Tape Robot Strategy at FNAL

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History of Tape at FNAL

Fermilab has a well established model of heterogeneous technologies served by a common software layer (Enstore)

- Enstore Entered Service in 1998
  - Currently used by all experiments at FNAL to manage robotic storage
    - One instance for DZero, one for CDF, and one for the running and preparing experiments: CMS, MINOS, SDSS, etc.
- Enstore is deployed on robots from STK and ADIC
  - 6 Powderhorn silos, 1 ADIC with 3 quadratowers
  - Space for 45k tape slots
  - Over 3Pb under management
- A variety of drive technologies
  - STK, LTO, DLT, 8mm
  - Currently STK 9940A and B, LTO 1 and 2, and legacy DLT are still in service

Technology Choices

Robots

- FNAL has an ADIC robot in storage with 4 quadratowers.
- Two robotic arms. Space for 20k tapes
- Possible to reassemble in FY2006
- Commitment from FNAL to provide storage for its experiments needs
- Establishing new tape room in Grid Computing Center (GCC)
- Evaluations of what to procure to meet the continued needs of CMS and other FNAL activities are on-going

Drives

- Technology preference at the moment is LTO-3
  - Historically media cost is favorable to other solutions
  - Performance and capacity and comparable
  - Operational Experience is good.

Capacity Planning

CMS Computing TDR estimates for a Tier-1 Facility in 2008 are 2.2PB of active tape storage

- FNAL is approximately 2 nominal Tier-1 centers for 4.4PB of tape storage in 2008
  - Estimated growth of approximately ~2PB per year
  - Includes raw, reconstructed, analysis and simulation data

The largest tape procurements occur in the final year of the ramp-up: 2007

- 20k slots represent contingency for CMS with adequate network
- The total tape capacity for CMS at FNAL is a increase over the existence capacity, but we believe we understand how to commission tape facilities
  - As a shared facility, the additional robotics will have been commissioned for Run2.
  - Mainly the addition of tapes and drives

CMS expects to contribute to cost of robotic storage starting in 2007

- Approximately 20 tape drives and movers.

Costs

Current Facility Planning calls for spending $1.2M on robotic storage, tape media, and tape drives.

- Approximately $380k was identified for dedicated robotic space or a CMS contribution to a larger robotic space
- $300k was identified for tape drives
- The remainder is media cost

This assumes an expected reduction in the cost per gigabyte of storage media and a modest decrease in drive cost