Exabyte-scale Flash with OCP and ExaDrive®
About Nimbus Data

› Our mission is to empower *data-driven innovation*
› Our solutions fully harness the potential of flash memory
  › ExaFlash® All-Flash Arrays
  › ExaDrive® Solid State Drives
› Over 200 customers
› Privately-held
› Headquartered in Irvine, CA
The Case for Scalable SSDs

- Artificial intelligence, big data, technical apps, and rich digital content demand fast, scalable, and reliable storage.
- Organizations also must contain escalating data center costs, including CapEx, power, cooling, and rack space.
- Widening price/performance/reliability gap between NVMe solid state drives and nearline HDDs creates a massive tiering and data prioritization challenge.
- We propose Scalable SSDs to meet this challenge.
  - Capacity, power efficiency, and endurance-focused SSDs
ExaDrive® DC series

① Record-breaking SSD capacity
② Unmatched energy efficiency
③ Superior reliability
④ Perfectly-balanced read/write performance
⑤ 42% lower TCO than competing enterprise SSDs
100 TB (terabytes)

- World’s highest capacity SSD
- 3x more than closest competitor*

What is 100 TB?

- 20 million songs, or
- 20,000 HD movies, or
- 2,000 iPhones worth of data
- And it fits in your back pocket

* Samsung PM1643: 30.72 TB
Lowest power / TB

› World’s most energy efficient SSD
› As low as 0.1 watts per TB
› 85% lower than closest competitor*

* Micron 5100 SATA: 7.68 TB
Superior reliability

- Competing SSDs have limited endurance, often less than 3 full drive writes/day
- ExaDrive DC series has **no such restriction**
- **Unlimited write endurance** for 5 year warranty period regardless of workload
- 2.5 million hour MTBF
- Embedded power protection
- Multiple ECC engines for data integrity
- Encryption and secure erase
Balanced performance

- Competing SSDs typically have 80% lower write performance than read performance
- ExaDrive DC series has perfectly balanced read and write performance
- Up to 100,000 read IOPS
- Up to 100,000 write IOPS
- Up to 500 MBps read throughput
- Up to 500 MBps write throughput
Easy HDD → SSD Transition

› Same 3.5” form factor as nearline HDDs
› Same SATA interface as nearline HDDs
› Plug-and-play with hundreds of storage and server enclosures
› Compatible with OCP storage designs that leverage 3.5” and SAS/SATA
42% lower TCO per terabyte

- Similar cost/TB as enterprise SSDs, but...
- Unlimited endurance for 5 years
- Up to 85% lower power costs
- Up to 85% lower rack space costs
- Up to 85% lower cooling costs
- Reduced storage enclosure costs
- Reduced administrative costs
- Reduced cabling costs
- Reduced HW refresh costs
<table>
<thead>
<tr>
<th></th>
<th>HGST</th>
<th>Micron</th>
<th>Samsung</th>
<th>Seagate</th>
<th>Toshiba</th>
<th>Nimbus Data</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Capacity</td>
<td>15.36 TB</td>
<td>7.68 TB</td>
<td>30.72 TB</td>
<td>15.36 TB</td>
<td>30.72 TB</td>
<td>100.0 TB</td>
<td>3x-12x</td>
</tr>
<tr>
<td>Power per TB</td>
<td>0.9 W</td>
<td>0.6 W</td>
<td>0.5 W</td>
<td>0.9 W</td>
<td>0.5 W</td>
<td>0.1 W</td>
<td>80-90% lower</td>
</tr>
<tr>
<td>Endurance over 5 Yr</td>
<td>3 DWPD</td>
<td>3 DWPD</td>
<td>1 DWPD</td>
<td>3 DWPD</td>
<td>3 DWPD</td>
<td>Unlimited</td>
<td>No restrictions</td>
</tr>
<tr>
<td>PB per Rack</td>
<td>8.1 PB</td>
<td>4.1 PB</td>
<td>16.2 PB</td>
<td>8.1 PB</td>
<td>16.2 PB</td>
<td>99.0 PB</td>
<td>6x-24x</td>
</tr>
<tr>
<td>Form Factor</td>
<td>2.5”</td>
<td>2.5”</td>
<td>2.5”</td>
<td>2.5”</td>
<td>2.5”</td>
<td>3.5”</td>
<td>Compatible with Nearline HDDs</td>
</tr>
<tr>
<td>Interface</td>
<td>SAS-only</td>
<td>SATA-only</td>
<td>SAS-only</td>
<td>SAS-only</td>
<td>SAS-only</td>
<td>SATA/SAS</td>
<td>Flexibility</td>
</tr>
<tr>
<td>Warranty</td>
<td>5 years</td>
<td>5 years</td>
<td>5 years</td>
<td>5 years</td>
<td>5 years</td>
<td>5 years</td>
<td>-</td>
</tr>
</tbody>
</table>
Demonstration in Booth A22

- 2OU 45-drive OCP chassis from Flex
- ExaDrive DC100 solid state drives
- 4.5 petabytes in 2OU
- Nearly 100 petabytes in one OCP rack