



Commissioning, Global Runs & ROC

CMS Tier1 visit to FNAL

November 05, 2007

Kaori Maeshima



Why Remote Operation? Why at FNAL?

- *Thousands of collaborators located all over the world*
- *Most of them not resident at CERN*
- *Collider H.E.P. facilities have, however, never been more concentrated at a single site*
- *Need to disperse and disseminate*



Advantage at FNAL for USCMS:

- *Natural base to serve large USCMS community*
- *LPC – LHC Physics Center*
- *Tier-1 center, Data Operation team*
- *Tevatron experiments' experience & resource sharing*
- *Remote work base for LHC accel. study & operation...*
- *Impact on future of HEP – way to operate --- ILC*
- *Tools developed here for the remote monitoring are NOT site specific --> can be used at any ROCs (eg. CMS center at CERN)*

ROC mini History

Location: Move to WH1 (LHC@FNAL)



Alan Stone arrives – full time ROC person

Tracker integ. test

HCAL Test Beam

2004

2005

2006

2007

2008 --

WBM effort continues....

MTCC I,II

DQM work continues ...

Global commissioning runs

we are here

Construction of WH11NW ROC room



Remote Operations

LHC @ FNAL Remote Operations Center



Infrastructure

Fermilab Remote Operations Center,
LHC@FNAL

CMSEYE_UCR1 2007-05-25 10:31:56



trust - one experiment

CMS Underground Control Room
2007 MAY Global Integration Run.
There are many of us (USCMS people) in action
here and there!

★
FNAL

technical ground- tool development

- Tools needed for remote status display (DQM, WBM, S³, etc...)
- Must be easy to use and flexible, but robust
- Cooperative with firewall, security
- Must survive trans-Atlantic crossing
- Reuse where it make sense: online and offline monitoring

★
CERN

2007 CMS ROC Shift Activities at LHC @ FNAL

The first group to use the ROC for shifts was the CMS Tier-1 computing administration operations team which was during weekday business hours.

- Responsible for FNAL Tier-1 resources (~ 50% of CMS computing in U.S.)
- Provides central support for the several university-based Tier-2 centers

The first detector group to use the ROC for shifts was the silicon tracker (Lenny's talk) .



Current: Global runs & Data Operation

We are working closely together with Commissioning people, (Tiziano/Darin et. al.), DQM team (Emilio/Andreas, et. al.), Subdetector DQM people, DPG, Data Operation, DBS, DataBase/Trigger/DAQ, software support people .. .

We would like to engage even stronger with the data operation and DPG groups – for the data handling (Transfer/Reconstruction, etc.) and analysis of the commissioning data from the real detector.

http://uscms.org/roc



The CMS Remote Operations Center at Fermilab is located in Wilson Hall. The FNAL ROC provides a suite of software tools for accessing, processing and analyzing various types of local and remote CMS data. In 2006, CMS physicists working from the FNAL ROC participated in real-time data monitoring with the Magnet Test and Cosmic Challenge. In 2007, shift duties for the Silicon Tracker Slice Test and the next phase of the Magnet Test will be performed from the FNAL ROC. For the LHC collider run beginning in 2008, CMS shifts will be taken at the FNAL ROC to complement shifts at CERN, and remote monitoring will continue to improve with automation and new tools such as trigger, luminosity and data acquisition.

ROC	WBM	ELog	Mailing List	Meetings	Presentations & Notes
	nippon.fnal.gov	Runs	CVS	SITracker	MTCC
	Screen Snapshot Service	Accounts & Nodes	New User Instructions	WebCams	
	CMS Workbook	Directories / Glossaries	Photos	VRVS / EVO	Google / Wikipedia
LHC@FNAL	Computing	Console Map	Documents	Mailing List	One East Mtg Schedule
	Telephones	To Do List	Video Conferencing		
Global Run	DBS Discovery	Detector Performance	DQM	ELog	Meetings
	Online DQM GUI	Process Summary	RunSummary	Screen Snapshot Service	SM Page 1
	SM Playback	Technical Coordination	Trigger	Weather Station	
LPC	Computing	dCache	Linux PC Inventory	Maintenance & Operation	Meetings / Rooms
	News	Remote Analysis Builder	Resources Grid	Software Environment	USCMS Photo Gallery
CMS	Page 1	Agendas / Map / Daily	CMS Times	HyperNews	Simba
	CMS Helpdesk	CMS Centre	CMS Notes	CMSSW	CPT
	CVS / LXR	Data Management	DQM	Event Display	WebCams 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11
	Event Filter / SM	Framework & EDM	Luminosity	MonALISA	Online Selection
	Savannah	Software	Timing & Control	Trigger & DAQ	TWiki
	Controls / Safety	ECAL	Electronics	Tracker	XDAQ
LHC	Accelerators & Beams	Dashboard	Experiments	Outreach	Webcams
CERN	Bulletin / Courier	Document Server	Information Technology	Site Maps	Users' Office
Fermilab	All Exp Mtg	Beam Status	Computing	List Server	Seminars
	Today	Training	Users' Office	Weather	VMS

ROC Web Page

Base page for many useful links

Information kept up-to-date by Alan Stone

Background: **WBM** (Web-based Monitoring)

- These are tools developed mainly by Bill Badgett, et. al., over the years of CDF running/monitoring. These tools have been found extremely useful (Trigger/DAQ/subdetector experts at local and remote locations).
- In February 2006, we proposed to install the WBM tools to CMS. Shortly after we began the development and implementation.
- WBM is a general tool, and CMS specific applications are rapidly developing.
- In addition to WBM software tool development, we also installed powerful server machines (cmsmon and cmsmon_dev) in order to distribute information outside of the experimental hall (P5) reliably for all the CMS colleagues.

CMS RunSummary - Netscape Browser

File Edit View Go Bookmarks Tools Help

http://cmsdaq.cern.ch/cmsmon/cmsdb/servlet/RunSummary

CMS RunSummary

Rows: 1 Data: [root](#) | [text](#) | [xml](#) | [query](#)

RUNNUMBER	USERNAME	SEQUENCE	BOOKINGTIME	RUN_MODE	START_TIME	STOP_TIME	TRIGGERS	EVENTS
2241	toppro	CESSY_DAQ	2006.08.10 13:40:46	null	2006.08.10 15:40:46	2006.08.10 16:25:15	50222	50222

Rows: 3 Data: [root](#) | [text](#) | [xml](#) | [query](#)

COMPONENT	AVERAGE_RATE_HZ	AVERAGE_SIZE	AVERAGE_SIZE_RMS	N
BU_PERFORMANCE	8.559	262492.814		127.999 96
EVM_PERFORMANCE	19.201	72.000		0E0 43
RU_PERFORMANCE	18.756	87469.880		31.728 129

LTC_CONTROL Configuration	LTC_CONTROL Rates, n=44	MagnetStatus
Trigger Name Enable	AVERAGEEFFICIENCY 1.000	Temperature, °K 5.034 n=243 2006.08.10 16:25:13
0 DT 1	AVERAGEDL1ARATE 19.131	Current, A 566.056 n=178 2006.08.10 16:25:13
1 CSC 0	AVERAGEDRAWL1ARATE 19.131	MAGNET_CURRENT, A 588.172 n=290 2006.08.10 16:25:14
2 RBC1 0	BLOCKEDTRIGGERS 0E0	VACCUUM, bar 1.665118E-6 n=0 * 2006.08.10 15:09:09
3 RBC2 0	EFFICIENCY 0.977	* no values during run; last value before run is shown
4 RPCTB 0	L1ARATE 18.523	
5 na 0	RAWL1ARATE 18.523	

FED Enable Masks		
Component Id	Status	OK?
ECAL 818	0x1b	Good
HCAL 700	0x3	Good
HCAL 701	0x3	Good
HCAL 702	0x3	Good

Done Spyware Protection Not Effective

CMS RunSummary - Netscape Browser

File Edit View Go Bookmarks Tools Help

CMS RunSummary

Column	min	max	clear
CHANGE_DATE	2006.08.10_15:40:46	2006.08.10_16:25:15	<input type="checkbox"/>
MAGNET_CURRENT	178.6	1251.6	<input type="checkbox"/>

Submit

DCS_ENVIRONMENT.CMSFWMAGNET2DCS Entries 290

[eps]

Rows: 290 Data: [root](#) | [text](#) | [xml](#) | [query](#)

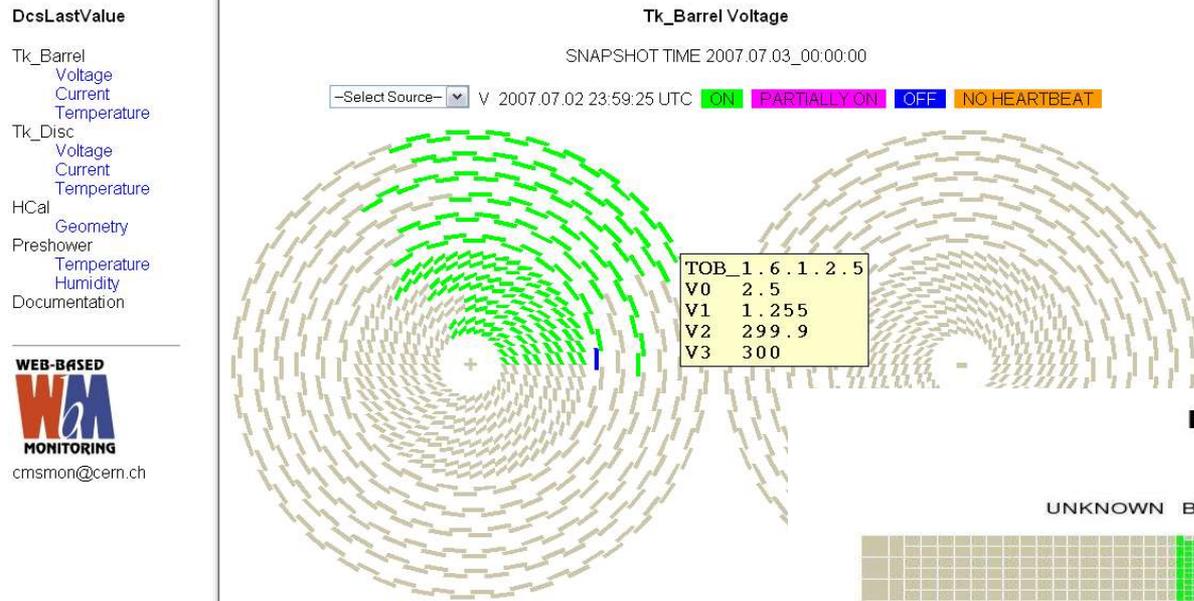
CHANGE_DATE	MAGNET_CURRENT
2006.08.10 15:40:49	196.000
2006.08.10 15:40:52	202.000

http://cmsdaq.cern.ch/cmsmon/cmsdb/servlet/GenericQu... Spyware Protection Not Effective

- Clickable measurements
 - Drill-down capability
- Plot creation
 - Provides Root TTree and histogram object in file
 - Resizeable on resubmit

- Access to current “right-now” conditions
- ...and historical settings and trends...

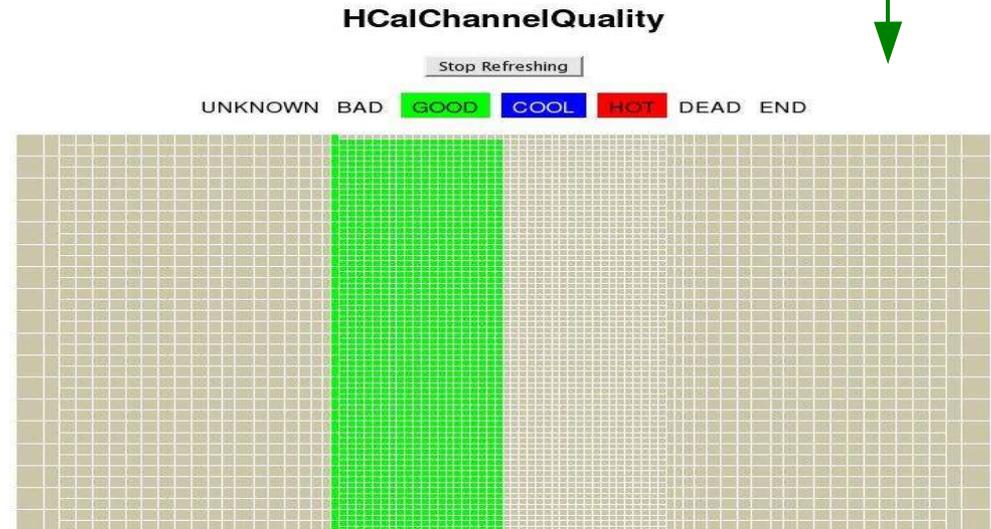
Address http://cmsmon.cern.ch/cmscb/servlet/DcsLastValue?SNAPSHOT_TIME=2007.07.03_00:00:00 Go File



HCal Channel Info. in preparation



Tracker DCS info. from TIF Test





More Run Monitor Tools

CMS Page 1 - Microsoft Internet Explorer

Page refreshed at: 2007/08/13 22:44:17 CET 20:44:17 UTC
All other times given in UTC

Run Information

Booking time	2007/07/27 17:19:01
L1 trigger rate	N/A
Run number	14920
Start time	2007/07/27 17:20:03
Stop time	2007/07/30 16:02:13

DCS Environment

DAQ cluster dew point	8.4 C
DAQ cluster relative humidity	39.6 %
DAQ cluster temperature	21.9 C

DSS

DAQ room temperature	24.8 C
Magnet room temperature	20.8 C
FED room temperature	21.8 C
SX5 temperature	16.6 C

RC States

CMS.LVL0:RC_STATE	Destroyed
CMS.LVL0:DAQ_STATE	Running
CMS.LVL0:TRG_STATE	Running

Web-Based Monitoring

FERMILAB MTCC File Lists
yumiceva@fnal.gov

DAQ Tests

- Current runs
- 4459-4600

MTCC-II

- 4401-4457
- 4301-4400
- 4201-4300
- 4008-4200
- 3964-4007
- 3320-3963

09/01-10/07

- 2706-3318

MTCC-I

- 2601-2690
- 2501-2600
- 2405-2498
- 2350-2403
- 2323-2354
- 1541-2313
- old runs

Log Files

- latest cron job
- cron job 1
- cron job 2

WBM: Zongru Wan, William Badgett & Steven Murray
Comments: Steven.Murray@cern.ch

CMS "Page 1" top level status display, simplicity for even the most naïve user (Oracle Portal)

(S.Murray)

CMS Fermilab Data File Process Summary Page
Files copied to FNAL Tier 1 site and status of processing

This page is automatically updated every 20'
Last modified: January 4, 2007 10:33:53

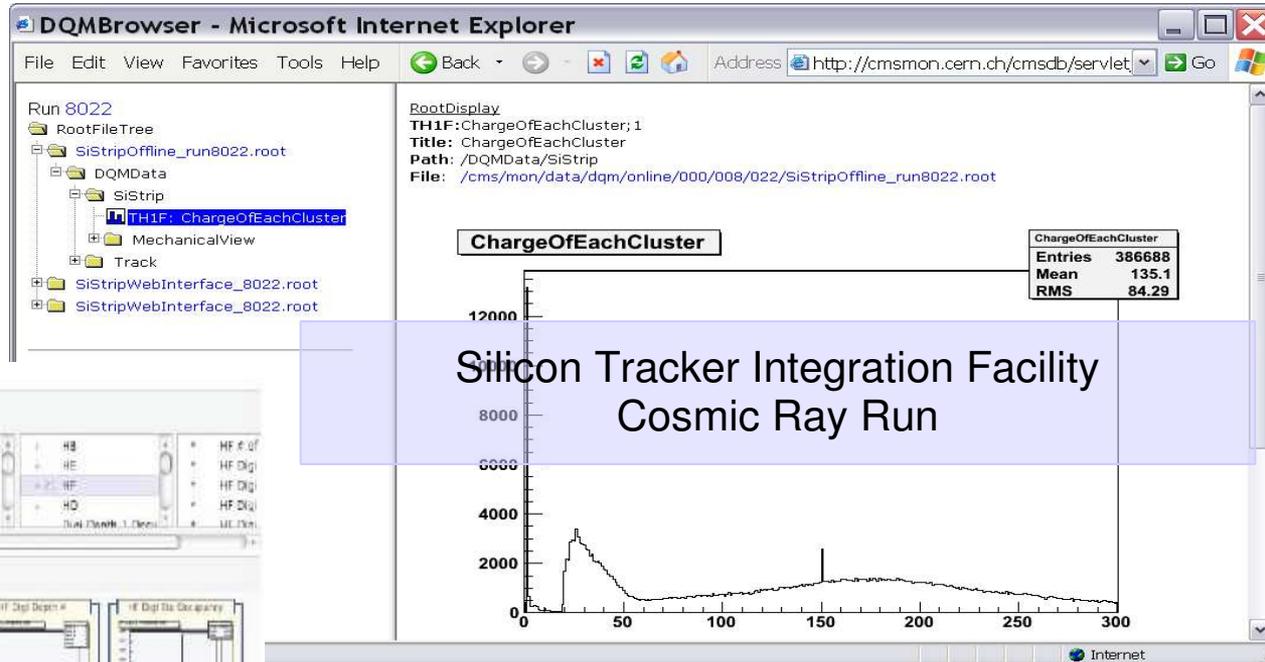
FERMILAB PROCESS SUMMARY PAGE

List of data files [txt], List of root files [txt], Runs being (or not) converted [txt].
green=files converted, orange=being transferred/converted, red=no files available.

Run	dat Files @CERN	Total events	dat Files @FNAL	root Files @FNAL	Total Size	Stop Time	Magnet [kA] / B[T]	DOM			
								TRG	TRK	HCAL	CSC
2600	A1100	776956	A1100	A1102	187 GB	2006.08.27 16:59:42	18.2 kA/3.7995 T	In	In	In	In
2599	A1181	766532	A1158	A1158	184 GB	2006.08.27 15:37:05	18.2 kA/3.7995 T	In	In	In	In
2598	A00	null	A00	A00	0.00 bytes	2006.08.27 14:22:39	18.2 kA/3.8001 T	In	In	In	In
2596	A00	759850	A00	A00	116 GB	2006.08.27 14:13:11	18.2 kA/3.7995 T	In	In	Out	In
2595	A00	null	A00	A00	0.00 bytes	2006.08.27 13:06:24	18.2 kA/3.8001 T	In	In	Out	In
2594	A1129	622258	A1129	A1129	150 GB	2006.08.27 12:56:41	18.2 kA/3.7996 T	In	In	In	In
2593	A1125	608938	A1125	A1125	145 GB	2006.08.27 11:38:23	18.2 kA/3.7995 T	In	In	In	In
2592	A00	null	A00	A00	0.00 bytes	2006.08.27 09:53:34	18.2 kA/3.8001 T	In	Out	Out	Out
2591	A00	30313	A00	A00	7.05 GB	2006.08.27 09:49:57	18.2 kA/3.7995 T	In	In	In	Out
2590	A00	15829	A00	A00	4.32 GB	2006.08.27 09:22:19	18.2 kA/3.7999 T	In	In	In	Out
2589	A00	221165	A00	A00	51.6 GB	2006.08.27 08:49:07	18.2 kA/3.8 T	In	In	In	Out
2588	A00	null	A00	A00	0.00 bytes	2006.08.27 07:45:47	18.2 kA/3.8005 T	In	In	In	Out
2587	A1171	863688	A1171	A1171	206 GB	2006.08.27 07:41:42	18.2 kA/3.7998 T	In	In	In	In
2586	A00	null	A00	A00	0.00 bytes	2006.08.27 05:32:20	18.2 kA/3.8001 T	In	In	In	In

DQM / RootBrowser

Dynamic JavaScript displays with Tomcat/Java backend

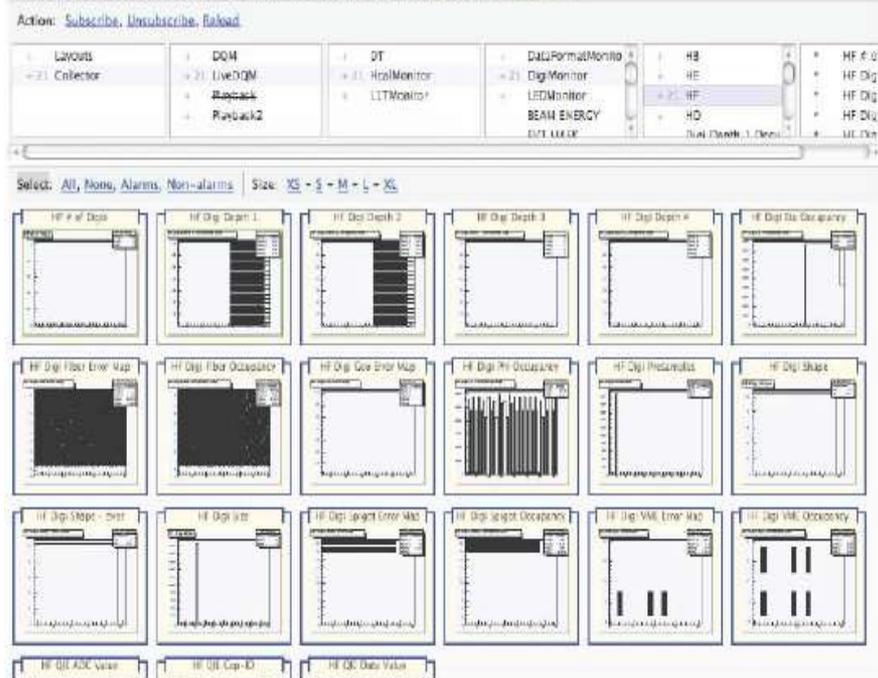


Silicon Tracker Integration Facility
Cosmic Ray Run

Hadron Calorimeter (HCAL)
Global Integration / Cosmic Ray Run
New DQM GUI with user markup (Lassi)

Andreas Meyer and Lassi are at FNAL this week. We will be working on core DQM, DQM GUI, interface, sub-detector needs, etc this week intensely.

This is pre-release version. Please file any feature requests and any bugs you find in Savannah.



Screen Snapshot Service, S³

- **Remote Operations need Remote Knowledge**
 - **Operations screens, e.g. RunControl, HV Control, EventDisplay valuable for remote users to know what is going on**
 - **But normally have tight restrictions on access to nodes**

- **What is the Screen Snapshot Service?**
 - **A way to provide periodic, read-only copies of display images (snapshots) for remote viewing**
 - **Similar to products like VNC, pcAnywhere, and VGA2WEB but without the cost or danger of accidental remote control**
 - **Can be used to make private-network displays viewable on the public internet (useful for remote monitoring)**
 - **Uses commonly available technologies for portability and ease of use: Java, JSP, Tomcat**

Screen Snapshot Service Example

IGUANA EventDisplay

Actual snapshots from
2007.08.30 CMS global
integration run

CMS SnapShotService Image List - Windows Internet Exp...

http://cmsmon.cern.ch

File Edit View Favorites Tools Help

SnapShotService Image List

Image capture of screens in the CMS Control Room

- EventDisplay USC55EVD01-0
- RunControl-0
- RunControl-1

Updated Thu Aug 30 09:18:28 GMT 2007

Run S³ on your computer

WEB-BASED
WAM
MONITORING

S³ Documentation

Done

Snapshot Service Image (RunControl-1) - Windows Internet Explo

http://cmsmon.cern.ch/snapshot/ShowImage...

File Edit View Favorites Tools Help

Snapshot Service Image (RunControl-1)

Done

Snapshot Service Image (EventDisplay USC55EVD01-0) - Windows Internet Explorer

http://cmsmon.cern.ch/snapshot/ShowImage.jsp?id=a375816

File Edit View Favorites Tools Help

Snapshot Service Image (EventDisplay USC55EVD01-0)

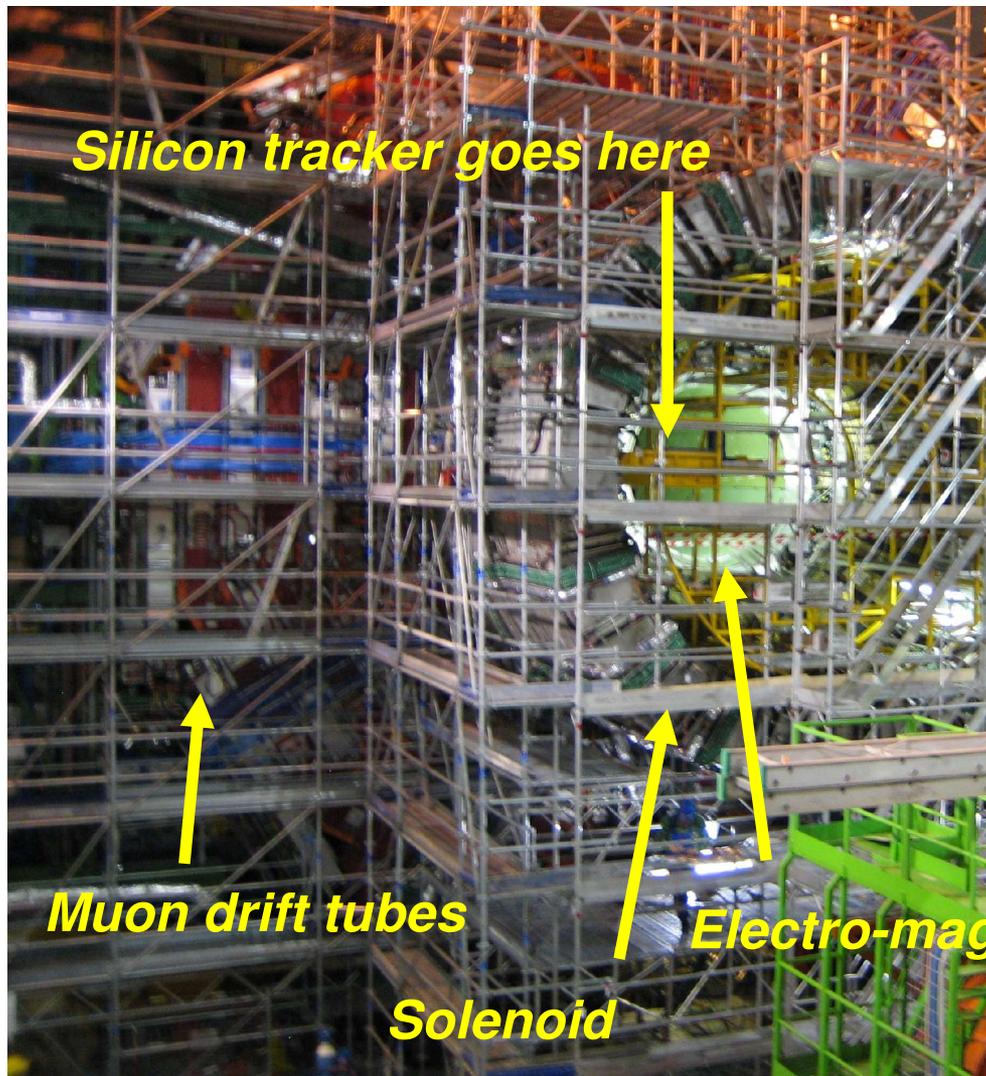
Done

0.078.1 fpx

0.078.0 fpx

CMS RunControl
(see Alex Oh, CHEP'07 279)

CMS Collision Hall – Busy & Crowded



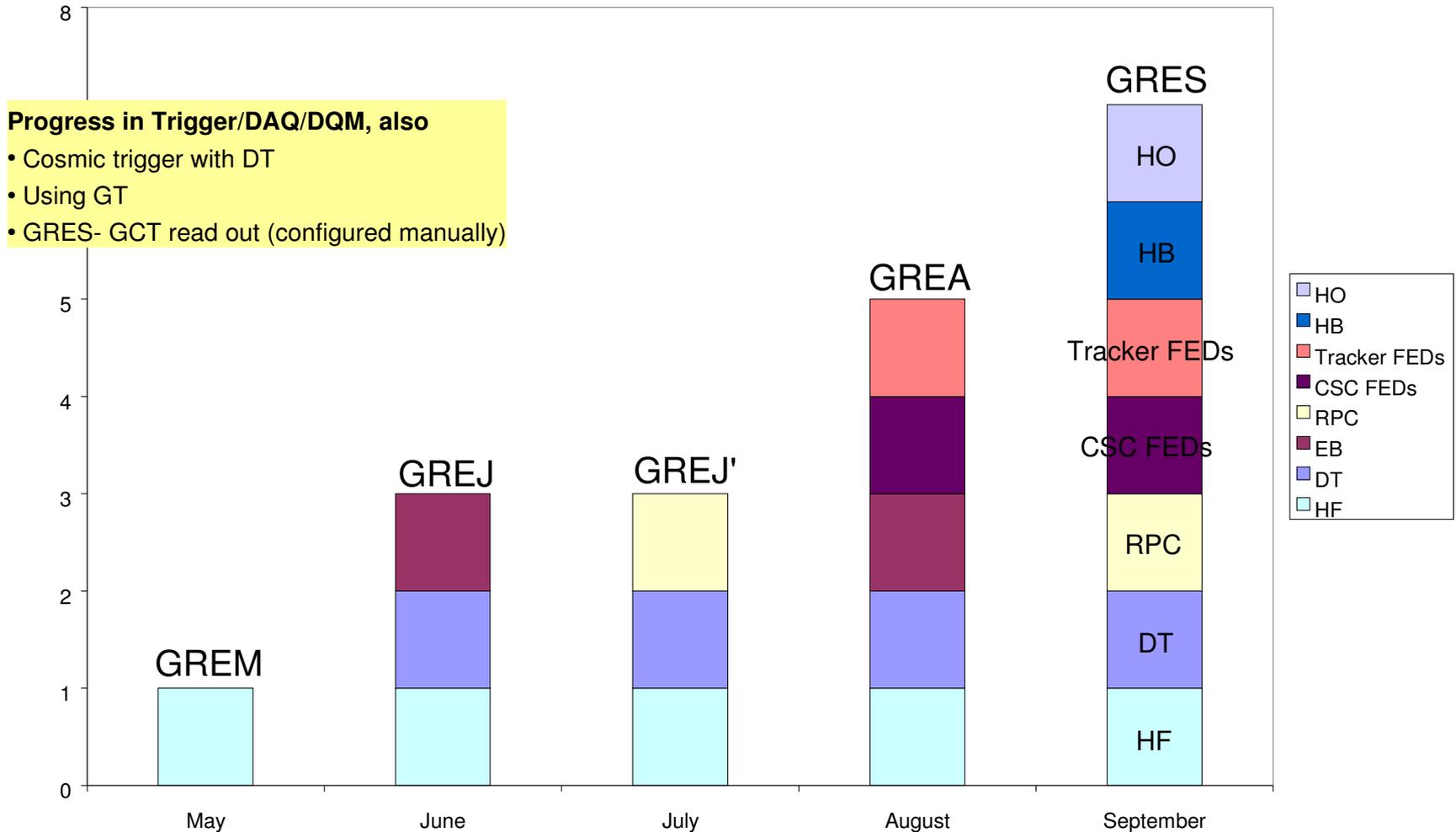
Status & Schedule:

- Most of the heavy lowering is done.
- Nov. global runs – extended to be two weeks long: **Nov. 26 – Dec. 7th**
- Decision on when to lower the tracker will be made this week. (likely in sometime in December).
- Cosmic Run (0T) with Tracker to be scheduled early in 2008
- In April 2008, Cosmic runs with magnet (3.8T) is planned.
- Summer 2008 collisions

CMS Collision Hall 2007

Increasing Complexity of the 2007 Global Runs

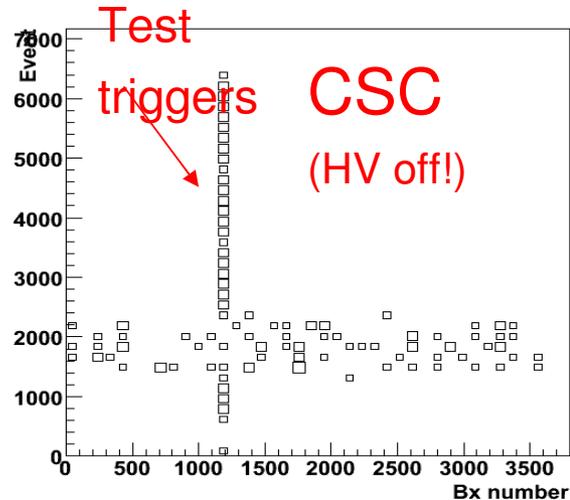
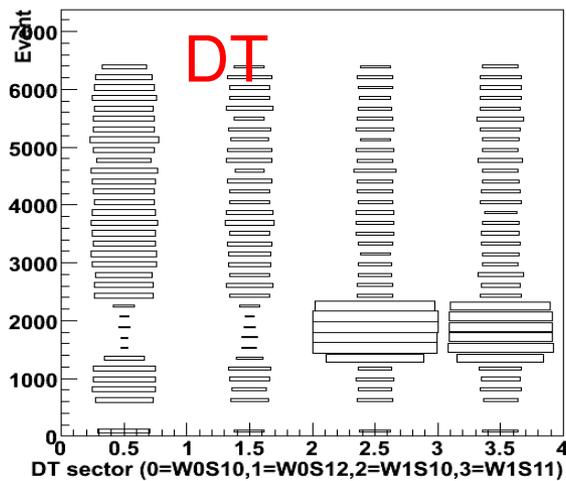
Participating Subsystems in Global Runs



GRES Summary, GREN Preparation

- **GRES Concluded (Sept. 26 – 28)**
 - Ran 7HB wedges, 3 HO sectors, 4 DT sectors, 4 RPC sectors and CSC and Tracker FEDs
 - Data (~5GB) taken and shipped to T1-FNAL and T2-Florida, T2-MIT, as well as the CAF
 - Analysis of GRES data started show important findings which could not be found looking at MC data (noise, alignments, timing, etc...)
- **Next global run is GREN (Nov. 26 – Dec. 1)**
 - Implies completing transition to CMSSW170, XDAQ3.11/SLC4, and all the necessary preparations beforehand
- **Prompt GRES and GREN data reconstruction by the data operation group would really help for the CMS commissioning!**

Correlated DT, CSC Noise



Run 20558

news from this morning: Problem found!!!!!!

Elog posting by Frank Geurts
 Fri Oct 5 12:24:46 Entry time
 Subject: CSC/DT Global Noise Run: found it

<https://cmsdaq.cern.ch/elog/CSC/2796>

..... the major source...: welding equipment....

“Slide from HCAL GRES Report”

(by Pavel, from a run meeting on Oct. 19th)



- Very interesting/useful data
- Progress with DT vs HCAL timing, DB, pedestal definition, noisy channels
- Looking forward to november run
- third of HB is now commissioned !!!
- Is it at all possible to try private DT/HCAL run earlier than late november ??? (note: this happened. run 25179 on Oct. 22)



summary

CMS is now in new phase:

- Most of detectors are in the collision hall and Commissioning “global runs”, while each sub-detector work continues.
- Many more sub-detectors are included in global runs, and can learn a lot from the real data.
- Availability of Coherent way of looking at the huge amount of information (data, monitoring information...) is crucial for the CMS operation as well as for the CMS remote operation. (most of the cases jobs to accomplish are common.)
- Similarly, online/offline monitoring can share many common tools.
- more organized 'shift activities' to be expected more and more at P5 & ROC.

Our Wish List from 'experience working on the global runs from ROC'

- Better notification mechanism of the data file arrivals at T1.
- Better transfer trigger mechanism (which runs being transferred....)
- Reconstruction!!!!!!
- DQM results data transfer
- We still need to experiment/experience about use of DB.....

Latency of the Data Transfer became much much better. Thank you!!!
