Introduction

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Plan for the Day

(Agenda for the day will go here)

Outline for this talk

- Goals/requirements for the farms
- Overview of system (H/W and S/W) designed to meet the goals
- Milestones
- Beyond 2 fb^{-1} (scalability)

Goals/Requirements for the farm

- Sufficient capacity to keep up with data taking
  - Reconstruct events
  - Split output into physics PAD datasets
  - Numbers later
- Capacity for some reprocessing
- Easy configuration and reconfiguration of processing
  - To meet changing priorities
  - To allow efficient use of the resources
- Excellent bookkeeping
  - To figure out what is going on
  - To be able to repeat reconstruction
- Excellent error handling and error prevention
- Others will be mentioned by Ping when he discusses the software design.

Farm Design

- High Level View of Design


Raw Data
20 MB/s
The Farm
Inclusive
Pads +
Physics Pads

CPU Power Required for worker nodes

- Using TDR and DMNAG numbers
  - 28 Hz DC average (75 Hz peak)
  - 1200 MIP-s/event ((1200/223)x16.9 = 90.9 SpecInt95-s/evt)
  - 28 Hz x 90.9 = 2,545 SpecInt95
  - Assuming 70% efficiency of use one needs 3,636 SpecInt95
- Worker nodes
  - Dual Pentiums are the proposed worker node choice
  - Dual PIII/500 are rated at 20.6 SpecInt95
  - For reconstruction alone one needs 3636/(20.6x2) = 88 Duals
- Other CPU needs
  - Uncertainty in processing (1818 SpecInt95)
  - Reprocessing (1818 SpecInt95)
  - Monte Carlo (1818 SpecInt95)
  - TOTAL : 9090 SpecInt95
- This leads to a probable size of 220 duals

I/O node(s)

- The I/O node(s) has two major jobs
  - Move Data from Tape to and from worker nodes
  - Split and Concatenate farm output into physics datasets

- CPU estimate for I/O node
  - Tape I/O (31 MB/s): 6 SpecInt95
  - TCP/IP (25 MB/s): 35 SpecInt95
  - Administrative : 8 SpecInt95
  - Split/Concatenate : 25 SpecInt95
  - TOTAL : 74 SpecInt95
  - A 4 processor O2000 should work

- Disk Requirement estimates
  - Disk rate : 20 MB/s input (tape + TCP/IP)
  - Disk rate : 5 MB/s output (TCP/IP)
  - Disk rate : 11 MB/s output (tape)
  - Input : 500 GB
  - Output : >1 TB

Milestones

- Major milestones
- October, 1998 : Prototype farm acquired
- November, 1998 : CDF executable runs on prototype
- February, 1999 : 14 node test
- July, 1999 : 1st version of software available
- October, 1999 : I/O node (O2000) available for farms
- September, 1999 : 50 worker nodes delivered to lab
- October, 1999 : Mock Data Challenge 1
- February, 2000 : Mock Data Challenge 2

Beyond 2 fb^{-1}

- To increase the capabilities of the farms to handle an increased data rate the whole system has to scale.
- CPU
  - Faster boxes
  - More boxes
  - Need to worry about network bandwidth/switch capacity/etc.
- I/O
  - Faster or more tapedrives
  - Need increased disk I/O
  - Need more disk space
  - CPU for splitting, etc goes up
  - Network
    - 10 Gbit ethernet
    - Multiple Gbit ethernet
  - More I/O nodes
- Software
  - The software is modular and should scale without major changes