Open Archive for Big Data and Supercomputing

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Big Data and Supercomputing

● When did Supercomputing “reach the masses”
  ● When compute costs dropped (for a GFLOP) from $1 trillion to 12¢ on a chip
  ● Complexity of Data Creation Applications grew exponentially
  ● Ability to “model the world” became “possible” with better sensors

● The results: Big Data – All the data in the world**
  ● 2005 -- ~125 Exabytes (EB) = 125 Billion Gigabytes (GB)….
  ● 1 Zettabyte (ZB) in 2010….

● Today (2014) ~4 ZB (based on doubling every 2 years since 2010)
What is Supercomputing? Is Multi-tier Data Protection and Archiving Needed?

- Divided into two categories
  - **HPC** – Traditional
    - Laboratories, Research, Defense – *Need specialized compute machines*
  - **Commercial** – All different arenas
    - Life Sciences, Earth Sciences, Video Surveillance, Energy, … – *need a lot of compute power but can be non-architecture locked*

- And when considering archiving/preservation, not all data (even Supercomputer data) is equally interesting all the time

- Tiered data management needed more today than before
  - The desire to “repurpose” data rather than recreate it
  - Challenge to understand and make use of the mountains of information require physically organizing the data better
What is Lowest Cost Tier?

- Recognizing data has a “time value” allows to organize it
  - Highest Value – SSD, high performance disk systems
  - Ongoing Value – Denser disks, object storage, “Selective Cloud”
  - Preservation and Archiving – Long term archived data on tapes

- Tape is increasing in value, capacity, stability, longevity*
  - Oracle has a 8.5TB tape (T10000D)
  - LTO6 has an extended roadmap life cycle (from LTO-1) and open format available (LTFS)
  - Reading/Writing speeds steadily increasing to over 300MB/s native
  - BER is now as high as $10^{19}$ (1000 times better than a disk drive)
    - Means: 1 “bit error” in 1.25 EB of data
  - Media life of cartridges are STILL 30+ years (vs. disk drive @3-4 years)

Disk and Tape: Need to Mix and Match Them!

- **Topics of Discussion:** What should we be doing to “stay current” in order to catch up / keep up / get in front of the growing data deluge?
  - **Primary:** Establish a Tiered Data Management architecture for total data management
    - Most flexible means of upgrading with the most varied options for including technology advances
    - Least disruptive, least complex (from user/application perspective)
  - **Ensure the “core” of the solution is a well-established software**
    - I can personally recommend Versity Storage Manager and SAM-FS
      - Long histories of providing innovative P&A solutions from feature-rich options
      - Developed by extraordinary file-system savvy engineers
  - **Establish a plan for technology refresh**
    - Do not use a “set it and leave… forever”, “if it doesn’t break, don’t fix it”
Disk and Tape: Need to Mix and Match Them!

- **Budget not only for technology but the services to help deploy them seamlessly**
  - System migrations/evolutions are not something everyone does everyday
  - Seek out and include “experts” to make sure upgrades/changes go as non-disruptively as they should

- **Don’t go into “denial” thinking that the system will work well forever**
  - Requirements will change… evolve
  - System must do so too
  - BUT without disturbing the use of the system