Run II Department

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Fermilab

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Motivation

- The CDF and DO Computing and Analysis departments were merged Aug 1, 2004
  - Exploit commonalities between the two experiments, encourage common solutions
    - Understanding and recommending common solutions requires understanding of both experiments' systems, model, constraints.
    - Preparing for the long term future in which the experiments still need support and highly functional computing, with efficient support.
  - Combined system administration to increase the depth of support and gain economies of scale.
  - Continue Joint projects data handling
  - Combining management and reporting duties
    - Larger departments have more natural substructure, which leads to distributing some management responsibilities, centralizing others
  - Sensitivity to both experiments needs vital
  - Running Experiments Department
    - Run II Department has combined with EXP Support to include MINOS and MiniBoone
  - This talk is covering Run II aspects only.

Run II Department Roles
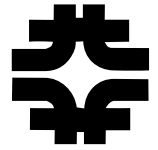
- Experiment specific support

- Production

- Data handling

- System administration

- Budget administration, line management, activity management

- CDF Online -> DO Online + MiniBoone

Production and Offline Support
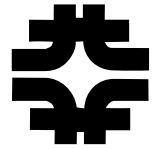
14 FTEs in the Run II Department plus 1.5 FTE for database development and 0.5 FTE for DO Reconstruction Task force (16)

- Experiment specific tasks
  - Experiment Management (operations, physics, computing, software)
  - Offline Code development and releases
  - Experiment specific database
  - Preparing and Running Production executables
  - Includes Guest Scientists and Visitors needed to leverage experiment expertise
  - Physics Analysis

Data Handling Operations Effort
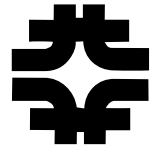
7 FTEs in the Run II Department plus 2 FTE direct support from other depts + 2 hires (11). This effort has been reduced by 2 FTEs in the past year

- Ongoing development to improve the services to improve maintainability and robustness and longevity

    Increased reliance on Grid efforts

    – Improved monitoring for users and experts

- Daily operations for both experiments for SAM and dCache

   – CDF requires more day to day operational support

# System Administration/Online
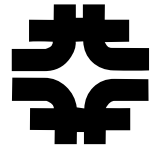
9 FTEs + 3 hires (12 FTEs)

- 24/7 operations for critical systems
- Sizable operational plant
  - 1400 (+520) worker nodes
  - 200 (+42) fileservers
- Introducing and perfecting automation
- CDF desktop support
  - Security issues
- CDF online became a CD responsibility in FY2005, work combine operations with D0 online—2 positions transferred from PPD
- Have been running short-staffed, but are training new hires and transfers

Remedy tickets

Legend: CAB Hardware | Disk server hardware | Helpdesk tickets | D0mino hardware
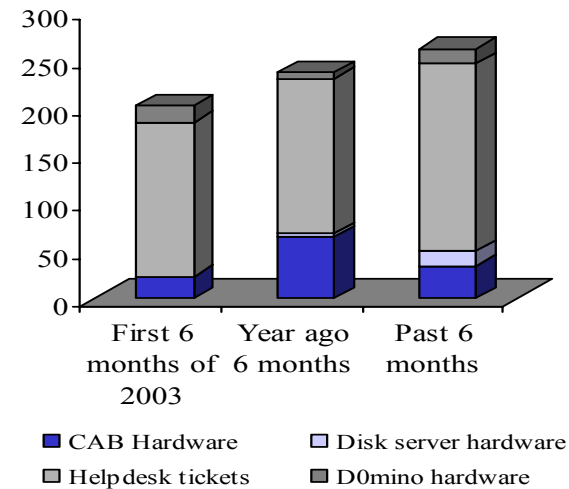
Using Remedy system tickets/hardware/year tracking in this way helps us to understand which and how to mitigate operational issues .

CD Central Support
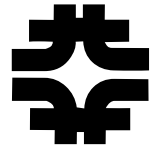
- Discussed in other talks
- Provides operational support
  - Database systems
  - Farms
  - Hardware evaluations
  - Networking
  - Robotic storage
  - Facilities
  - General services: Equipment pool, e-mail, linux support, contract support, customer support
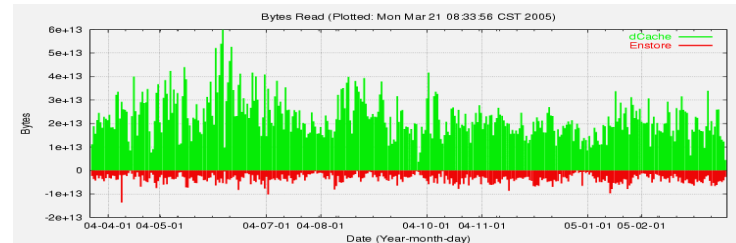
DCache and Enstore Reads/day for CDF for the past year

- Refining systems and evaluating hardware and scaling issues for all consumers and streamlining operations.
- CD evaluates and provides common tools to allow for uniform maintenance and operation of large systems.
- CD provides services that allow experiments to use common solutions as they move towards global and grid computing
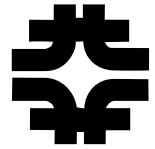
Budget
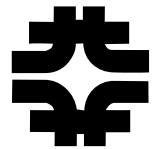
SWF:

Corresponds to 37 FTEs for computing

		FY04 ACTUAL BASE	FY05 BUDGET	FY06 PBR	FY07 FLAT TO PBR	FY08 FLAT	FY09 FLAT
1.1	Accelerators	0.0	0.0	0.0	0.0	0.0	0.0
1.2	Collider Experimental Program	18,383.4	18,673.6	17,526.5	17,541.2	17,532.8	17,693.0
1.2.1	CDF	6,769.7	6,789.2	6,089.3	6,109.8	6,087.2	6,131.5
1.2.1.1	CDF Operations	5,582.2	5,934.0	5,871.2	6,082.9	6,087.2	6,131.5
1.2.1.4	CDF Run IIb	1,187.5	855.2	218.1	26.9	0.0	0.0
1.2.2	DZero	7,885.5	8,372.5	7,652.8	7,501.9	7,476.8	7,527.1
1.2.2.1	Dzero Operations	6,652.9	7,206.8	7,257.8	7,475.3	7,476.8	7,527.1
1.2.2.4	Dzero Run IIb	1,232.5	1,165.7	395.0	26.6	0.0	0.0
1.2.3	Run II Computing	3,544.3	3,330.9	3,736.1	3,929.5	3,968.8	4,034.4

M&S

|		FY04 ACTUAL BASE	FY05 BUDGET	FY06 PBR	FY07 FLAT TO PBR	FY08 FLAT	FY09 FLAT
1.1	Accelerators	0.0	0.0	0.0	0.0	0.0	0.0
1.2	Collider Experimental Program	9,189.3	7,928.5	6,812.2	6,782.2	5,316.4	5,351.6
1.2.1	CDF	2,347.8	1,838.2	1,746.1	1,731.1	1,486.6	1,492.3
1.2.1.1	CDF Operations	1,370.1	1,778.2	1,746.1	1,731.1	1,486.6	1,492.3
1.2.1.4	CDF Run IIb	977.7	60.0	0.0	0.0	0.0	0.0
1.2.2	DZero	3,245.2	2,625.0	1,600.8	1,585.8	1,335.8	1,335.8
1.2.2.1	Dzero Operations	1,719.1	1,576.0	1,600.8	1,585.8	1,335.8	1,335.8
1.2.2.4	Dzero Run IIb	1,526.1	1,049.0	0.0	0.0	0.0	0.0
1.2.3	Run II Computing	3,596.2	3,465.3	3,465.3	3,465.3	2,494.0	2,523.5

Budget

- 39 FTE of direct support (-2 as ongoing projects end)
- Approximately 36 FTEs direct support through 2009
  - Responsibilities likely to increase with constant staff
- Equipment
  - 2004—"Tax" for supporting new Grid Computing Center
  - Making M&S budget cover needs requires experiment choices
  - Use CDF/DO/CMS/General resources to form Fermigrid
- Operating--$150K/year/experiment
  - Supports Tape Budget
  - Experiment choices also need in this area.
- Maintenance
  - Have largely moved off the large SGIs
  - Robotics and Database machines require costly maintenance contracts

Risks to Run II

- Increased demands on FNAL CD as migration of university effort to LHC
- Scaling with data sample size might have unanticipated consequences
- Operational performance of new hardware elements, Moore's Law deviations, experiment code
- Longevity of hardware components and software applications
- Living within the limited budgets requires increasingly choices and increased risk.

Summary
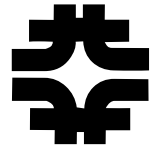
CD effort and expertise is required to cover a spectrum of tasks.

- Evaluating taking on more responsibilities from the experiments where we think there can be economies of scale.
- Looking for efficient and productive ways to share expertise

- Conscious effort towards streamlining operations
  - Learning and prioritizing
- Looking forward to meeting the challenges that the future will bring.

RUN II Department Roles

- Operations—Running the systems, standing pager rotations/shifts, researching latest technologies
  - purchasing and deploying equipment
  - tracking down and fixing problems
  - code management
- Development—exploring use cases, writing code, introducing new features, testing, documenting, exploring technologies
- Integration—testing, more testing, training users, transition from development to operations
- Planning—how best to use resources to meet stakeholder needs, facility issues
- Interfacing – Serve in experiment management roles, bridging the CD and the experiments, CD department to CD department, hosting guest scientists
- Participate in physics analysis as collaboration members -- 30% of department FTEs hold scientific positions

Risks, expanded

- Increased calls on FNAL CD as migration of effort and equipment to LHC
- Declining equipment and operations budgets are already limiting the data collection rate.
  - Over time, limits in the equipment and operating budget will create delays
- Operational performance of user code
  - DO reconstruction code performance and release turn-around
  - CDF user code has caused inefficiencies on the CAF
- COTS Computing
  - Experiments need best price/performance, which introduces risk.
  - Moore's law
  - Have a good process in place for evaluation, purchase and acceptance.
  - Each purchase of worker nodes presents challenges
    - FNAL CD plays engineering/integrator role by default
  - Commodity fileservers are maintenance intensive

Risks, expanded

- Data Handling
  - SAM system, dCache, hardware working well
  - User patterns are still evolving, sometimes conflicts between wanting to get results out and using standard production.
  - Scaling with data sample size might have unanticipated consequences.
  - Count on next generation tape drives to mitigate tape costs
- Longevity of hardware components and software applications
  - Starting to use a 4 year replacement cycle for worker nodes so the equipment is off warranty the final year.
  - 5 year life cycle on major components, replacement needed again around 2010 when budget for Run II will be extremely limited.
  - Migrating either experiment from existing mode of operation or user interfaces would be time intensive and costly.