Tape Product Trends

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Tape Technologies Agenda

- Tape Technology Trends
- Tape for Archive
- Tape at Oracle
- More Information
Storage Technologies
Overview 2010

Tape and Disk
• Technologies continue on their evolutionary tracks.
• Magnetic Disk
  – Perpendicular recording is now fully commercialized
  – Flash memory replacing high IOP's segment of the market
  – Areal density growth of 40% per year CAGR will slow down by 2012 unless new inventions (HAMR, patterned media) are quickly introduced
• Tape capacity growth has accelerated and is now at 41% per year
  – Tape continues at 5-10x less expensive than disk in $/GB
Storage Technologies
Areal Density Trends

Source: INSIC roadmap
Tiered Storage Reduces IT Costs
Tape Tier Maximizes Savings

Single Tier of Disk Storage
- 100%
- Average ~$15,000/TB

Disk Multi-tiered Storage
- 62%
- Average ~$8,000/TB

Modern, Multi-tiered Storage
- 6%
- Performance Disk $7 - $22/GB
- Capacity Disk $1 - $6/GB
- Tape Drives $0.25 - $1/GB
- Average ~$4,000/TB

Source: Horizon Information Strategies, 2009
Technology Price per GB Predictions

- Tape
- Disk
- Optical Blu-ray
- MLC NAND Flash up to 4 bits/cell
- SLC NAND Flash

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Storage Technologies
Overview 2010

- Tape is roughly 5-10x less expensive than disk storage in price per GB
- Data can be archived with little to no power usage
  - Almost 2 orders of magnitude less power
- Native cartridge capacity – 1.0 TB
- Average data access time – roughly 60 seconds
- Native transfer rates: 120-160 MB/sec
- 30 year archive life
  - WORM cartridges available
## Other Considerations For Archive

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<th>Disk</th>
<th>Tape</th>
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<tr>
<td>Max shelf life (bit rot)</td>
<td>10 years</td>
<td>30 years</td>
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<td>Best practices for data migration to new technology</td>
<td>4-5 years</td>
<td>10-15 years</td>
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<td>Uncorrected Bit Error Rate</td>
<td>$10^{-14}$</td>
<td>$10^{-19}$</td>
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<td>Power and cooling</td>
<td>290X</td>
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Oracle StorageTek Tape Strategy

• Continue to Deliver a Best-in-Class Tape Storage Portfolio
  • Extend our #1 market position in Tape by focusing on technology innovation:
    • Reliability/availability
    • Scalability
    • Performance
    • Investment protection
    • Service delivery
Oracle StorageTek Tape Portfolio

- Extreme scalability
- Superior consolidation and virtualization
- Industry leading reliability and availability
- Strong investment protection

Software

- Device Management
- Data Management
- Tiered Storage
- Virtualization
- Encryption
StorageTek ranked #1 in “Overall Quality” and “Reliability” according to Storage Magazine in August ‘09 publication.

- IBM finished #2
- HP finished #4

• StorageTek has won this award every year – 4 years in a row
StorageTek Tape Market Leadership

• 10 of the 10 Top Banks
  Get Better Results With StorageTek Tape

• 10 of the 10 Top Telcos
  Get Better Results With StorageTek Tape

• 8 of the 10 Top Pharmaceuticals
  Get Better Results With StorageTek Tape
“The SL8500 that we have today is the maximum in a single frame, but the SL8500 works where you can stack them side by side and the (tape) can actually go from one frame to another,” State of Tennessee’s Max Arnold said. “So it’s hugely scalable.”
– Storage Magazine, Sep. ’09
Next Generation Tape Drive
Top 5 Strategic Objectives

1. Increase capacity advantage
2. Add features to manage higher capacity tape
3. Lead in throughput
4. Preserve customer investment
5. Maintain robust enterprise quality
Next Generation Tape Drive
For More Information

• CDA 1:1s are available this week

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