Trends In Reliable Storage

A Guide to the Intelligent Buyer

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Future Trends

- Interaction with power
- System & problem size
- Hardware trends in soft errors
Power Management and Reliability

- You will have power management
- Power management will create thermal variations that will induce mechanical stresses at chip and board levels
  - Storage controller may be affected
  - Do you know what is in your storage controller?
- Disk reliability may be affected:
  - Longevity of disks inversely proportional to the number of power cycles
    - Disks designed to sustain a power on-off cycle every 8 hours (Seagate)
    - Each power on-off is estimated to cut the life of a disk by 10 hours (Google)
  - Varying the motor speed induces mechanical stresses
  - No models or understanding of the effect on reliability exists
Power management is useful, but if done carelessly it can impact reliability.

Need: Temperature and reliability-aware power management algorithms.
Future Trends: Problem Size

- Indirect but powerful: Storage density growth struggling to catch up with demand
  - Larger systems will have far more components (controllers and disks....)
  - MTBF will go down
When DVS reduces voltage, the SER increases within an order of magnitude.  

Need to assess this with newer technology and develop reliability-friendly DVS algorithms.
What to do?

- Know what you are buying. Ask the right questions about the storage controller.
- Understand how power management is done, and how it will affect you.
- Don’t count on system-level SER masking only, think about hardening your data.
- Be intelligent, don’t skimp on quality in return for a low cost now, more pain tomorrow.