CMS Remote Operations Center at FNAL

The CMS Collaboration

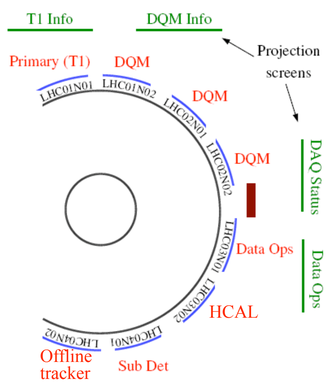
History and Design

The first CMS Remote Operations Center (ROC) was established at Fermilab in 2005 on WH11. In late 2006 a larger, high profile ROC was built on the first floor of Wilson Hall with a glass wall facing the atrium. The ROC design includes space for several subsystem shifts, a 24-hour live video connection to other CMS operation centers, and high visibility for outreach purposes.

Infrastructure

FNAL ROC, 2007

- Eight shift consoles of 3-screened Linux machines arranged in a crescent.
- Four Macintosh consoles display monitoring info onto projection screens
- A fifth projection screen runs an informational video about CMS and the LHC and displays event images in front of the glass wall
- Flexible network, lighting, and heating/cooling configurations



Video Conferencing

Shift takers at the FNAL ROC stay connected to the CMS site (P5), CERN main site (Meyrin), DESY, and any remote computer shift takers via 24-hour high definition live video and conference calls. This enables quick and constant communication between remote and on-site collaborators.

A. Soha, K. Maeshima, A. Meyer.
Fermilab Today, 2009

LPC Dedication. Fermilab Today, 2007

Outreach

The FNAL ROC was designed with outreach in mind for visitors, from funding agencies and local schools alike. The glass wall and first floor location make it highly visible; the projection screen closest to the glass displays videos and images about the LHC, CMS detector, and remote operations, informing curious onlookers. The transparency allows visitors to be aware of the significant contributions taking place at FNAL.

FNAL ROC Shifts

DQM shift training. M. Case, S. Maruyama

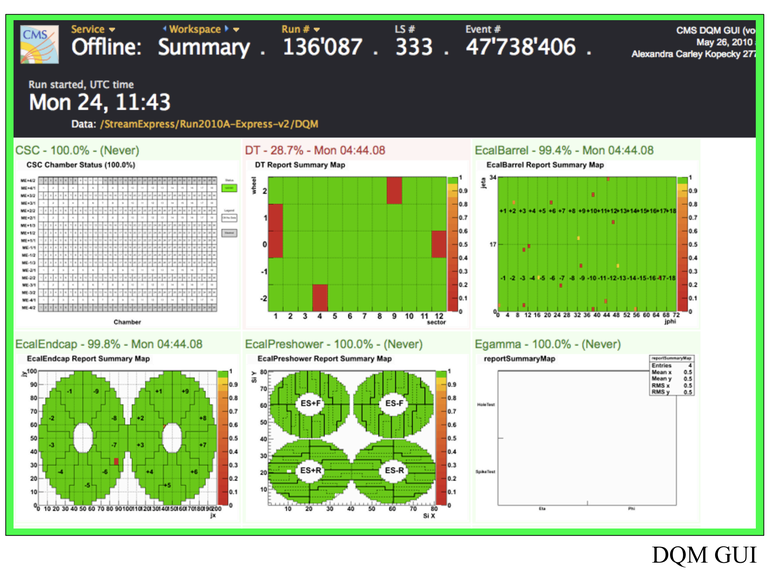
Several different shifts take place at the FNAL ROC. They include DQM, Data Operations, Tier 1 "primary", and multiple subdetector shifts. Collaborators use web-based monitoring tools such as the DAQ Status page (right) and the DQM GUI (below left) to check data quality, data transfer, and detector status in real time. Some shifts are taken "online," analyzing the detector while data is taken, while other shifts are taken "offline" several hours after data acquisition to analyze the detector performance and physics objects.

DAQ Status Page

Subsystem Shifts

- HCAL
  - Monitor subdetector response during runs
  - Covered all owl shifts during some cosmic runs
- Tracker
  - Check automated data certification flags
  - Determine causes of bad runs

Data Quality Monitoring (DQM)



DQM GUI

- DQM online and offline shifts are well suited for remote operations
- Shift Responsibilities
  - Identify detector and data quality problems using the DQM GUI and report them to shift crew (via video connection, phone, elog, run registry message board, etc...)
  - Determine data quality and update bookkeeping with Run Registry for later use in analyses
  - Work in coordination with shift takers at Meyrin and DESY, in parallel with shift takers at P5
- Demonstrated capability for covering solo DQM shifts from FNAL ROC

Data Operations

- Ensure data processing occurs
- Oversee data transfer from CERN to Tier 1 sites
- FNAL Tier 1 primary shifts taken at ROC

HCAL shift training
Fermilab Today, 2008