MOCK DATA CHALLENGE 1

CDF Run II Offline

January 28, 2000

Tony Chan CDF Farms group

OUTLINE

- Introduction
- Hardware configuration for MDC-1
- Software for MDC-1
- The MDC-1 Chain
- Results & Conclusions
- Future plans

INTRODUCTION

- The purpose of MDC-1 is to test the ability of the integrated Run II software to function together. It is a continuity and integration test.
- MDC-2 will feature a rate test and a robustness test of the system.
- Several new software packages were implemented for MDC-1.
- Significant manpower from Level 3 and Offline groups dedicated to integrating Run II software for MDC-1 and making sure it works.
- The CDF Farms group used a prototype farm system for MDC-1. This prototype farm is dedicated to Run II testing.

HARDWARE CONFIGURATION FOR MDC-1

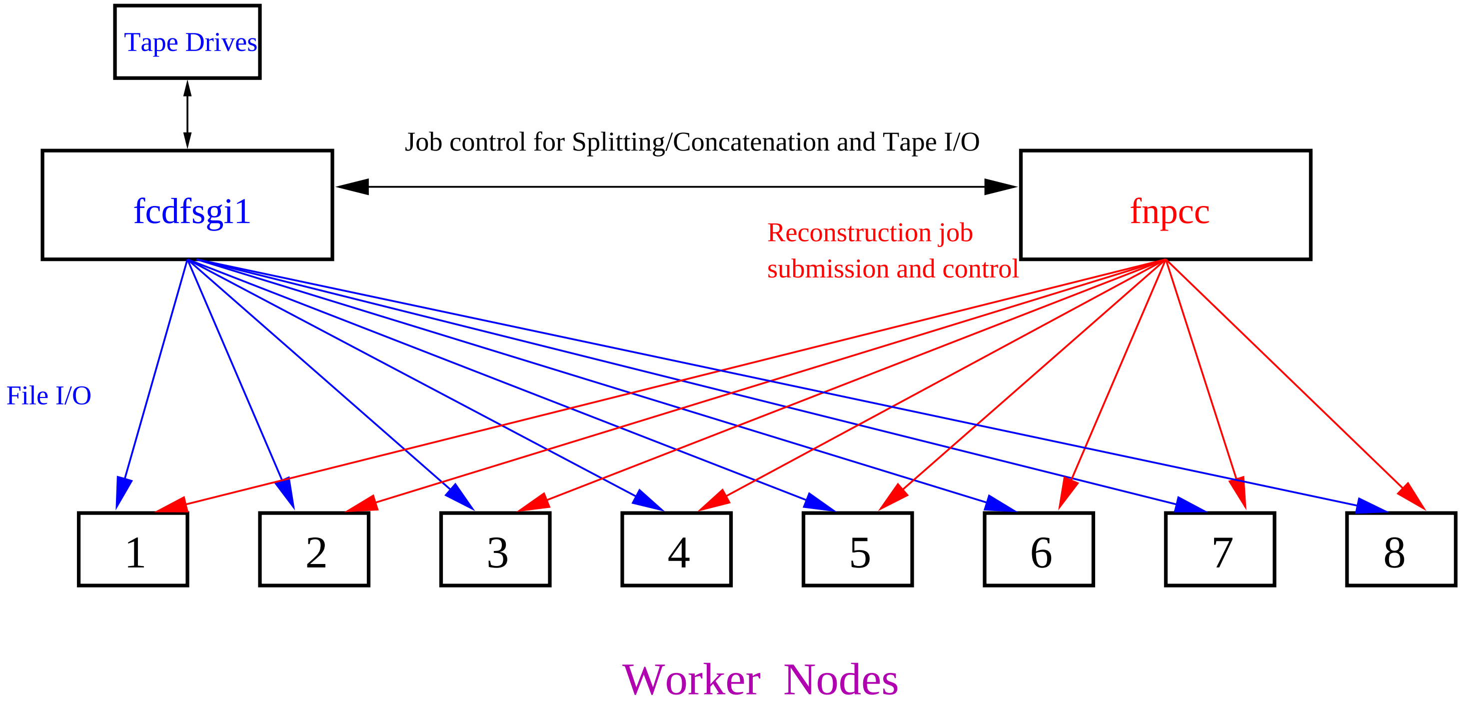
- Level 3 farm of 32 dual Pentium-II 500 MHz CPU's running Fermi RedHat Linux. For MDC-1, 7 of these nodes were used.

- The prototype farm system is made up of 18 nodes (14 worker nodes and 4 control nodes), each with dual Pentium-II 400 MHz CPU's. The OS is Fermi RedHat Linux. For MDC-1, CDF used 8 worker nodes and 1 control node.

- New SGI node with 4 R12000 300 MHz CPU's used by Farms and Data Handling group. It is connected to the tape drives attached to the robot.

- For MDC-1, the I/O-type Linux machine (fnpcc) is the control/build node and monitoring system. The SGI (fcdfsgi1) performs data I/O, data handling and tape I/O functions.

Set up for Mock Data Challenge 1



Tony Chan

CDF Farms group

CDF MASS STORAGE SYSTEM

SOFTWARE FOR MDC-1

CDF-Specific Software

- Used standard Run II software from CVS repository.

- Monte Carlo data (500K events) produced with Run II simulation code. Sample includes top, W/Z, jets, $B\overline{B} \rightarrow J/\Psi$, and Higgs + SUSY.

- Data organized in a structure similar to expected Run II conditions (run number, run sections, file-name conventions, etc).

- Level 3 executable processed Monte Carlo events and wrote Level 3 trigger bits in event data structure.

- B0 and FCC Dataloggers collected and transferred data from Level 3 PC Farms to MSS.

- Data File Catalog (DFC) recorded information from Level 3, Data Handling and Farms during data processing.

- Production executable reconstructed Level 3 data on the prototype farm system and created inclusive data files.

- Farms control software used to integrate CDF-specific software and external software and to control/monitor data processing in the farms.

- Data Handling Output module split and concatenated inclusive files into output streams.

- Data Handling Tape Daemon collected physics streams file by file, formed filesets and wrote filesets to MSS.

Major Software Packages

- The Run II software used GEANT 3 for the CDF detector simulation.
- Farm Batch System (FBS) was used in the prototype farms for job submission, monitoring, etc.
- Farms Inter-Process Communication (FIPC) package was used for inter-process communication and network traffic control in the Farms and Data Handling software.
- ORACLE was used by the Data File Catalog and Calibration as the primary database system for MDC-1.
- The Event Data Model (EDM) used a new ROOT-based data storage mechanism for MDC-1.

Major Milestones completed in MDC-1

- Successful upgrade of EDM to ROOT in Run II software.
- Implementation and testing of new Data Handling software (DIM, DH Input and DH Output modules, Dataloggers, MSS interface, etc).
- Inclusion of major reconstruction (tracking, calorimetry and muon) components in Level 3 and Production executables.
- Implementation of an ORACLE-based Data File Catalog.
- Implementation of Farms control software in the prototype farm.
- Most important of all, the successful integration of all Run II software for MDC-1.

FARM BATCH SYSTEM

1) The Farm Batch System (FBS) is a software package developed by CD. It is designed for a farm architecture with all the traditional tools such as job submission, job queuing, load balancing, etc.

2) FBS was first released (v1.0) in Nov. 98 for evaluation by the users. Based on these evaluations, FBS v2.0 was released in April 99. FBS v2.1 was released in July 99 with further improvements. FBS v.2.2 was released in January 00.

3) CDF, D0 and fixed target experiments have adopted FBS as their farm batch system. It has become an official FNAL product.

4) More detailed FBS documentation can be found in http://www-hppc.fnal.gov/fbs/fbs.html.

FARM INTER-PROCESS COMMUNICATIONS

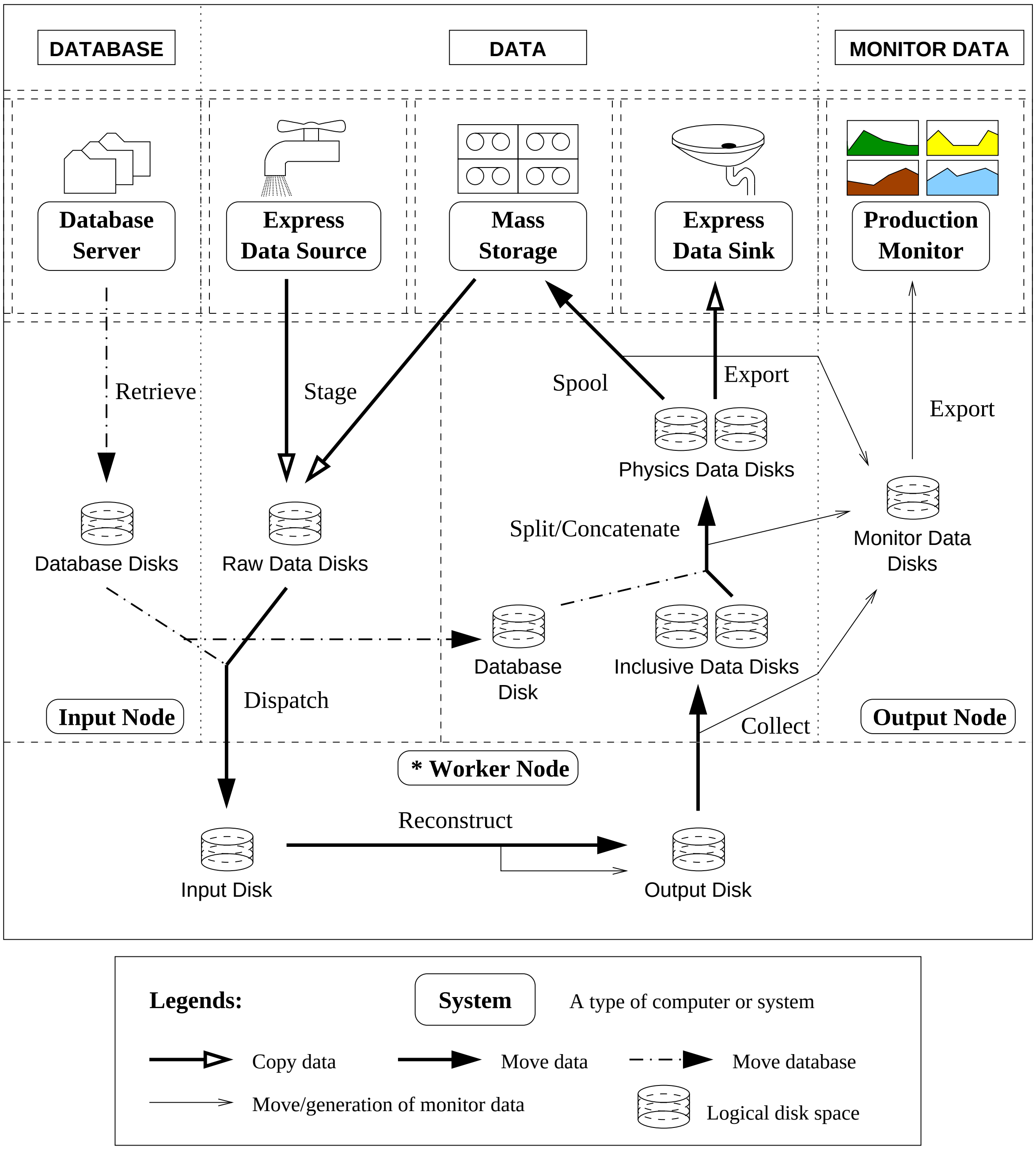
1) The Farms Inter-Process Communications (FIPC) software package was developed by CD to address the need for inter-process communication and network traffic control in a parallel-computing environment.

2) Both CDF and D0 have been evaluating FIPC. The general reaction has been positive and FIPC has recently become an official FNAL product.

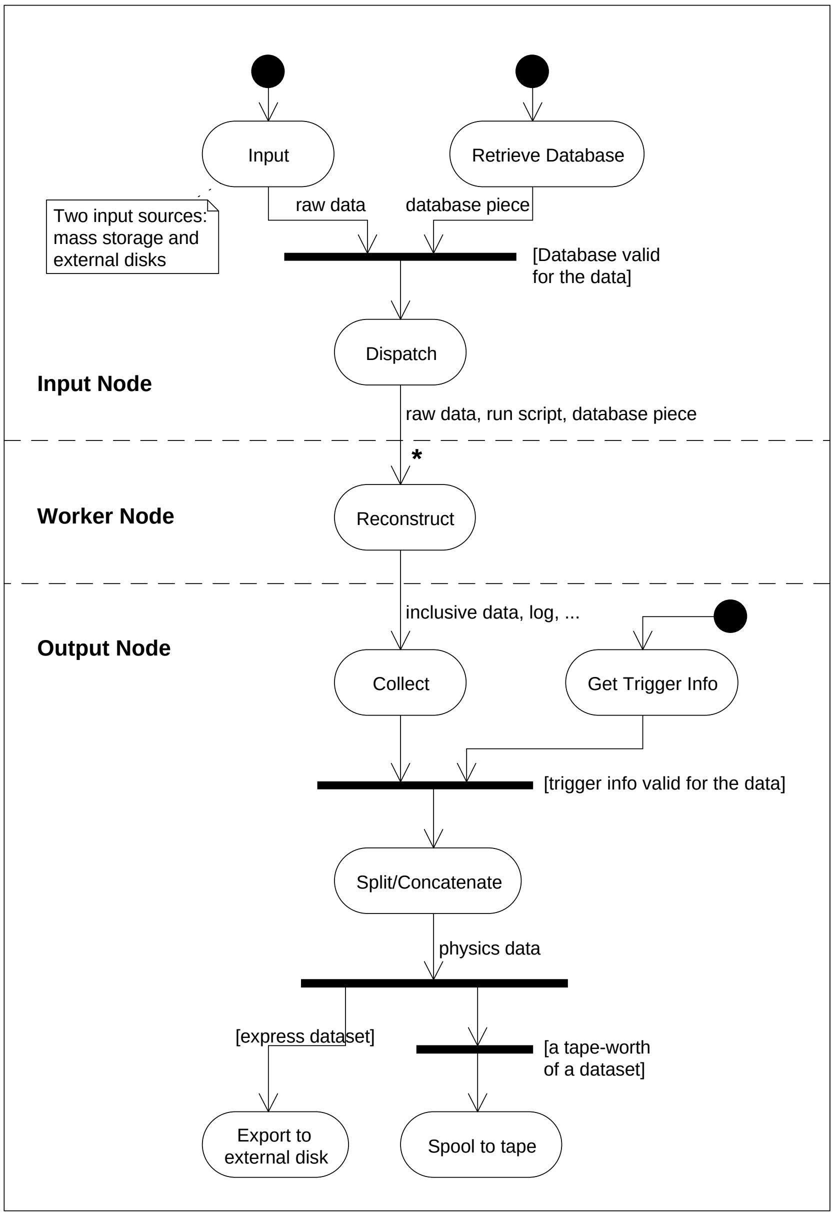
3) FIPC (v1.0) was first released in May 99. We are currently using v.1.3, which includes a GUI for control/monitoring purposes.

4) More detailed FIPC documentation can be found in http://www-hppc.fnal.gov/fipc/FIPC.htm.

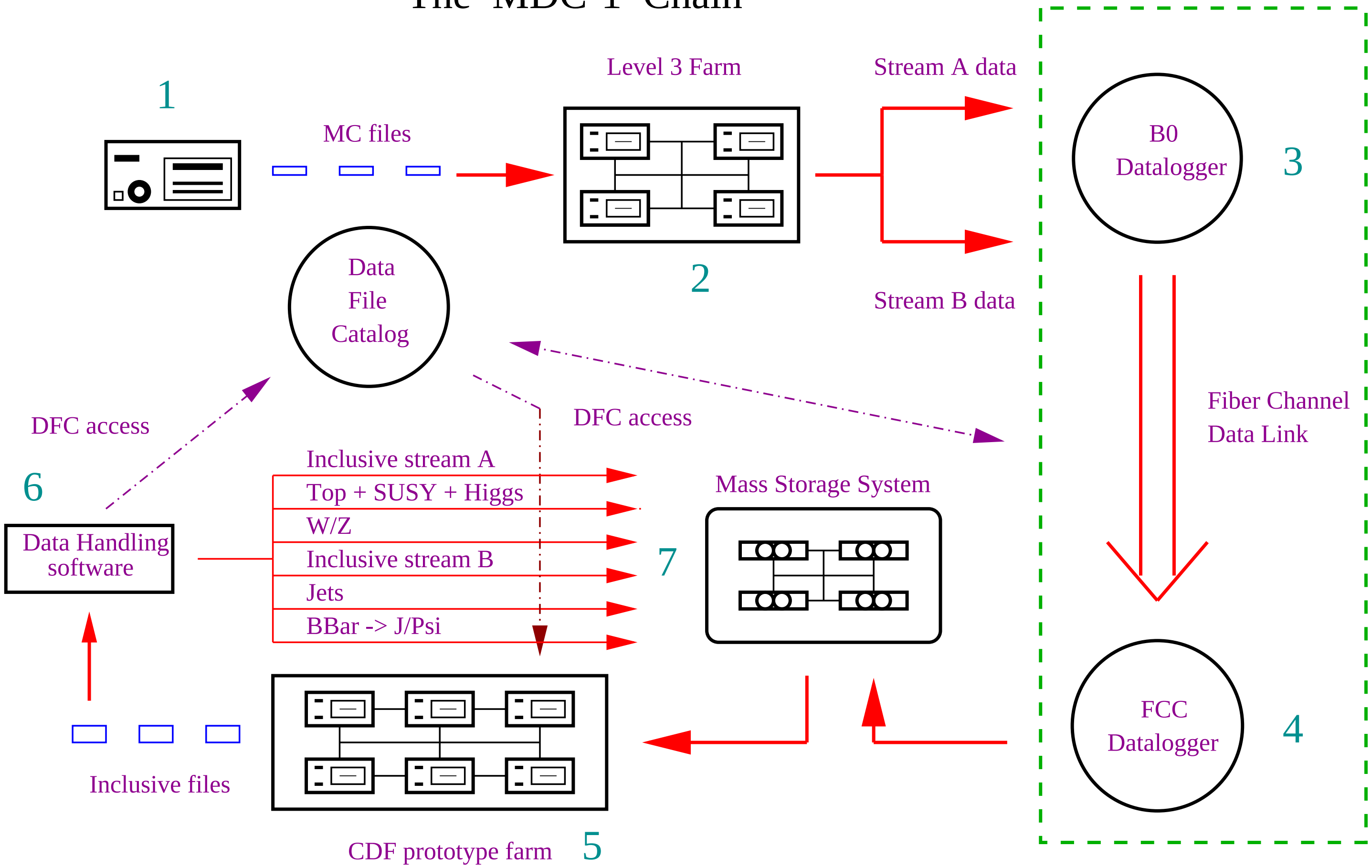
Conceptual Model of Run 2 Production System



Tony Chan CDF Farms group


Input
Retrieve Database
Two input sources: mass storage and external disks
raw data
database piece
[Database valid for the data]
Dispatch
Input Node
raw data, run script, database piece
*
Worker Node
Reconstruct
inclusive data, log, ...
Output Node
Collect
Get Trigger Info
[trigger info valid for the data]
Split/Concatenate
physics data
[express dataset]
[a tape-worth of a dataset]
Export to external disk
Spool to tape

The MDC-1 Chain



Tony Chan

CDF Farms group

RESULTS & CONCLUSIONS

- The MDC-1 versions of Run II software allowed us to exercise the entire data processing chain.
- MDC-1 allowed the CDF Level 3 and Offline groups to test, identify and address some of the problems and potential problems in the data processing chain.
- Most problems in MDC-1 related to integrating new software into the data processing chain.
- We processed $\sim$ 120 GB of data through the prototype farms in $\sim$ 24-CPU hours. The continuity and integration test was successful.
- The output of MDC-1 will be on tape and available for physics groups soon.

FUTURE PLANS

- The first batch of 50 worker nodes for CDF was delivered in October of 1999. It will be available to CDF soon.
- We have finalized the general requirements for the farm I/O node, and we have initiated the acquisition process.
- Continue to improve Level 3, Farms control, Data Handling, Database access software.
- Find more manpower for Offline effort.
- Begin preparations for MDC-2 early to minimize integration problems in the data processing chain.

Run II Farm