



The Balanced Approach to Server Acceleration

A Discussion about Server-Side Caching

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Forward Looking Statement

During our meeting today we will be making 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 industry trends, future technologies, and future products.

Actual results may differ materially from those expressed in these forward-looking statements due to 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.

What Are We Balancing?

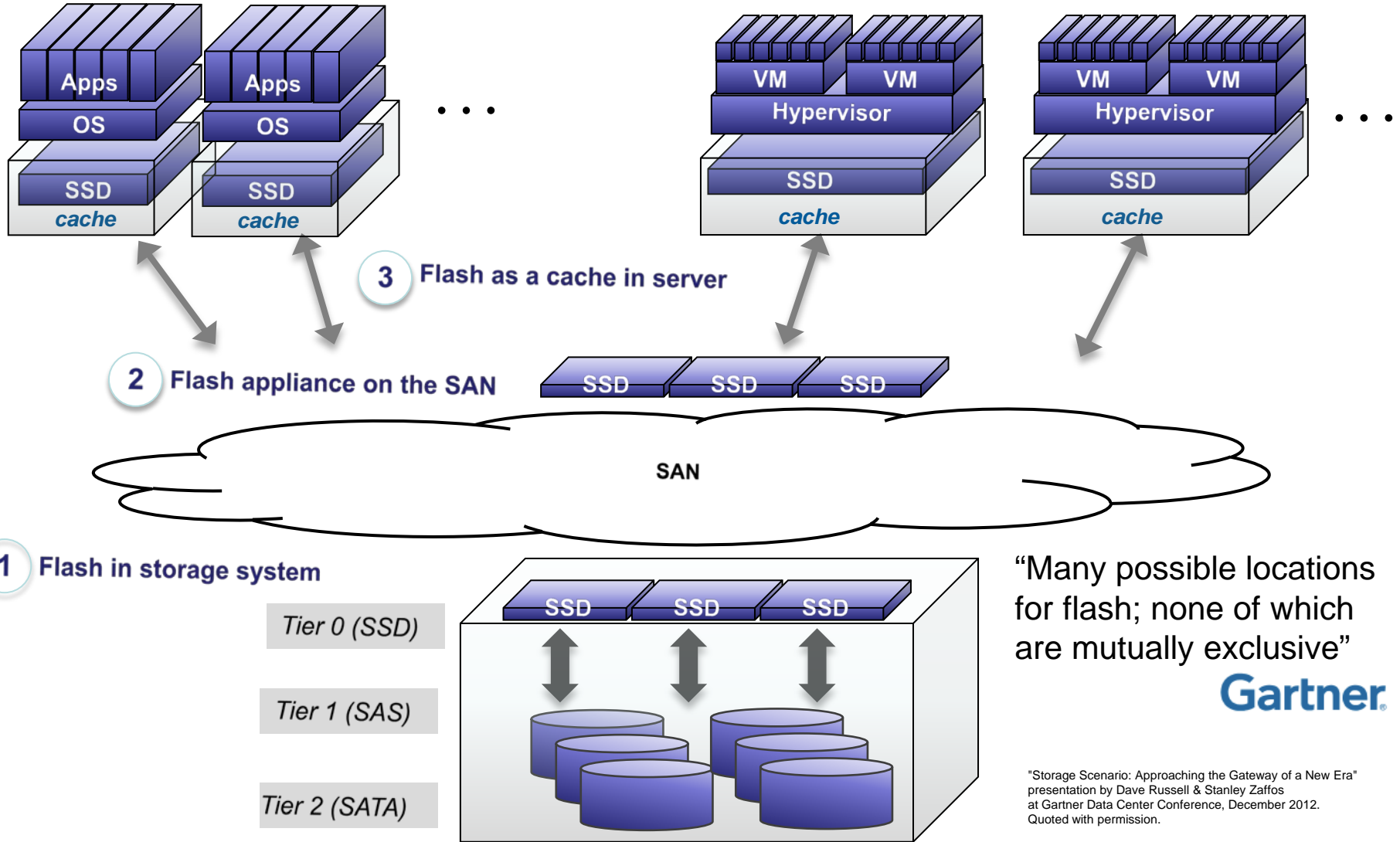


I/O Operations

Resource Utilization

Data Center Budget

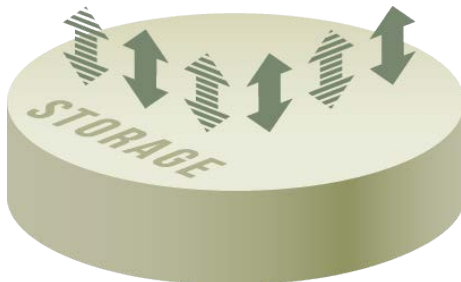
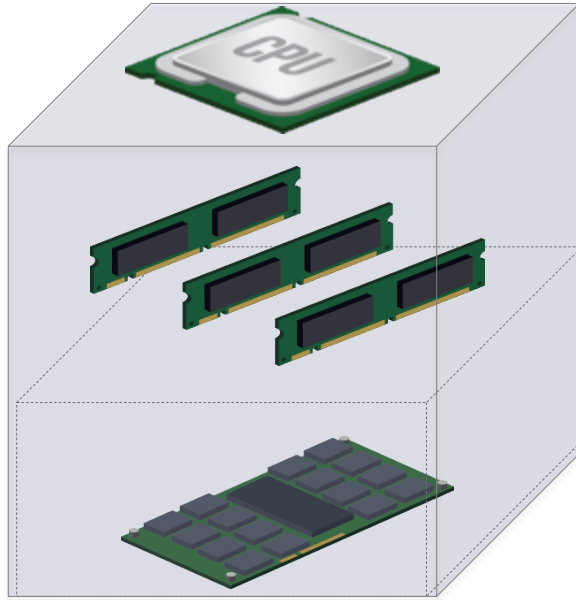
Moving to the Server Tier



“Many possible locations for flash; none of which are mutually exclusive”

Gartner

The Economics of Server-Based Caching



Full CPU utilization

- Key to server consolidation

Efficient use of memory

- Don't use memory as storage cache
- Minimal memory for metadata, etc.

Efficient use of SSD

- Dynamically allocated SSD capacity
- Optimized for SSD I/O

Storage Efficiency

- Moves I/O traffic from SAN to cache
- Efficient flushing

Compatibility

- No changes to Apps, OS, VMs
- No changes to storage systems, network or policies



3 Questions about Server Caching

- When should you consider it?
- When should you avoid it?
- What should you know before trying it?

When to Consider Caching

- I/O-constrained workloads
- Data with hot spots
- Server-resident flash volumes alone won't work
 - Manually pinning data to SSDs is impractical
 - Your storage is your “system of record”
- You want more time before next storage refresh
- You have the ability to test & evaluate

When to Avoid Caching

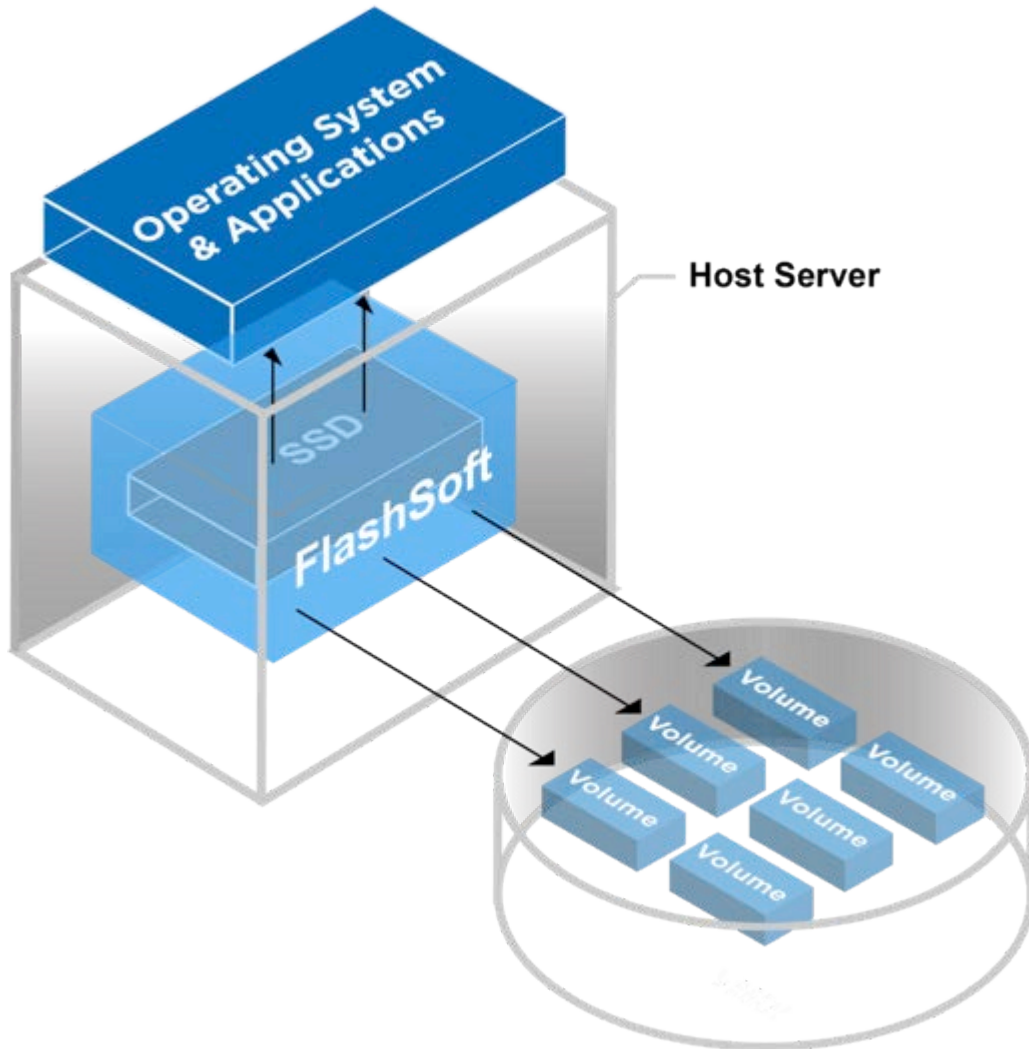
- Your workloads not I/O-bound
 - Your latest storage refresh was a big one
 - You're giving VMs & DBs ample memory
 - You're running mostly in-memory apps
- You are committed to shared flash resources
 - But keep in mind...
 - Shared flash can still work as a cache
 - Server-side flash can be a complement to storage-side flash

What You Should Know

- The best test is *your* test
 - But don't make your test "blind"
- Read caching vs. write-back caching
 - Know what you need & how it will work
 - Are your servers clustered?
- Which flash devices work best?
 - Consider technology *and* economics
- Check & double-check compatibility issues



FlashSoft™ Software



- **Host-Based, Solid-State Caching**
 - Software solution
 - Platform-independent caching engine
 - Any PCIe or SAS SSD, from any vendor
 - Write-back cache (single node)
 - Write-through cache (cluster)
 - Scalable: 100's of volumes or VMs
- **Resource Efficient**
 - Server resource efficiency: 140MB
 - CPU utilization: 2%-4%
- **Linux & Windows Server® Acceleration**
 - Databases: OLTP performance 3x-5x
 - OLAP batch processes 4x – 5x faster
 - Enterprise apps: 3x concurrent users
- **VMware vSphere® Acceleration**
 - App performance 3x-5x faster*
 - VM density 3x greater**
 - Full support for VDI
- **Compatibility**
 - Transparent to applications and OS
 - No changes to underlying storage SAN, NAS and DAS

*Results from TPC-C based OLTP workload tests. System under test: Dell R720. Performance numbers are tpmC scores. Complete test report available

**Results from tile-based test using SPECvirt_sc2010 workloads. System under test: Dell 810. Complete test report available



Thank You

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