

# *High Performance Storage System*

## *HPSS 7.1 Candidates*

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# List Of Major Candidates for 7.1

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- Small Files
- VFS
- SAN (should be in 6.1 and 6.2)
- Multiple Distributed Movers
- Miscellaneous



# Small files - What are the issues?

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- Small File Insertion Rates - improved by 5.1, but still needs more
- Metadata overhead - very small files can have more metadata than data
- Small file tape performance - limited by buffer flushing and TM writes



# Tape Performance Options

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- Add tape aggregation to HPSS. A number of options are under consideration.
- Tape aggregation via a third party. Use a third party solution integrated with HPSS to solve the problem.



# Third party tape aggregation

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- LANL working on an interface between the HPSS mover and TSM. Looks like tape device to HPSS.
- Virtual tape systems. At least one new effort in this area with "tape aggregation" is ongoing.
- New company will announce virtual tape and library emulation based purely on disk store.



# Tape aggregation in HPSS(Options)

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- Add batch migration capability to existing HPSS migration mechanisms. Has been looked at and will present challenges.
- Store small files as BLOBS in DB2. Presents problems in relation to load and limitations of logging BLOBS in DB2. Also becomes an issue in terms of how large databases become.



# Tape aggregation in HPSS(cont.)

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- Store files in a POSIX file system rather than HPSS disks. Either batch migrate the files by modifying existing HPSS capabilities or build a tape aggregation server. Storing files as POSIX files simplifies the code for tape aggregation. Storing files in POSIX file systems at level 0 has been prototyped in HPSS 4.5.



# Small file insertion rates(Options)

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- Prototyping of storing files in POSIX file system indicates significant performance can be gained here.
- Storing small files in DB2 should be significantly faster.
- Consider modifications to mover and core server to streamline existing process to speed performance.



# Metadata reduction(Options)

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- Third party tape aggregation solutions can help at best partially.
- Adding tape aggregation to HPSS would significantly decrease the metadata footprint.
- Storing small files in a POSIX file system may further reduce the metadata footprint.



# VFS(Virtual File System)

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- Build a LINUX based VFS for HPSS.
- Post 6.1 requirement that has already had some limited work.
- Somewhat complex, will require a good implementation to achieve good performance.
- Long term changes to HPSS needed. Allow variable size storage segments for a single HPSS file.



# Multiple Distributed Movers

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- Manage HPSS devices with more than one HPSS mover.
- Select mover based on client/device affinity.
- Fail over to alternate mover following admin action.
- Load balance across movers(primarily disk movers).



# Miscellaneous enhancements

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- MPS enhancement to increase migration performance when using multiple requests.
- Dynamic device add/delete
- Grid FTP capability(Argonne working)
- Advisory quotas(LBL has this based on accounting and GateKeeper)
- Improve disk allocations algorithms



# Miscellaneous enhancements(cont.)

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- File lifetimes (LANL has considered doing this locally).
- Improved disk allocation algorithms.



# Schedule for HPSS 7.1

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- Current focus is on getting HPSS 6.2 by 1<sup>st</sup> quarter 2005.
- Design and planning for HPSS 7.1 will start when HPSS 6.2 goes into system test phase(October 2004).
- Tentative release date: 4<sup>th</sup> quarter 2005 or 1<sup>st</sup> quarter 2006.

