PRESENTATION TITLE GOES HERE

NVM technology and New storage taxonomy

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Is storage being disrupted?

- Looking from the application
- Expectations are changing
- Fundamental assumptions challenged
  - Cost, Latency, Coding
  - Solid State vs Magnetic Media
- Data is being spread around the Cloud
Latency Disruption

Dynamic Range of Media Latency is Expanding
- Factor of 1,000,000 difference

Wear Characteristics are different
- From “never” to a few months
Cost Disruptions

SFF HDD  NL-SAS PMR  Archive+SMR  Archive+HAMR+SMR  Tape  3D-TLC  cMLC  NVM-SSD

3D Flash crosses over 10K SFF

Gap Narrows but does not close

NVM
So what?

- Performance changes + cost disparities
- Different access controls for each media type
- Different coding techniques
  - RAID tuned for each media type
  - What works for Flash, PCM different from NL and Archive
- Connectivity to media
  - Moving away from proprietary interconnects
  - Ethernet everywhere
New Taxonomy

- **Data Management**
  - Handle transparent data movement at lowest cost
- **Storage Management**
  - Manage data resilience & protection for specific media
- **Collectively manage interconnect resilience**

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**Data Management**
Manage Transparent, Policy driven data movement between layers

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**Separate Storage and Data Management**

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<tr>
<th>Data Protection</th>
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<tbody>
<tr>
<td><strong>Memory 300ns Media</strong></td>
<td>PCM SSD 10uS Media</td>
<td>Flash SSD 300us Media</td>
<td>Near-line HDD 10ms Media</td>
<td>Archive 10s+ Media</td>
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Final Thoughts

- NVM is a new storage class
  - x1000 improvement in latency
  - Storage efficiency is necessary (think early days of flash)

- Application expectations are changing
  - Faster
  - Data is spread around lots of places
  - Local, fast and expensive to distant, slow and cheap-(ish)

- Final Final thought
  - NVM will become the dominant storage tier
  - Magnetic will still be lower lost but SLOW!
  - Have to manage the disparity in costs and latency!