x2C8F2) TevStore: 3477

Trigger: PHYSICS_2_04 [2,464,454]

TSEvents: 17,594,767 TSCalib: null

Output: HardEvb ReadoutLatency: 746.3001 usec

Partition: 0 Level2Latency: 36.365 usec

UserNode: cdtdag@b0dap73.fnal.gov FredLIA: 1,340,864,442

Day: 2004.05.09 FredLIA Hz: 15.791

Activate: 01:28:07 L1Accepts: 1,290,424,671

Terminate: 03:47:23 L1Accepts Hz: 15,180.5

MyrL1bnc: 0,0,0 L1Accepts nb: 618,398,29

RunType: Physics [1] L2Accepts: 17,594,767

Data Type: Beam data [1] L2Accepts Hz: 207.0

L2TagSet: 464 L2Accepts nb: 8,431,78

L3TdTag: 811 L3Accepts: 3,805,768

TevEnergy: 979.66 GeV L3Accepts Hz: 44.8

LumiBegin: $57.224 \times 10^{18} \text{ cm}^2 \text{ sec}^{-1}$ L3Accepts nb: 1,823.80

LumiEnd: $13.104 \times 10^{18} \text{ cm}^2 \text{ sec}^{-1}$ CalibLIA: 0

LumiDeliv: 2.415042 nb^{-1} ReformatErrors: 26 (0.00%)

LumiLive: 2.086721 nb^{-1} RunTime: 23:36:45.5

DfcLumiOnline: 2,022,938 nb^{-1} GFredTime: 23:35:11.7

P Begin: 8.9531×10^4 NFR: 44

Phar End: 598.8×10^4 L1DoneDead: 3.90%

Pharross Begin: 1,200.9 Hz L1orRODead: 53.55%

UseSilicon: 1 WaitBusyDead: 3.71%

SVT Map: 4:antofSteer: 20040828203946:mapser:0:053656

Online GoodRun bits:
GoodAna|RC|CLC|L1|L2|L3|CAL|COT|CMU|CMP|CMX|IMU|SVX|ISL|L0|SVT|SMX|TOF|MN|P|BSC

SlowControl - Netscape

http://www-cdfonline.fnal.gov/cdfsbu/

SlowControl

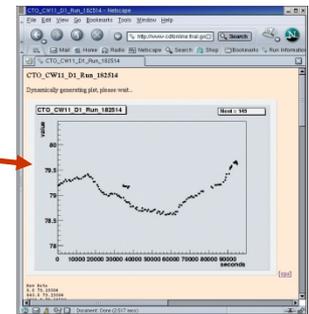
Fetching from database, please wait...

Data below represent 10 minute window around run time

Click on IFIX_AVERAGE value for a plot of the value vs. time; click on SENS_ID value to retrieve sensor value for a range of physics runs

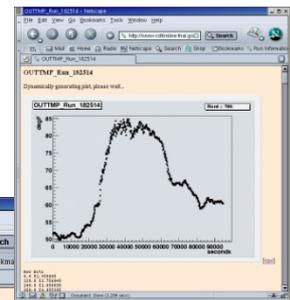
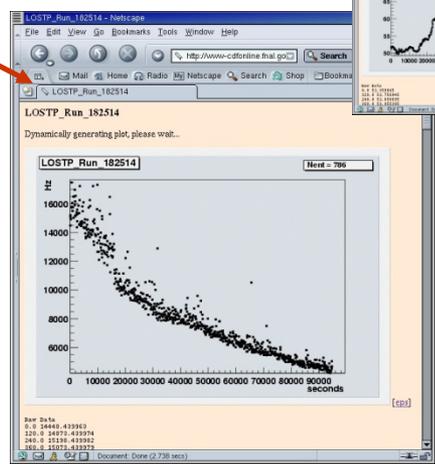
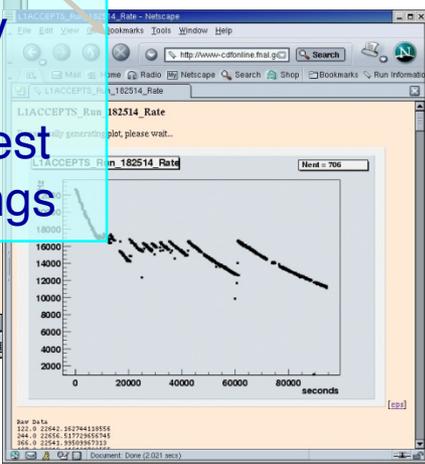
Detector: SOLENOID
Activate: 2004.05.09:01:28:07
Terminate: 2004.05.10:03:47:23

DET_ID	SUB_DET	SENS_ID	TAG	DESCRIPTION	IFIX_AVERAGE	STDDEV	N
491	null	12576	S_HALL_PROBE	Hall probe 1 magnetic field	13,790.665	2.336	144
491	null	12577	S_MAG_FIELD	Magnetic field NMR measurement	-1,750.000	0.000	144
491	null	14319	S_MAG_DCCT	Magnetic current	-1,750.000	0.000	144
491	null	14320	S_NMR_LOCKED	NMR locked bit	1.000	0.000	144



<http://www-cdfonline.fnal.gov/>
Follow RunSum and related links

Run summary pages are dynamically produced, with almost every quantity hyper-linked, with many of the links drawing plots of the quantity of interest & links to error logs and all run settings



Root used for plotting



Useful Monitoring Shell Commands

W. Badgett
CDF RunControl
2011.08.09

First you “**setup fer**”, then from the terminal shell prompt, type:

- **rcd**
 - ✓ Starts up display of all RunControl states
 - ✓ Useful between stores when lots of experts around
 - ✓ Also launchable from RunControl File menu
 - ✓ Click on partition to get list of crates owned
- **resources**
 - ✓ Book a partition and crates without starting up RunControl
- **mapvme**
 - ✓ Map the VME bus of the specified crate controller
 - ✓ Fast, non-GUI text display
 - ✓ Argument is crate CPU, e.g. b0cot05
- **daq**
 - ✓ Bring up CDF VME card and crate control panels for specified crates
- **partition**
 - ✓ Display current status of all partitions to screen
 - ✓ Fast, non-GUI text display
 - ✓ Optional argument for specific partition will print booked resources



Conclusions

W. Badgett
CDF RunControl
2011.08.09

- DAQ Ace's main responsibility is operation of Run Control
- Before your shift, come to CDF control room and try out Run Control features, learn from experienced Aces and other DAQ experts
- Don't understand a feature or warning? Don't ignore! Find out! Page experts if necessary!
- Have a look at new, clickable RunControl User's Guide:
<http://www-cdfonline.fnal.gov/daq/runControlGuide/>
- Questions, comments, suggestions, complaints, send e-mail:
cdf-rc-support@fnal.gov
- Urgent problems, page DAQ/RC at 630-612-8215



Addendum

W. Badgett
CDF RunControl
2011.08.09

Databases, rtServers &
all that...

“Behind the Scenes in
CDF RunControl”

some details for your edification and
amusement, please read at a quiet
moment

51 21 : 59 : 55



What is a database?

- A way to structure data in disk files to make it more useful and easier to manipulate
- A database table's *columns* define your datatypes
- Each table can have many *rows* of data entries
- Quite similar to a Root nTuple (TTree)

Column x Integer	Column y Float	Column z String
45	67.67867	"Hello"
-872	743.1111	"Doggy"
3	45.55E12	"Toots"

Entries can point to other tables
"Relational Database"



CDF's Database

W. Badgett
CDF RunControl
2011.08.09

- ❑ The database software we use is from Oracle Corporation
- ❑ The data are never read directly from the data files, but always via the Oracle database server over the network
- ❑ Our server runs on node *bzora1.fnal.gov* in the 3rd floor computing room and has a large disk array to hold all the data files
- ❑ The database is named *cdfonprd* or "CDF Online Production"



Database Contents

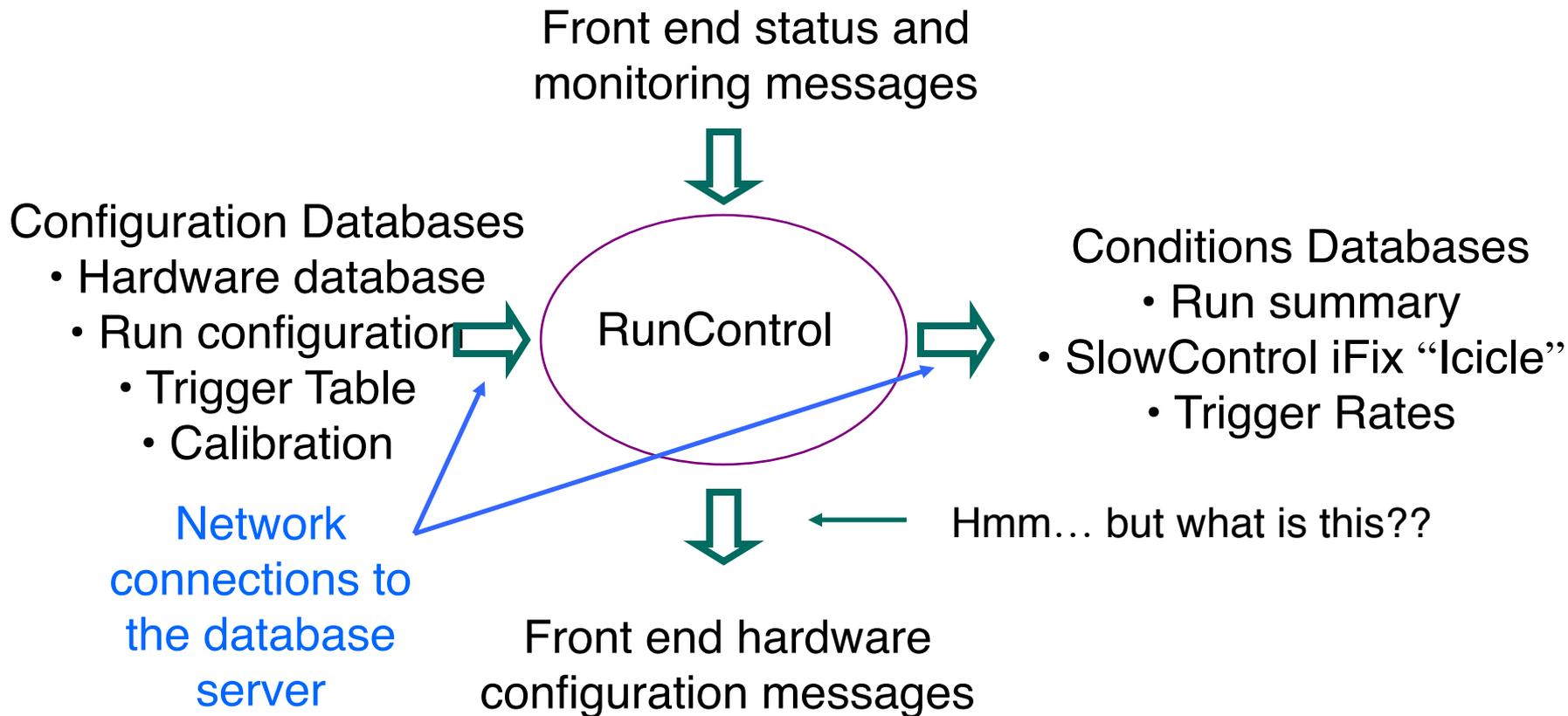
W. Badgett
CDF RunControl
2011.08.09

- ✓ Database is divided up into major parts called "Schemas"
 - ✓ Trigger
 - ✓ Calibration
 - ✓ Run
 - ✓ Hardware
 - ✓ SlowControl (online only)
 - ✓ SAM (offline only)
- ✓ Each "Schema" contains many tables
- ✓ We use the database to CONFIGURE our systems and to record monitoring CONDITIONS



RunControl and the Database

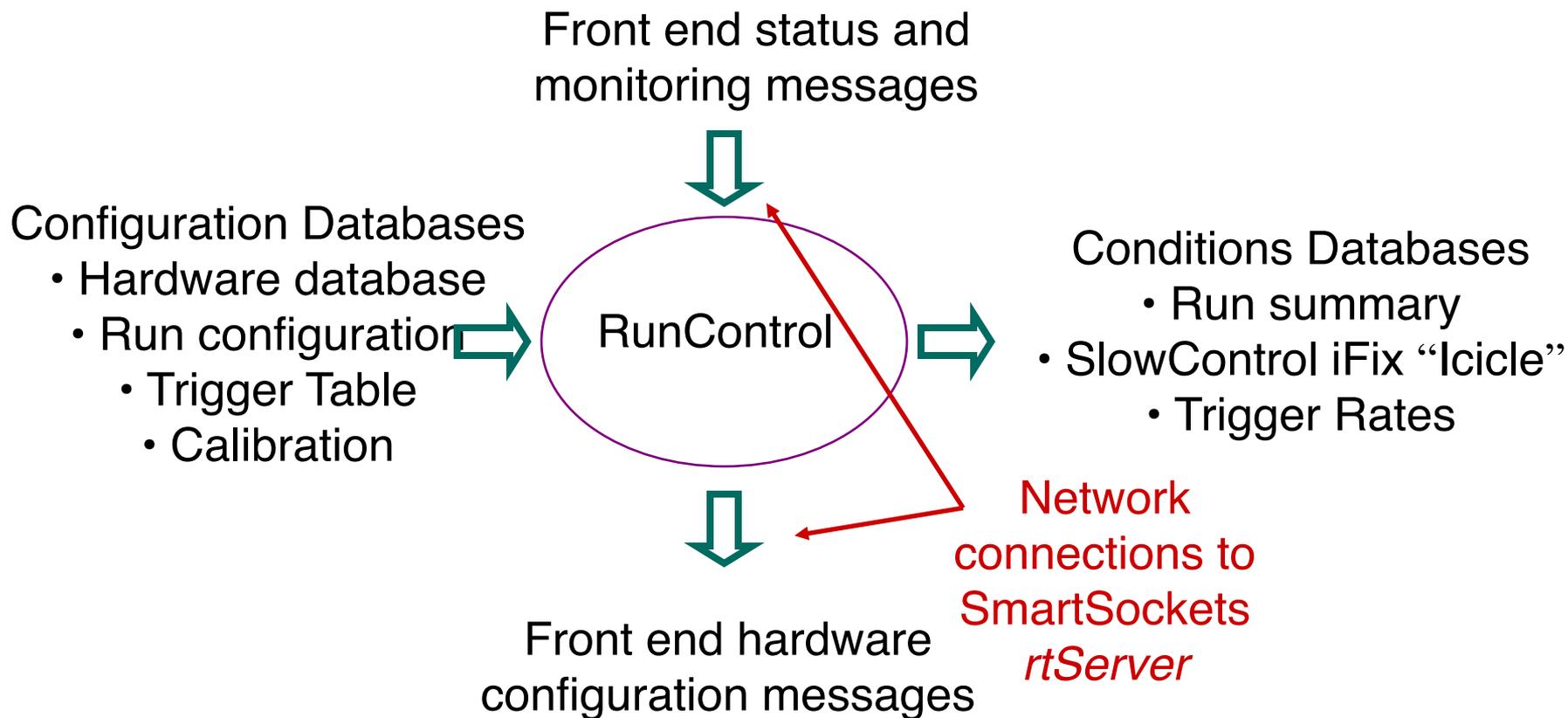
W. Badgett
CDF RunControl
2011.08.09





RunControl Communications

W. Badgett
CDF RunControl
2011.08.09





What is SmartSockets?

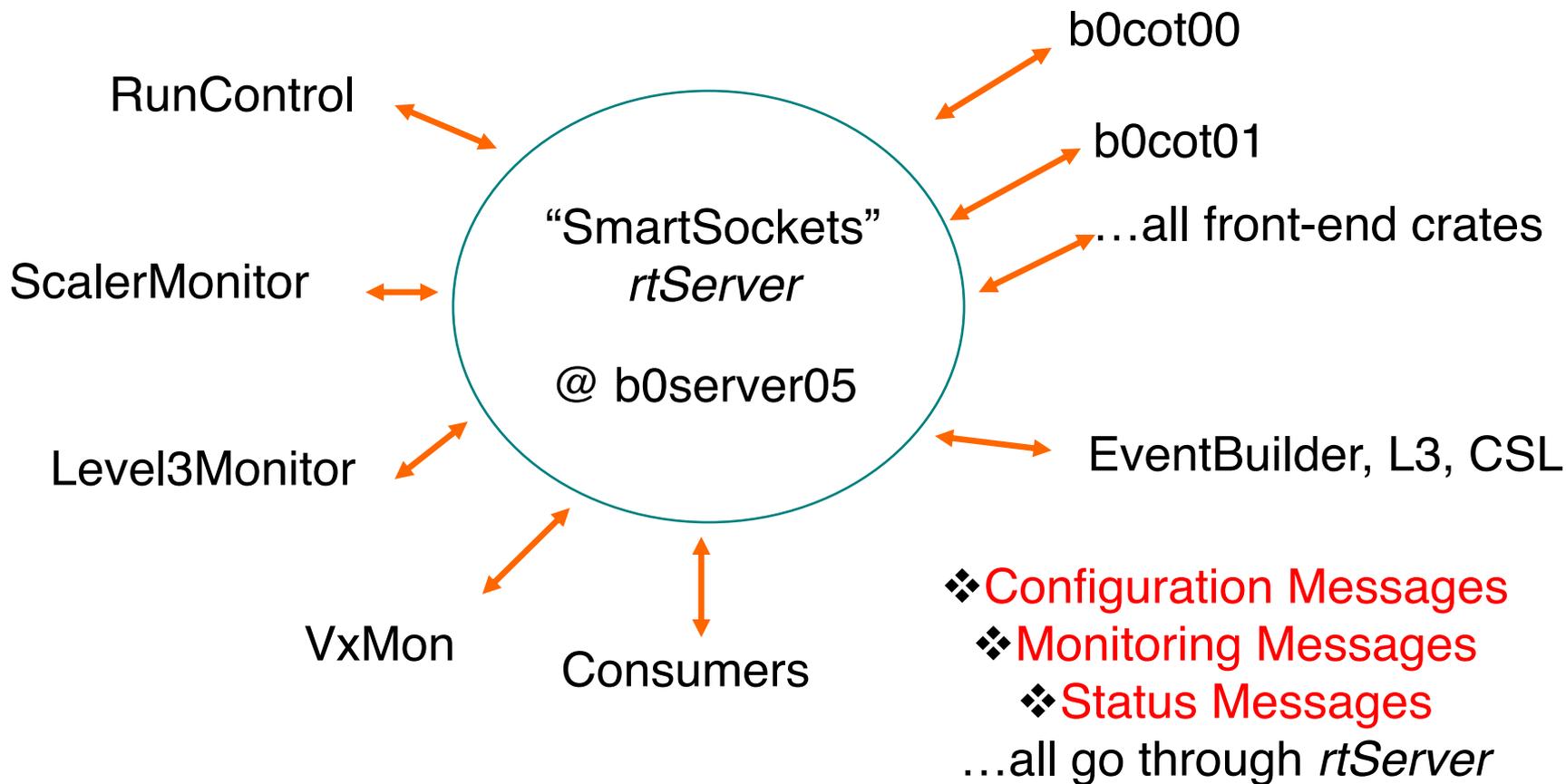
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- ✓ SmartSockets is a commercial message passing protocol and software package
- ✓ Used to configure and monitor the front-end crates and other RunControl clients
- ✓ It is a "Publish and Subscribe" protocol
 - ✓ Tell the rtServer what kinds of messages you want to receive, and it will send them to you as they arrive — *subscribe*
 - ✓ When broadcasting messages to clients, you must specify a destination - who should receive them — *publish*
 - ✓ The destination is called a *subject* and can include wildcards
- ✓ To keep track of subjects and subscribers, a central server is needed: The rtServer process
 - ✓ Runs on node b0server05 in the 3rd floor computer room



The rtServer

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Remember to *vxshutdown* front end crates to cleanly disconnect from *rtServer*



Servers and their Pitfalls

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- o Oracle Database server and SmartSockets rtServer are critical to CDF online operations
- o Lack of either compromises our ability to control and monitor our experiment
 - o A huge pain when something goes wrong