

### An Intelligent & Optimized Way to Access Flash Storage

Increase Performance & Scalability of Your Applications

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During our meeting today we will make forward-looking statements.

Any statement that refers to expectations, projections or other characterizations of future events or circumstances is a forward-looking statement, including those relating to market position, market growth, product sales, industry trends, supply chain, future memory technology, production capacity, production costs, technology transitions and future products. This presentation also contains forward-looking statements attributed to third parties, which reflect their projections as of the date of issuance.

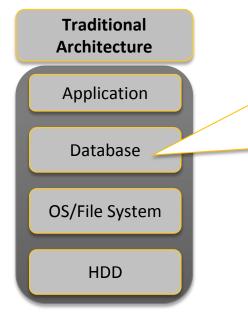
Actual results may differ materially from those expressed in these forward-looking statements due to a number of risks and uncertainties, including the factors detailed under the caption "Risk Factors" and elsewhere in the documents we file from time to time with the SEC, including our annual and quarterly reports.

We undertake no obligation to update these forward-looking statements, which speak only as of the date hereof or as of the date of issuance by a third party, as the case may be.





# Legacy Architecture Can Take Limited Benefit of all Flash Storage



Traditional architecture based upon HDD type memory structure •Disk API has no calls for unique capabilities for flash storage

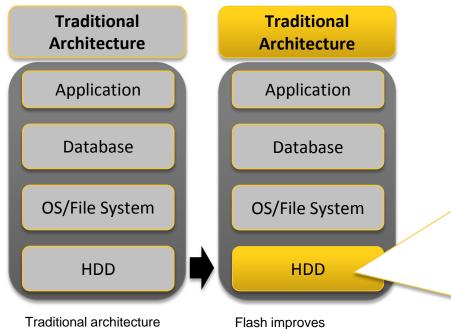
- Disk API blocks full benefits of flash
- •OS disk code & file system lacks parallelism needed for high IOPs of flash







With Flash Adoption Performance & TCO Improve But Full Potential of Flash Storage Still Unrealized



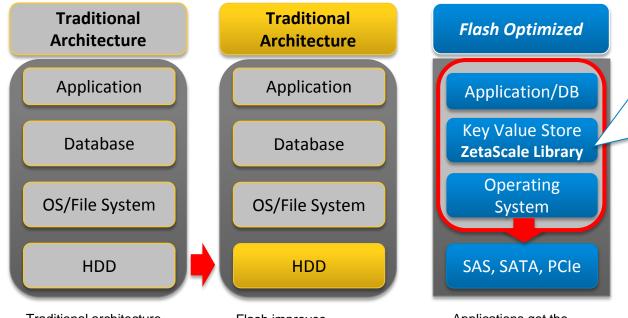
Traditional architecture based upon HDD type memory structure Flash improves Performance & TCO but challenges remain Many applications treat HDD and Flash alike:

- Replacing HDD with Flash can increase IOPs and performance
- However, full potential of Flash still not achieved because:
  - 1. Disk API still prevents full use of Flash as it does not have flash oriented calls
  - 2. OS disk code & file system still lack parallelism needed for high IOPs of flash





#### With **ZETASCALE**<sup>•</sup> Applications Get Full Benefits of Flash Storage



Traditional architecture based upon HDD type memory structure Flash improves Performance & TCO but challenges remain

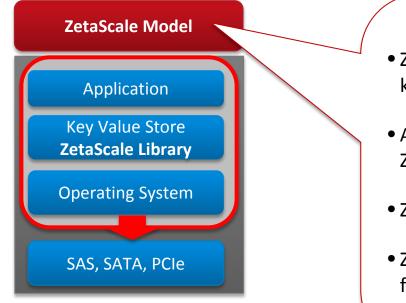
Applications get the full benefits of flash memory

- ZetaScale API treats flash as memory to enable flash's full potential
- Highly parallel flashoptimized ZetaScale maximizes flash IOPs
- ZetaScale works with any flash format, such as SSDs, DIMM, PCIe and NVME





#### **ZETASCALE**<sup>\*</sup> An Intelligent Way to Access Flash Storage

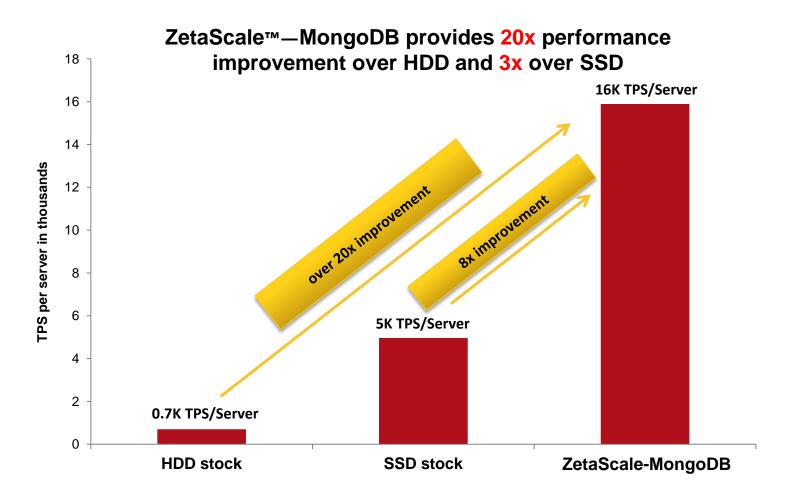


- ZetaScale<sup>™</sup> is an intelligent and flash optimized key-value store
- Applications place their logical objects into ZetaScale that provides storage subsystem
- ZetaScale API better exploits flash feature-sets
- ZetaScale optimizes the use of cores, DRAM, and flash to maximize application performance









100 Bytes, 10 Cols, 128M Rows - 95% read / 5% write

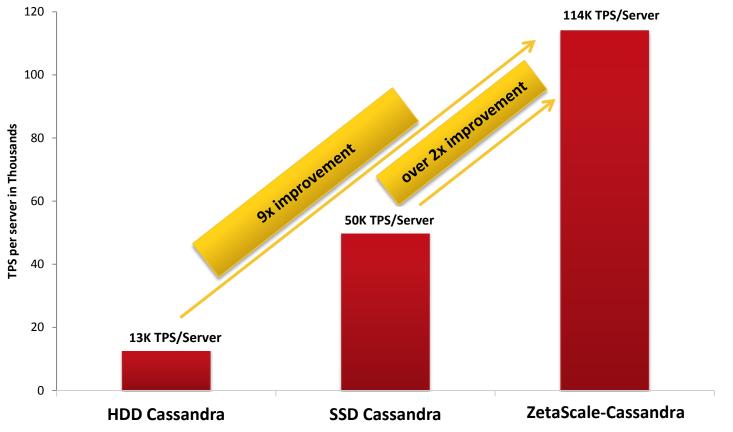
Flash Memory Summit 2014 Santa Clara, CA  Dell R720 dual socket Intel 2.6GHz CPU, 32 cores, 128GB DRAM (limited to 64GB for test) with 8x SanDisk x210 SATA SSDs single node, Cassandra v1.2.2, ZetaScale v2.0

- YCSB (uniform distribution, 128 threads) measurements performed by SanDisk





ZetaScale<sup>™</sup> provides 9x performance improvement over HDD & more than 2x over SSD



- 100 Bytes, 10 Cols, 128M Rows - 95% read / 5% write

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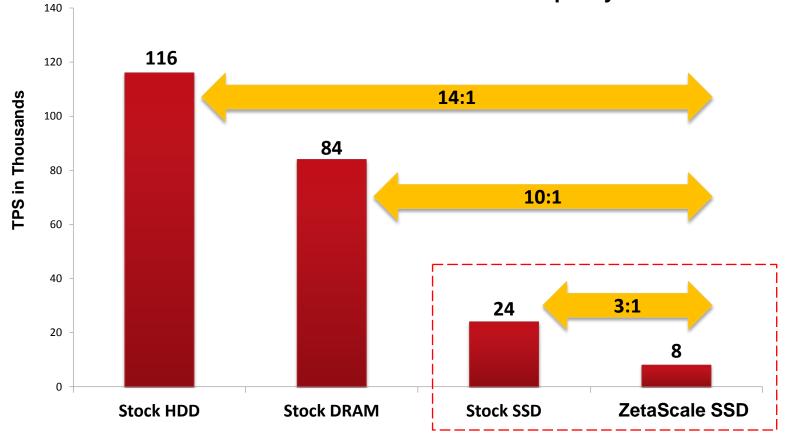
single node, Cassandra v1.2.2, ZetaScale v2.0

- YCSB (uniform distribution, 128 threads) measurements performed by SanDisk





ZetaScale<sup>™</sup> – Cassandra provide major server consolidation for same TPS & C=capacity



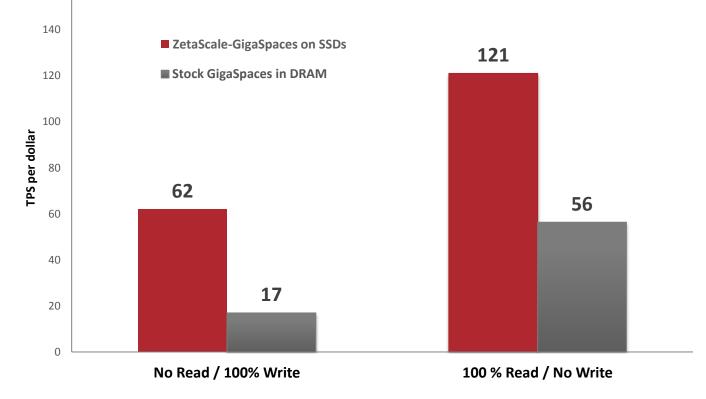




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## ZetaScale–GigaSpaces XAP MemoryXtend provides 2x-3.6x better TPS per dollar

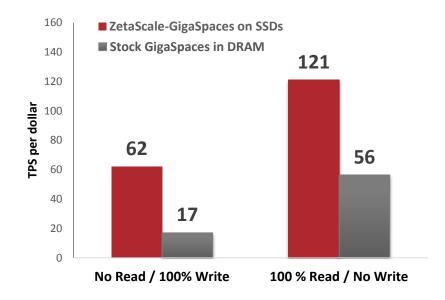


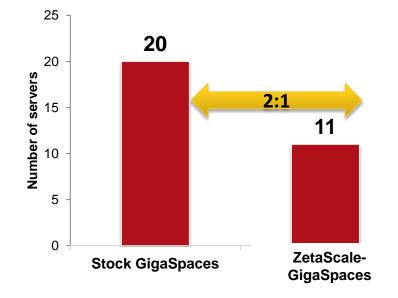




#### ZetaScale<sup>™</sup>–GigaSpaces XAP MemoryXtend provides 2x-3.6x better TPS per dollar

50% server consolidation for the same dataset



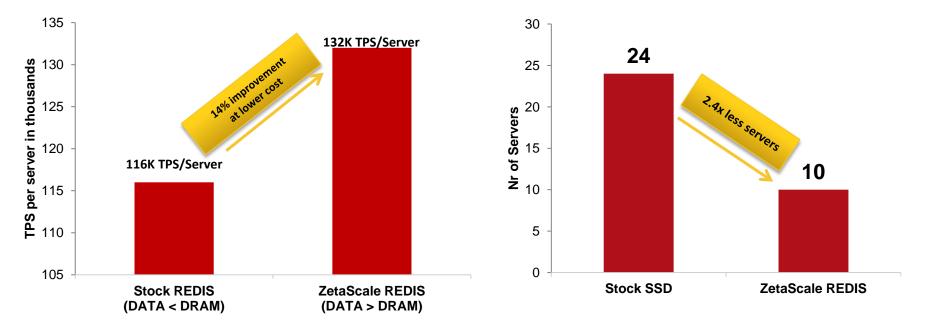






ZetaScale<sup>™</sup>–REDIS allows out-ofmemory datasets to run at same or better speed as in-memory datasets

>50% server consolidation for the same dataset







ZetaScale<sup>™</sup> offers an intelligent and optimized way to access flash storage

Applications can achieve significant performance improvement and scalability

As a result, datacenter can realize significant TCO benefits





### **Thank You!**

Keep up to date with the latest on technology trends and news from SanDisk at ITBlog.SanDisk.com

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### SanDisk Booth 204



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