

SSD Architectures

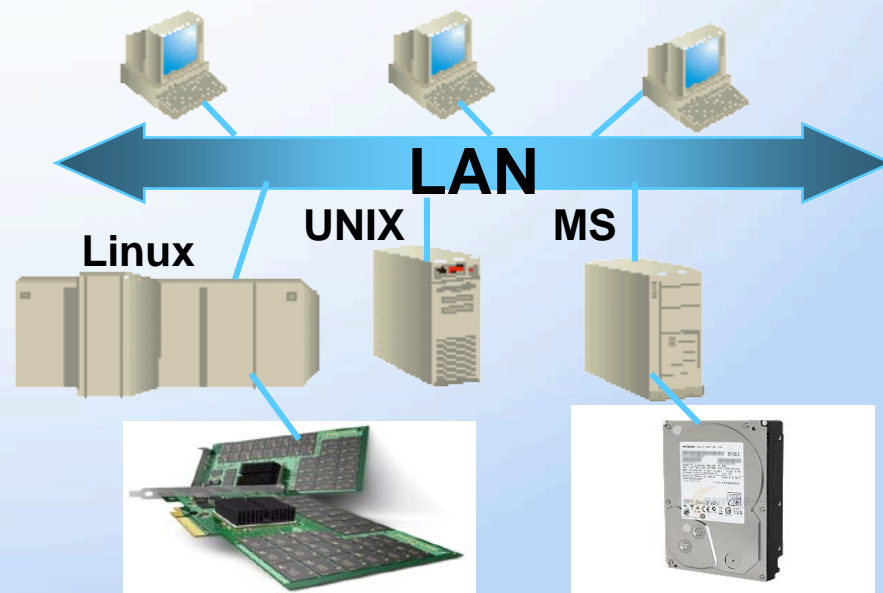
Which One is Right For You?



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Option #1: Server-Attached SSD

- Pros
 - Closer to server → lower latency, higher IOPS
- Cons
 - Data island → difficult to manage and protect
 - Sharing issues
- Product forms:
 - **PCIe SSD Cards**
 - x1-x32 lanes, 16GB/s
 - Fully exploit parallelism of SSD
 - **SATA and SAS SSDs**
 - 3—6 Gbps
 - Inexpensive & compact
 - Compatible with storage interfaces



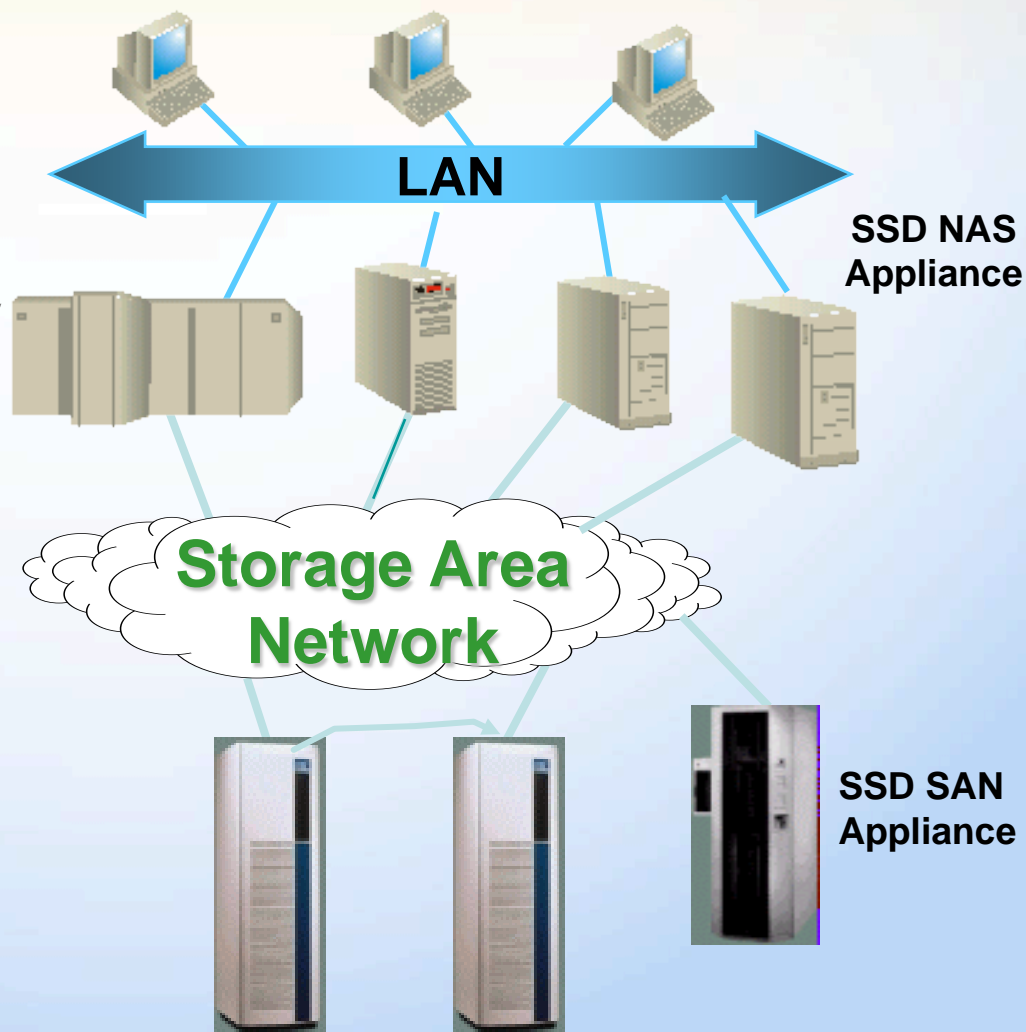
Option #2: SSD Appliances

- Pros:

- Relatively easy to add to existing infrastructure
- Purpose-built system may offer high performance

- Cons:

- Adds another box (\$'s, back-up, reliability, space, power, cooling)
- Requires new data management & DR systems and processes



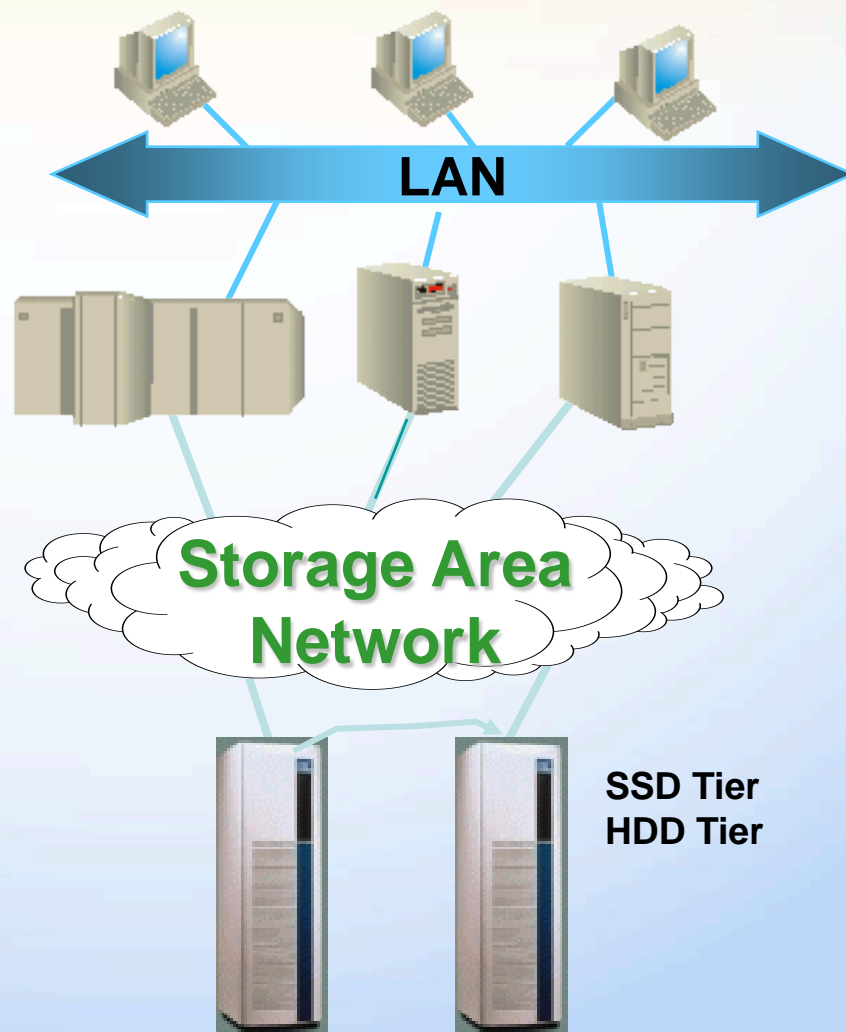
Option #3: SSD in Storage Array

- **Pros:**

- Minimal change to existing storage
- Leverages existing data management & DR

- **Cons:**

- **Latency**
 - Distance from server = network bottlenecks
 - Protocol and context switching overheads
- Higher \$ per IOPs
- Data Tiering Challenges



Best Choice Depends on Priorities

- **The ideal solution should**
 - ✓ Use low cost SSD hardware of your choice
 - ✓ Leverage existing storage investments, easy management
 - ✓ Be transparent to applications
 - ✓ Dramatically improve both READ and WRITE performance
 - ✓ Have high reliability and long endurance
- **You could use any of these solutions:**

Server attached
SSD

SSD in a storage
array

SSD Appliances

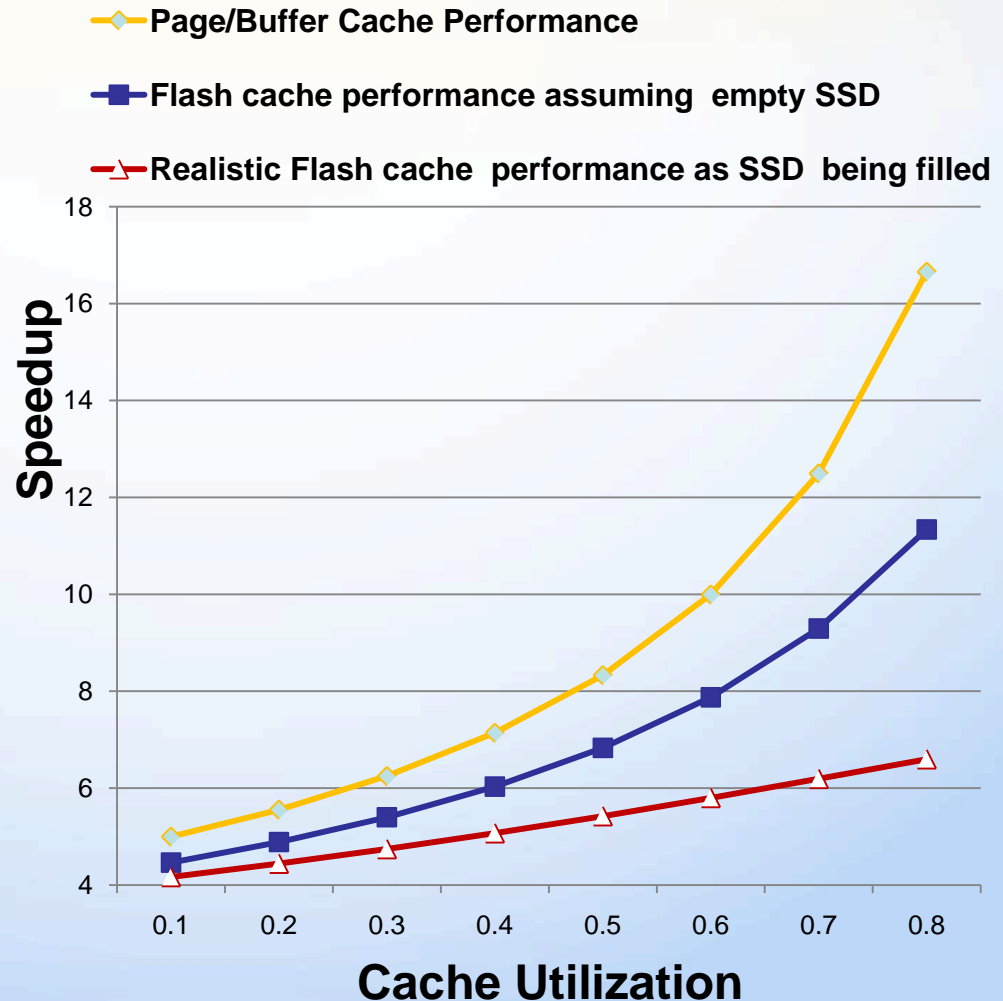
Storage Tiering
Storage
Hierarchy

Cache

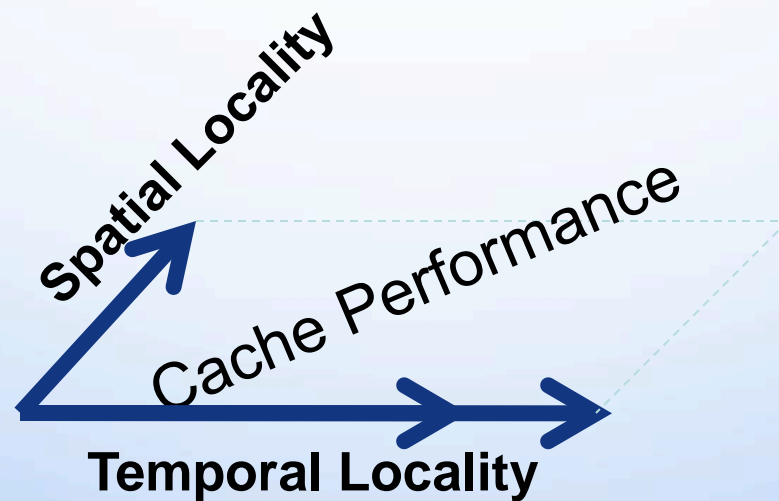
- **No matter which solution you choose, all boil down to one thing → → →:**

Does Traditional Cache Work on SSD?

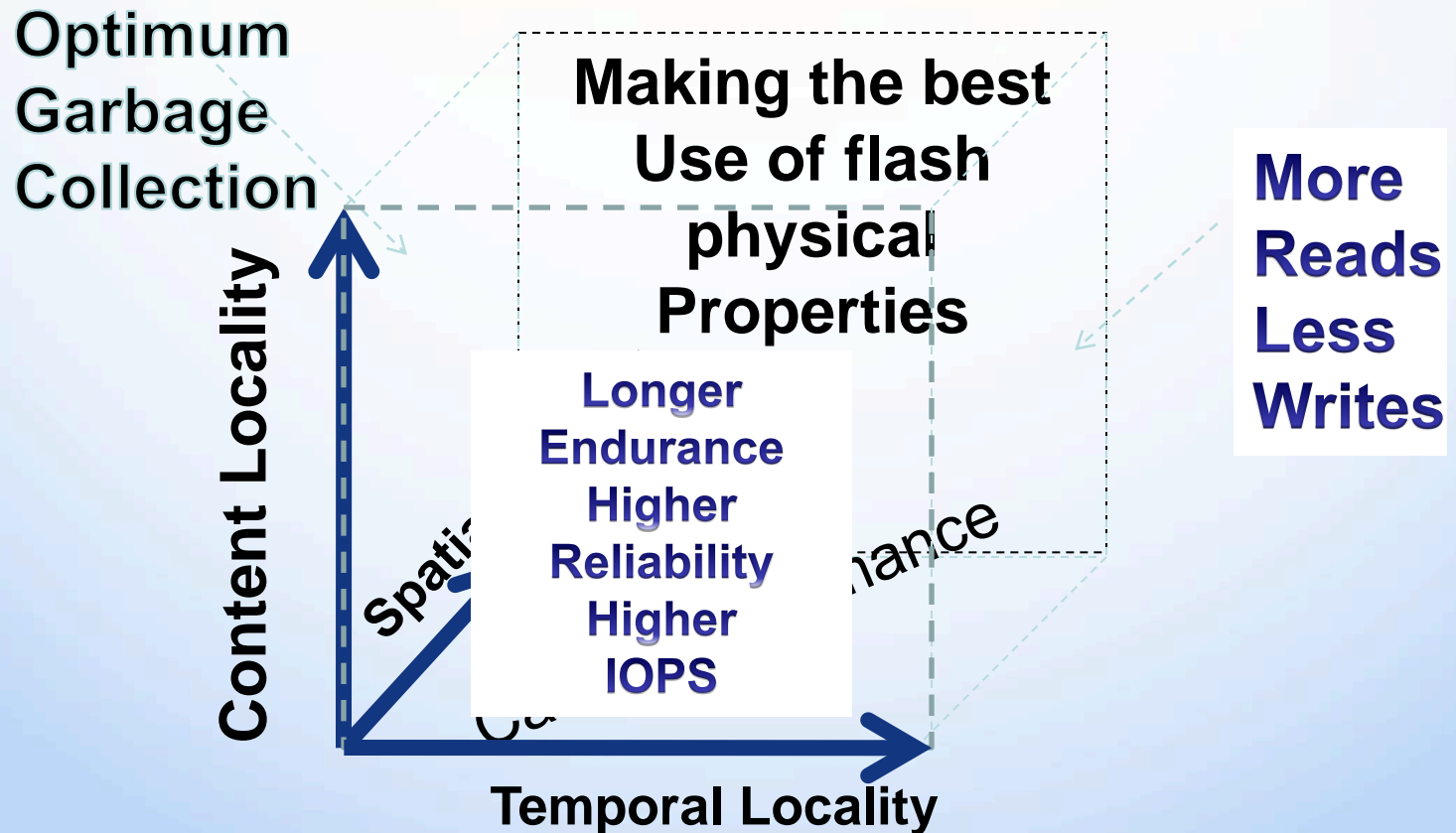
1. Cache concept has been around for decades
2. Flash Memory is quite different from RAM
 - Asymmetric
 - No in-place writes
 - Wear-leveling & garbage collection
 - Write amplification
3. Performance drops when device approaches full utilization
4. New challenges require a New Way of Thinking



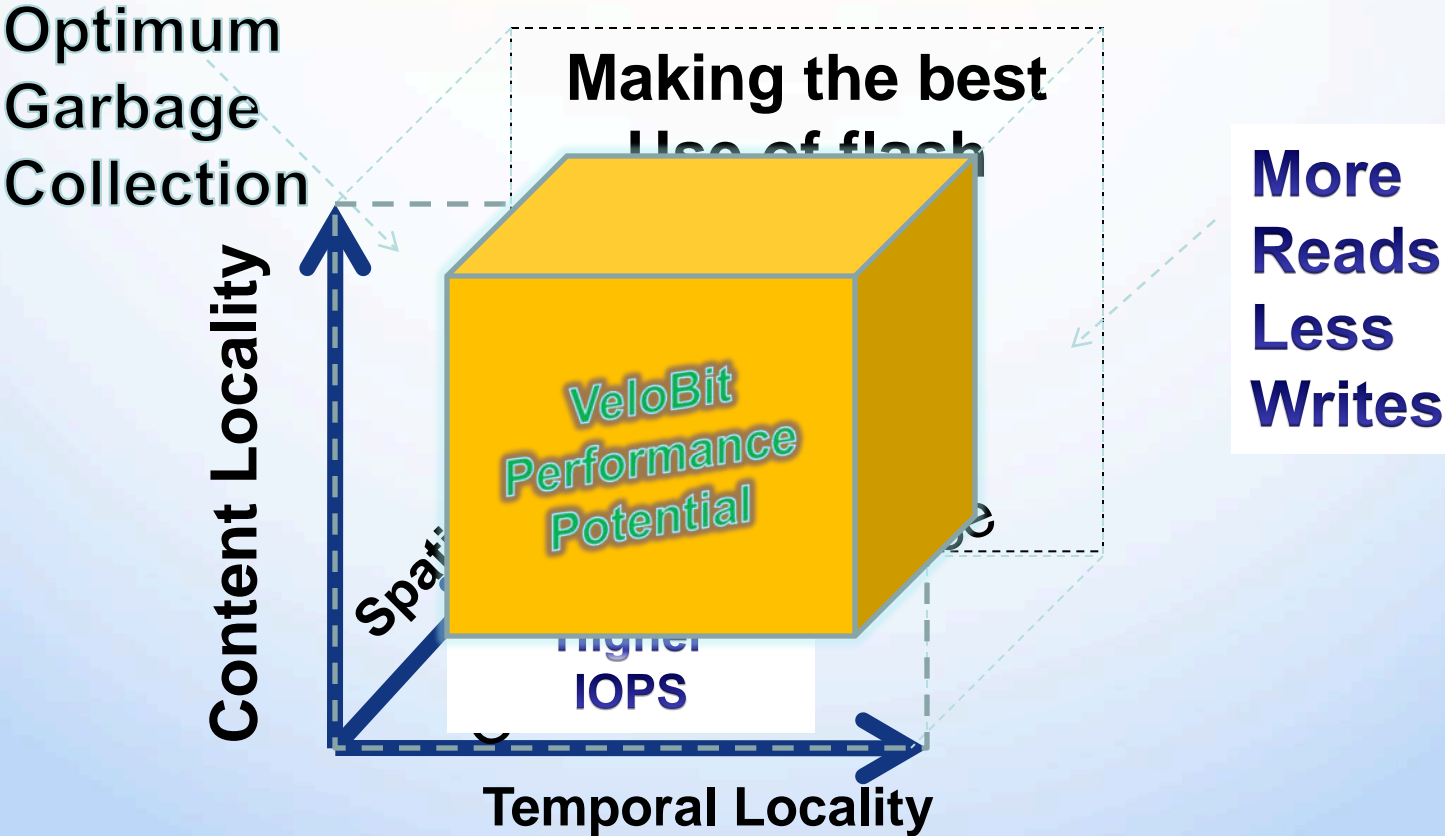
Why and How Cache Works



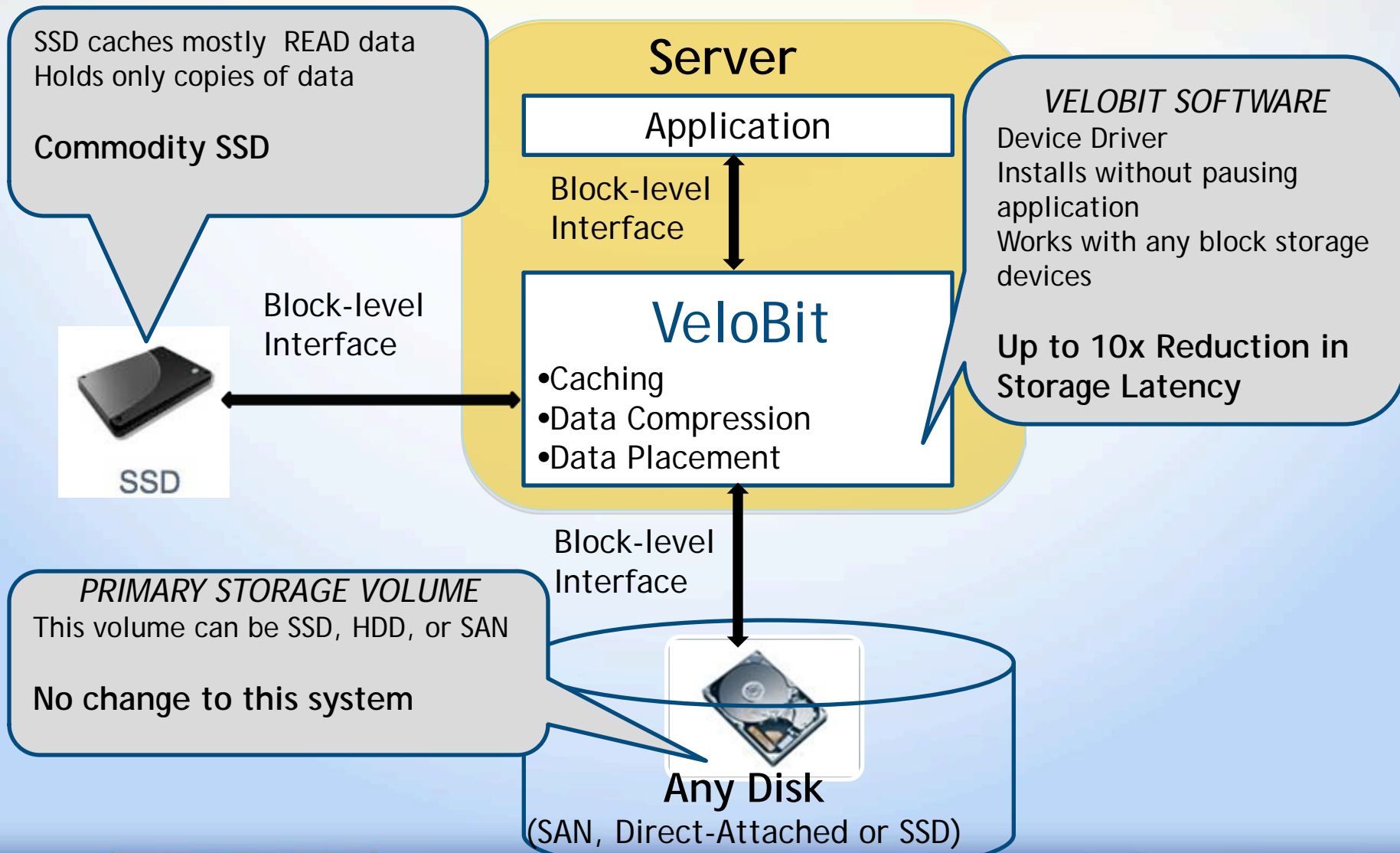
VeloBit Opens a New Dimension in Caching



Great & Endless Opportunity

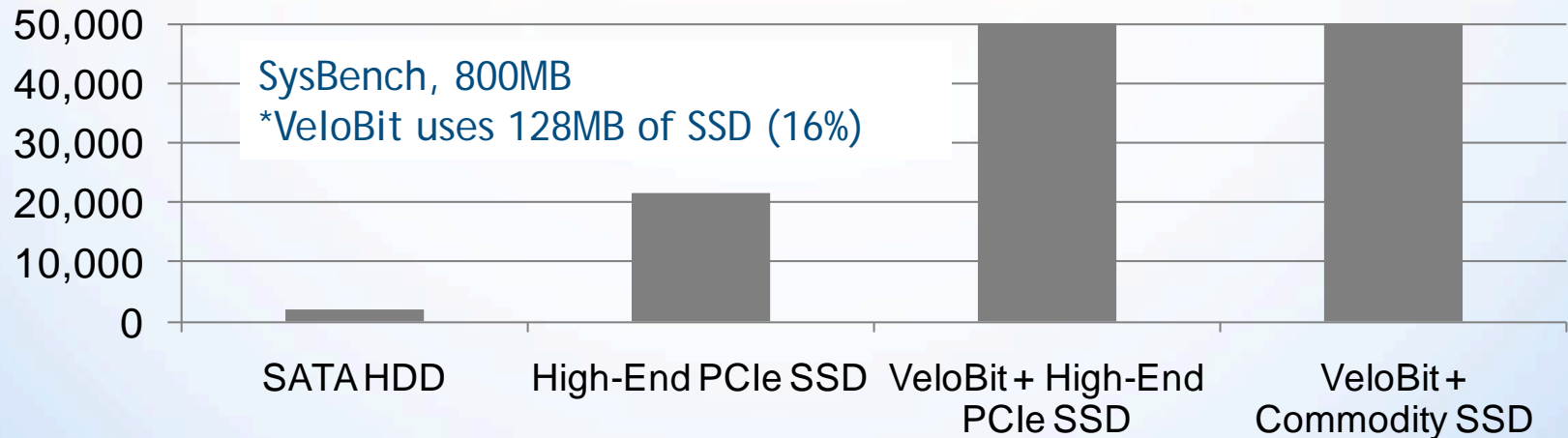


The VeloBit Solution



MySQL Performance Improvement

Storage System Performance



| | | | | |
|---------------|--|---------|---------|-------|
| SSD \$'s | | \$5,000 | \$5,000 | \$200 |
| Software \$'s | | | \$999 | \$999 |

- VeloBit is 3x faster than the current SSD performance leader.
- VeloBit enables use of commodity SSD.
- VeloBit used 84% less flash in this benchmark.