CDF Offline and Operations

Robert M. Harris

Fermilab CD/CDF

CDF Week

May 16, 2000

Outline

- Offline Status Report
  - Offline Organization and Management.
  - Data and Computing Systems.
  - Software Infrastructure.
  - Reconstruction and Simulation.
- Offline Operations
  - Organization and MOUs.
  - Security & access to fcdfsgi2.
  - Introduction to Mock Data Challenge 2.
- Conclusions

Offline Organization

Manage-ment
M. Shapiro
R. Harris

Data & Computing Systems		Reconstruction & Simulation		Software Infrastructure	
Farms Y. Chen S. Wolbers	**Data Handling** S. Lammel T. Watts	**Recon-struction** R. Snider E. Sexton-Kennedy	**L3 Algorithms** K. McFarland	**Framework & Integration** E. Sexton-Kennedy R.Snider	**Event Display** D. Litvinsev
Databases M. Lancaster R. St. Denis	**Central Systems** R. Colombo S. Lammel	**Simulation** P. Murat	**Trigger Simulation** S. Rolli	**EDM & Banks** R. Kennedy	**Code Manage-ment** A. Kreymer

Management

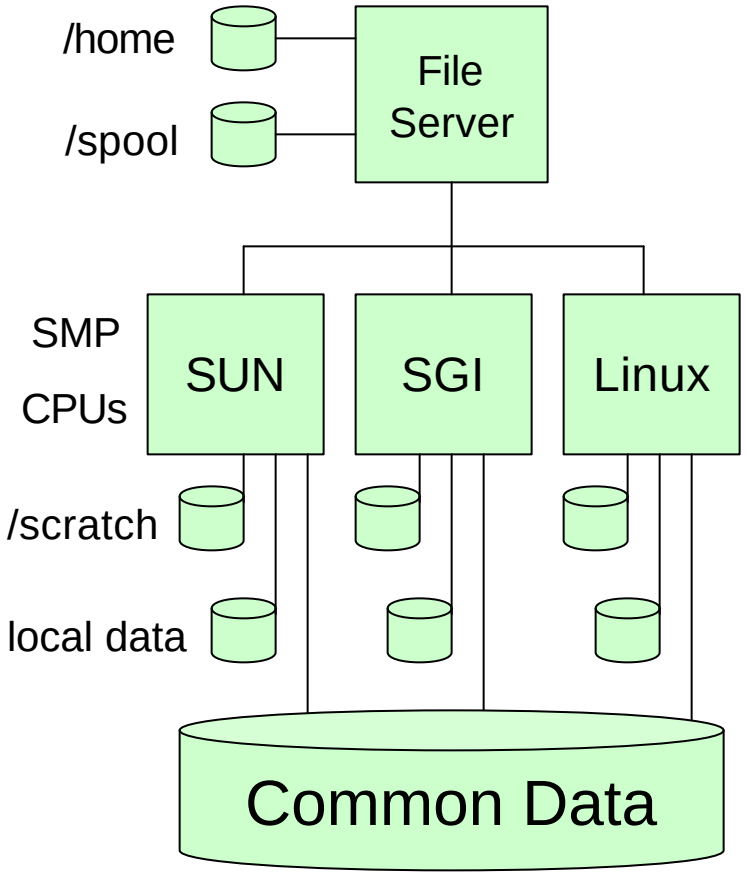
- E. Buckley-Geer and D. Amidei retire from project
  - Thanks for their years of service.
- Updated offline WBS available on offline web page
  - Result of over a dozen meetings with sub-projects.
  - Reorganized as a task list with assigned names and dates.
- Mock Data Challenge 2:
  - Pasha Murat and Fedor Ratnikov are co-coordinators.
  - Rate test of offline system scheduled to begin June 5.
- Dave Waters will be the offline consultant to online & trigger.

Data and Computing Systems

- Central Systems
  - CPU and disk.
- Databases
  - Central & remote database servers, clients & sofware.
- Farms
  - Fermilab production computing systems & software.
- Data Handling
  - Central & remote systems, tapes & software.

Central Systems

Leaders: R. Colombo, S. Lammel

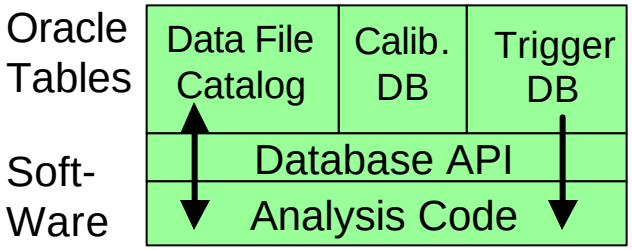


- Available Now
  - File Server
  - SGI: fcdfsgi2 (64 processors~4x cdfsga)
  - SUN: fcdfsun1 (4 processors)
  - DISK: 7 Tbytes (not Common)
- MDC2:
  - fcdfsgi2 will be used (not cdfsga).
- Commisioning Run:
  - Common data disk.
- Run 2 Start:
  - ~ Triple the current amount of CPU
  - ~ Double the current amount of disk
- Project in good shape.
  - 24 x 7 operations phase has begun.

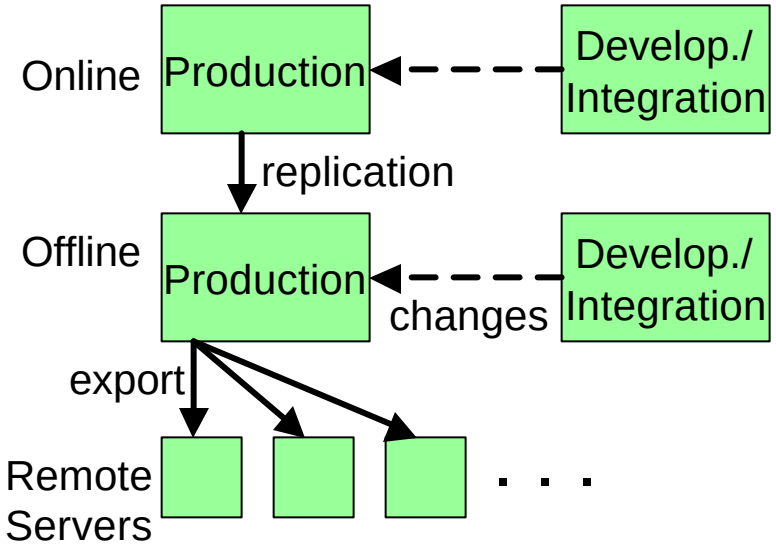
Databases

Leaders: R. St. Denis, M. Lancaster

Tables and Software



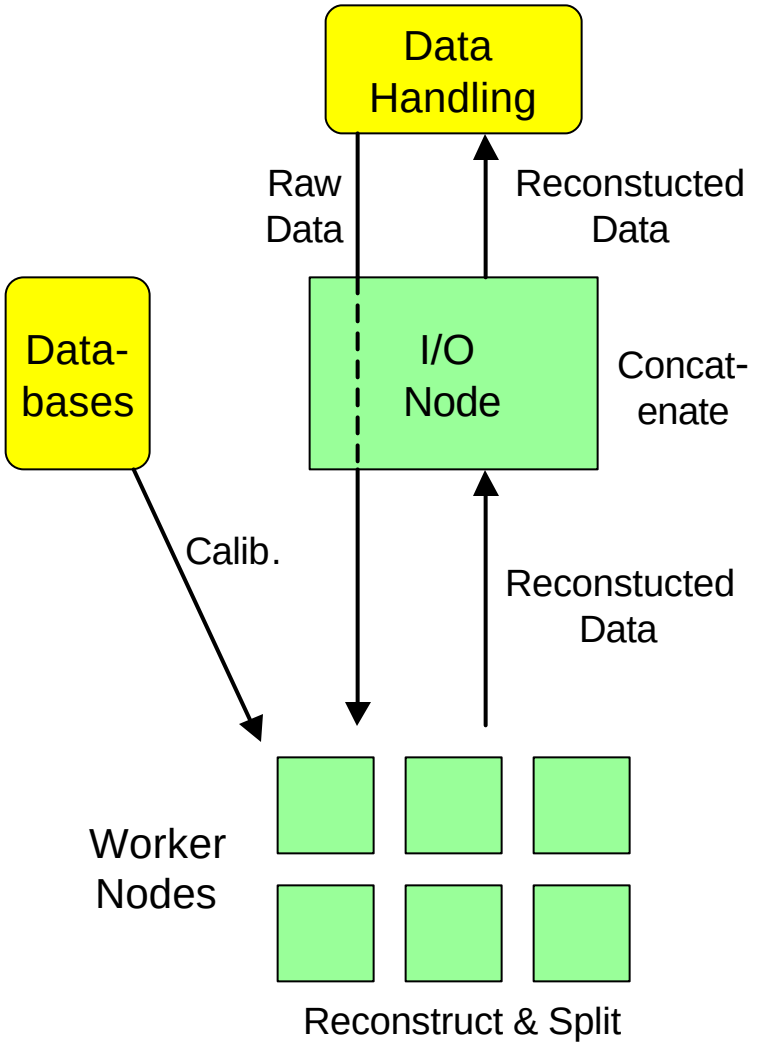
DB Servers, Replication & Export



- Available Now:
  - Temporary online and offline servers (SGIs)
  - Many examples of tables, API, & code.
- MDC2:
  - Tables and software being added.
  - 1st phase of valid set monitors.
- Commisioning Run:
  - Final online & offline servers (Suns).
  - 2nd phase of valid set monitors.
  - L1/L2 tables and software for Trigger DB.
  - Replication between online and offline.
  - Oracle/freeware remote export prototypes.
- Start of Run:
  - Remote export of databases.
- Full system planned to arrive just in time.
  - This project needs more help.

Farms

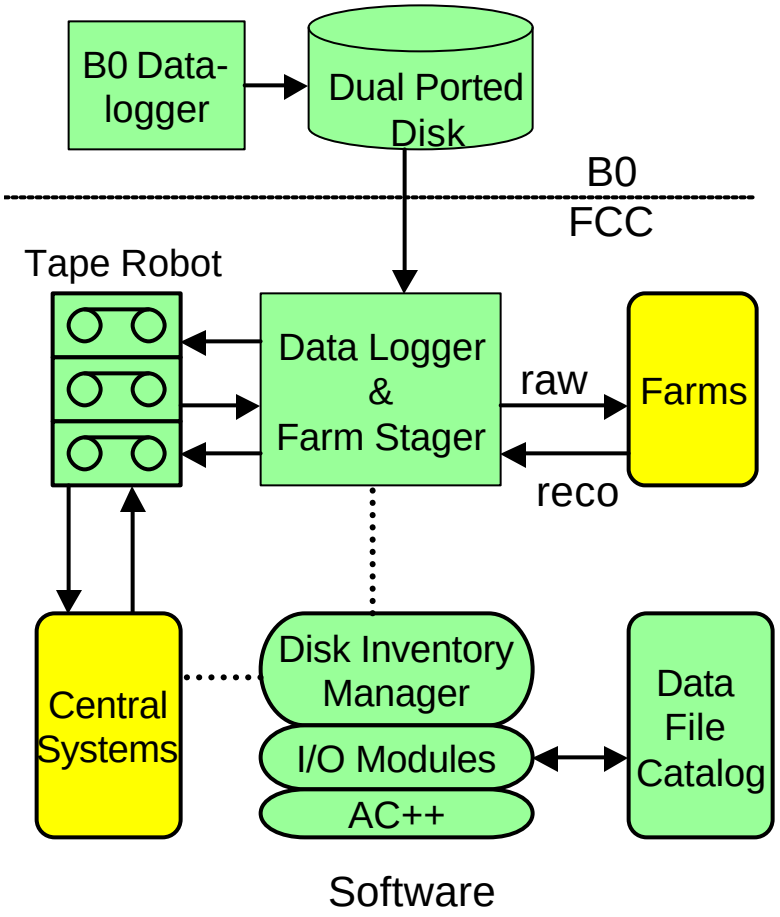
Leaders: Y. Chen, S. Wolbers



- Available Now:
  - Farm Control Software (FCS) v1.
  - Farm Batch System (FBS) software.
  - I/O node (cdffarm1: SGI)
  - 50 worker nodes (PCs running linux).
- MDC2:
  - FCS v2 with concatenator & bookkeeping.
  - Interact with DB using API.
  - Interact with new Data Handling system.
- Commisioning Run:
  - Farm Control Software v3.
- Start of Run2:
  - Farm Control Software v4.
  - 50 more worker nodes.
- Project in good shape.

Data Handling

Leaders: S. Lammel, T. Watts



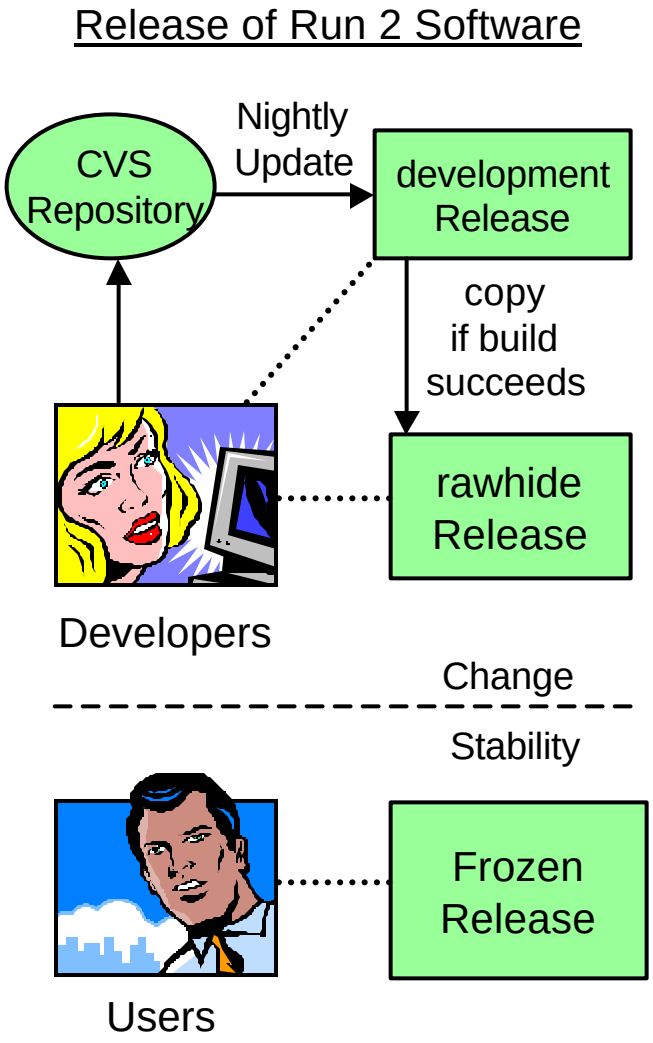
- Available Now:
  - B0 Data Logger & Dual Ported Disk
  - FCC Data Logger/Farm Stager (fcdfsgi1).
  - Tape Robot.
  - Old DIM & Old Output Module.
  - Input Module & Data File Catalog.
- MDC2:
  - B0 DL write ROOT format to XCFS filesystem.
  - 8 AIT2 Tape Drives & Media (on order).
  - Basic DIM, stripped down version.
  - Improved Output Module & DFC.
- Commisioning Run:
  - Basic DIM and Full Output Module.
- Start of Run 2
  - Full DIM.
  - More Tape Drives & Media.
- Full system planned to arrive just in time.
  - This project needs more help.

Software Infrastructure

- Code Management:
  - Releases, Distribution and Basic Validation.
- Framework & Integration:
  - AC++ and Production Executable.
- Event Data Model:
  - Banks, Objects, and File Formats.
- Event Display:
  - Root based event display.

Code Management

Leader: A. Kreymer



- Available Now:
  - CVS Repository: the latest source code.
  - Releases:
    - Development: a build of yesterdays code.
    - Rawhide: a copy of last successful build.
    - Release 3.5.0 for MDC2 simulation.
  - Development distributed daily to 58 nodes.
  - Validation of frozen releases (run w/o crash).
- MDC2:
  - Release 3.6.0. for reconstruction.
    - 1st tag next week; frozen & built June 5.
- Commisioning Run:
  - Release 3.7.0.
  - Fewer executables built by default.
  - Anonymous CVS access for users.
  - Online & level 3 to build own frozen releases.
- Project in good shape & in operations phase.

Framework and Integration

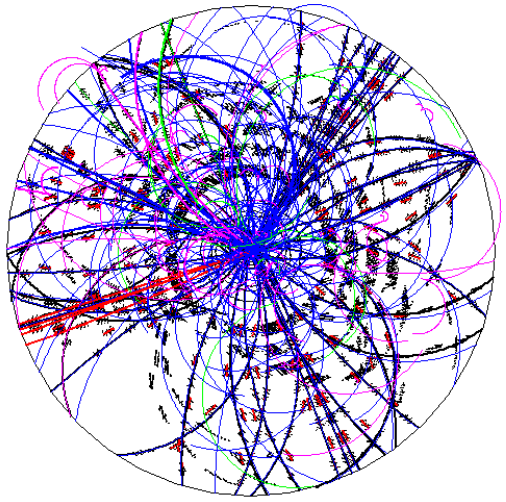
Leaders: E. Sexton-Kennedy, R.Snider

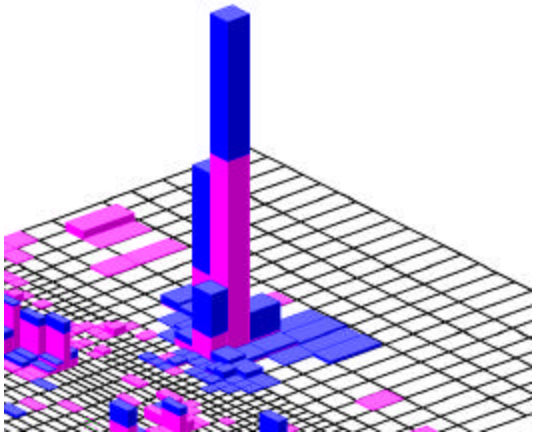
- Available Now:
  - Working AC++ framework and production executable.
  - Unified simulation and reconstruction geometry framework.
  - Calibrations read from database for Calorimetry and CMX.
  - Newly formed alignment group.
- MDC2:
  - Prototype production table and parser.
  - Policy and guide for error logging in reconstruction code.
- Commissioning Run:
  - Calibrations & alignment read from database for most detectors.
- Start of Run 2:
  - User friendly additions: Build Job++, GUI Menu Handler in AC++.
- Project in good shape.
  - alignment planned to arrive just in time.

CDFEvent Data Model & BanksLeader: R. KennedylAvailable Now:äWorking EDM that supports persistent banks & objects.äEDM for r

Event Display

D. Litvinsev





- Available Now in Root Event Display (evd):
  - Silicon.
  - COT.
  - Lego (with optional jet ID and ADC count display).
  - Muon Stubs.
  - CLC.
  - The coolest HEP web pages I've ever seen!
- Open Inventor detailed SVX Event Display (alignment).
- MDC2 & Commisioning Run
  - Wedge display of raw calorimeter data.
  - Track info in lego display.
  - User interactions
    - Refit (Track, Vertex)
    - Re-Cluster (Jets)
- Project in good shape.

Reconstruction & Simulation

- Reconstruction:
  - Calorimetry, jets, electrons, muons, silicon, tracking, . . .
- Simulation:
  - GEANT3 based detector simulation.
- Level 3 Algorithms:
  - Use of reconstruction in level 3.
- Trigger Simulation:
  - GEANT3 based simulation of Level 1 and 2 trigger.

Reconstruction

Leaders: R. Snider, E. Sexton-Kennedy

- Calorimetry:
  - All calorimeters except Mini-Plug have been integrated.
  - Working on TDC banks for CHA and WHA, and validation.
- Jets:
  - Standard cone algorithm is available now.
  - Working on new cone alg., KT alg., compressed objects.
- Electrons:
  - EM Clusters, electrons, and strip clustering in C++ exists.
  - Working on LSHR for MDC2.

Reconstruction (continued)

- Muons:
  - Linking using run 1 fortran (CMLNK) for CMX, CMU, CMP.
  - Unified Sim. & Reco. geometry framework is big progress:
    - Muon extrapolator uses GEANT3.
    - Initialisation of geometry in GEANT3 allows muon linking in C++.
  - Commissioning Run: Muon linking in C++ needs help!

- Silicon:
  - MDC2: Working on L00
  - Commisioning Run: special geometry description (ISL).

Reconstruction (continued)

- Tracking:
  - New hit-based algorithm completed
    - Should increase tracking efficiency from 95% to full efficiency.
  - Progress has been made in the final fit.
  - Commisioning Run needs code to extract t0 from tracks.
- TOF:
  - Code should be ready in time for for TOF detector.
- CLC:
  - Raw data format and calibrations done.
  - Reconstruction code beginning soon. Luminosity analysis?
- Trigger:
  - Need filter module that knows what trigger passed (TRGSEL).
- Big project in fair shape. Completion of muons is needed soon.
  - Collaboration must get more involved with reconstruction.

Simulation

Leader: P. Murat

- Available Now:
  - Working simulation using old geometry framework.
    - Fast calorimeter simulation (GFLASH).
    - Muons, Silicon, COT, TOF, CLC.
  - Prototype simulation using unified geometry framework.
- MDC2:
  - Data sample generation on farms using old simulation.
- Commissioning Run & Beyond:
  - Integrate detector elements into new simulation.
- Project in fair shape.
  - Old simulation works, new simulation planned to arrive just in time.

Level 3 Algorithms

Leader: K. McFarland

- Available Now:
  - Level 3 executable and trigger table.
  - New regional reconstruction framework.
- MDC2:
  - Modified COT regional reconstruction for new framework.
  - New interface to accommodate DAQ redesign.
  - B0 Data Logger will write events in Root format, not XXX.
- Commissioning Run & Beyond:
  - Run Control Integration:
    - Timing synchronizations to make available exec, calib & trigger.
- Project in good shape.
  - operations phase about to begin.

Trigger Simulation

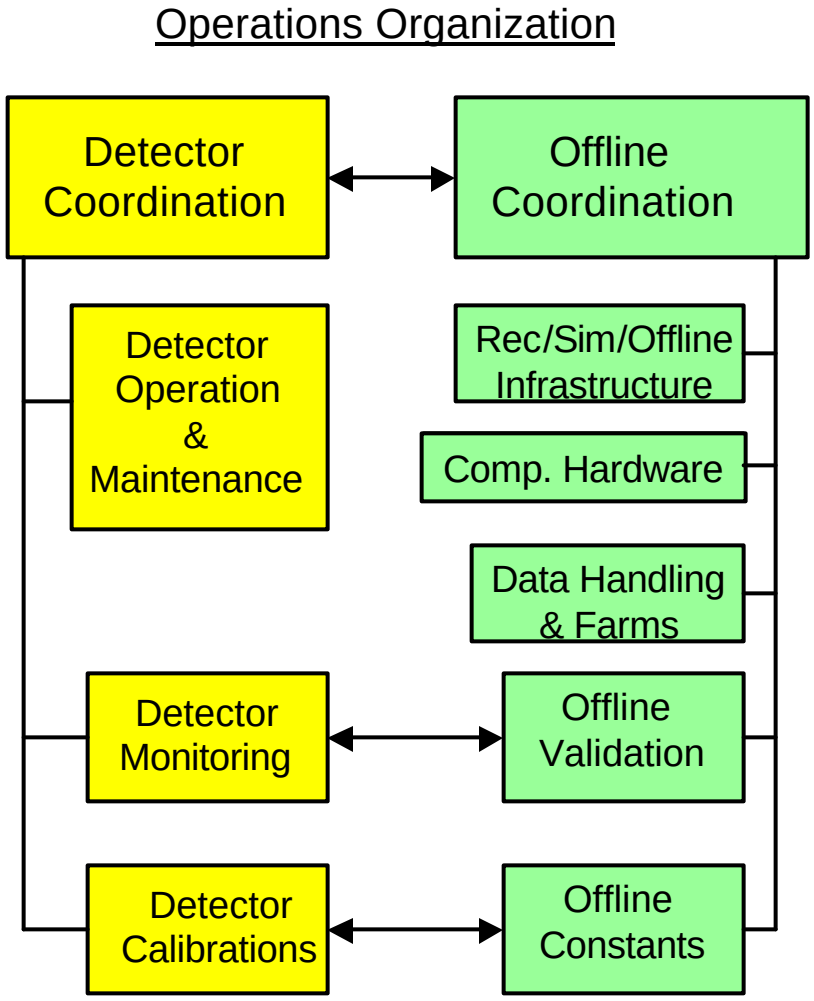
Leader: S. Rolli

- Available Now:
  - Calorimetry, XFT and SVT. Calorimetry is most advanced.
- MDC2:
  - Run L1 & L2 simulation in level 3 just before production.
  - Cal, XFT, SVT and possibly muons (CMU & CMX).
  - Not making TL2D yet, so not running as a filter.
  - First test to see that it works & provide some analysis info.
- Commisioning Run:
  - Read parameters from database (Trigger DB, Run Cond, etc.)
  - Need TRGMON to read and display more trigger banks.
- Start of Run 2:
  - XTRP simulation and L1/L2 global decision simulation.
- Project in good shape.

Offline Operations

- Organization.
- Memoranda of Understanding.
- Security & access to fcdfsgi2.
- Introduction to mock data challenge 2.

Offline Operations Organization



- Offline Coordinators:
  - One chosen by collaboration.
    - We have a strong & interested candidate.
  - One chosen by computing division (me).
- Offline Operations Projects
  - Rec/Sim/Offline Infrastructure.
    - Reconstruction, L3 Algorithms, Display.
    - Detector Simulation, Trigger Simulation.
    - Framework, EDM, Code Management.
  - Computing Hardware.
    - Central and trailer systems.
  - Data Handling & Farms
    - Data handling support & farm shifts.
  - Offline Validation
    - Code, monitor, TDSWG & physics groups.
  - Offline Constants
    - Offline calib., monitor, maintain DB API.

Memoranda of Understanding

- Operations MOUs needed between
  - CDF and the computing division.
  - CDF and the collaborating institutions.

- MOUs are needed in many areas
  - Networking
  - Central Systems
  - Data Handling
  - Farms (good draft exists)
  - Databases (draft exists)
  - Code Management (draft exists)
  - Software Infrastructure
  - Reconstruction Code
  - Simulation Code
  - Event Display

Like the detector, the offline will be operated by both the CDF Collaboration and Fermilab, and requires MOUs.

Example MOU: Farms

- Draft MOU Between CDF and CD on the Farms:
  - Sections: Preamble, Components, Upgrades, Responsible Parties,Service Levels, Change Management, Procedures, Estimated Effort.
  - The responsibilities of the following CD Departments are defined
    - CDF Computing and Analysis Department
    - Operating System and Support Department
    - Integrated Systems Development Department
    - Distributed Computing Department
  - The responsibilities of CDF is defined and broken down into two groups
    - CDF farms group.
    - CDF shifters (people taking shifts on the farms).
  - Effort is estimated for each CD Department and each CDF group.

Security & Access to Central Systems

- CDF & CD will meet to discuss remote institutions access concerns:
  - Practical modifications to full security plan will be seriously considered by CD.
- The CDF Department in CD has and will continue to insure:
  - Central systems are easily accessible by ALL collaborators.
  - Adequate security exists to avoid significant disruptions.
- The CDF Department provides:
  - Simple instructions on the installation and use of kerberos client to access fcdfsgi2:
    - This does not interfere with how you presently access other nodes, although we of course recommend you use secure connections (ssh).
  - Help with kerberos client installation or usage problems.
- Please give kerberos client a try!
  - Send any problems to cdfsys@fnal & kerberos-pilot@fnal.

Introduction to MDC2

- MDC2A Rate Test:
  - Goal is 20 MBytes/s.
    - Will attempt this for individual components, interfaces & partial chain.
    - Full chain will be limited to 6-8 MBytes/s by number of tape drives on order.
  - Schedule:
    - May 1 – 14: Standalone component testing.
    - May 15-29: Two component interface testing.
    - May 30 – June 4: Full chain testing.
    - June 5 – June 11: Rate tests
- MDC2B Data Test:
  - Goal is large reconstructed samples for physics groups.
    - 100K events to each of QCD, Top, Exotics. 3M events to Bottom.
    - Scheduled to begin on June 12 and end on June 30.
  - Good opportunity for physics groups to use offline & validate it.

Conclusions

- The offline construction project is in decent shape.
  - ➤We have made significant progress in the last few months.
  - ➤We are focused on MDC2, Commissioning & start of run 2.
  - ➤Help is needed for Data Handling, Databases & Muons.
- The offline operations project is about to begin:
  - ➤Good opportunity for new people & institutions to join.
  - ➤MOUs will be written to formally clarify responsibilities.
- Please use the run 2 offline and improve it!
  - ➤Students & physics groups need to participate in validation.