

Server-Side Flash & Application Integration

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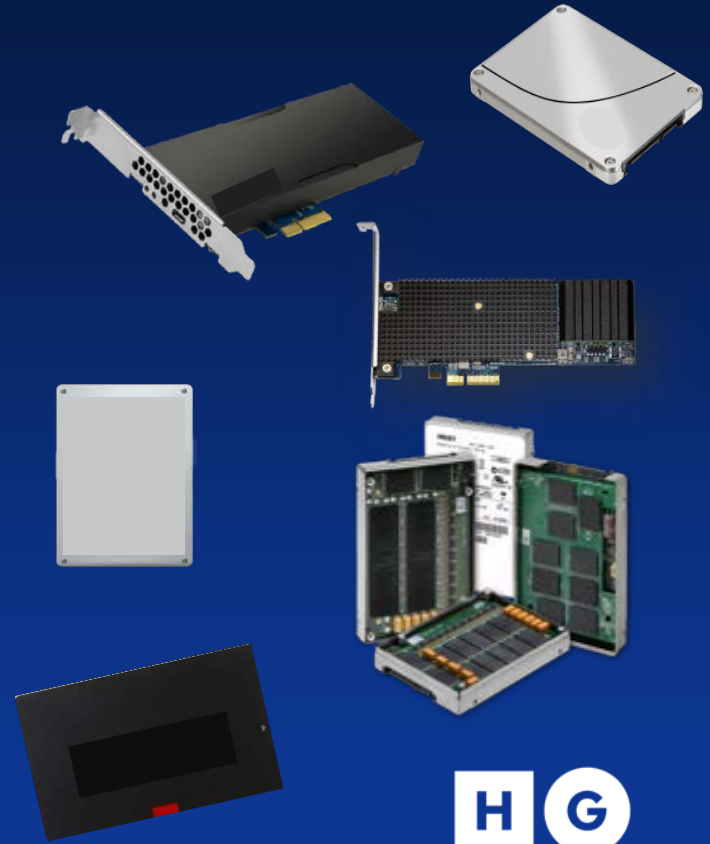
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Agenda

- Today's Server-Side Flash Reality
- 2nd Platform Use Cases
- 3rd Platform Use Cases
- What The Future Holds...



Today's Server-Side Flash Reality

2nd Platform - Enterprise



Need more IOPs for performance & headroom

Improve CPU/Core utilization—license costs

Architectural/Management “Fit”

Dominated by shared-storage

3rd Platform - Cloud



High latency across distributed nodes

Inefficient storage utilization

Massive server sprawl

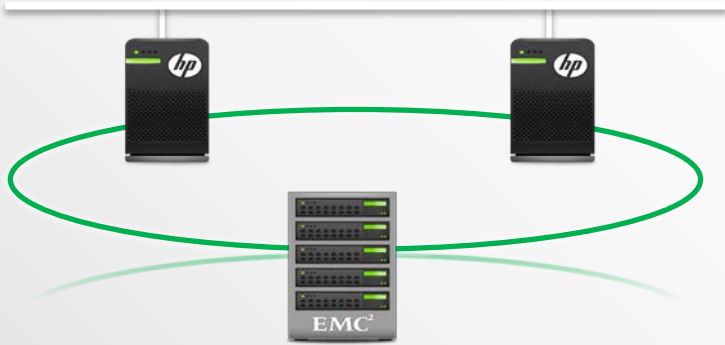
Dominated by direct-attached storage





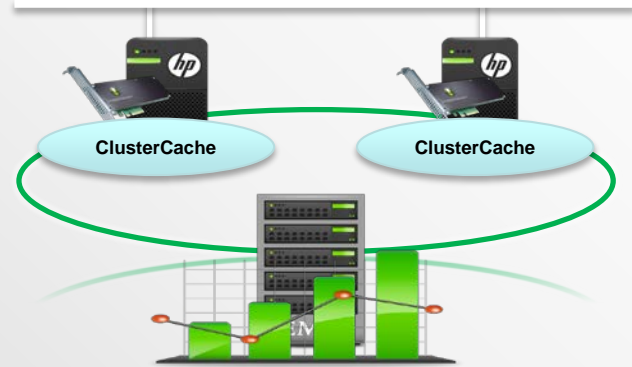
Oracle[®] Database Caching (SI or RAC)

Before



Multi-millisecond latencies
Poor CPU/Core Utilization
High License Fees
20-70 millisecond wait times

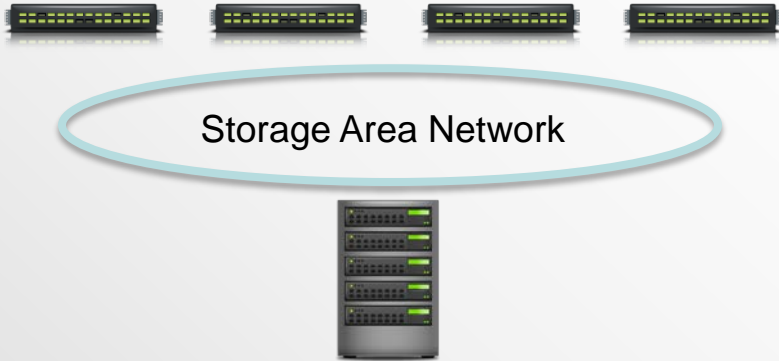
After



7x IOPs improvement
<80 microsecond wait times
1/4th the cost of equivalent SAN Upgrade
No change to operations or Management
80 to 90% CPU/Core Utilization

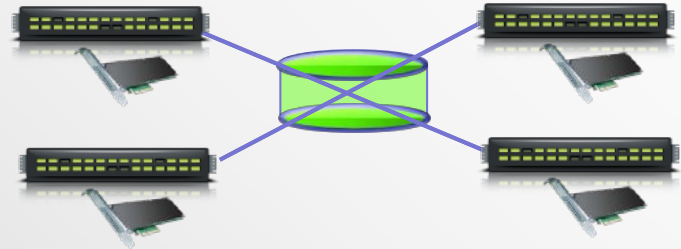
Shared Access to SSDs for Oracle® RAC

Before



Monolithic SAN Array
Poor CPU Utilization
Milliseconds of Latency
High Cost to Add IOPs

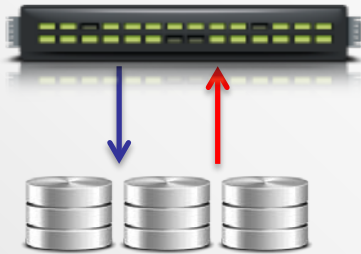
After



Server-Side PCIe Flash with Sharing Software
Microsecond Latency, Millions of IOPs
Optimized CPU Utilization
Repurpose Existing SAN
6x Performance at 30% Cost of AFA SAN

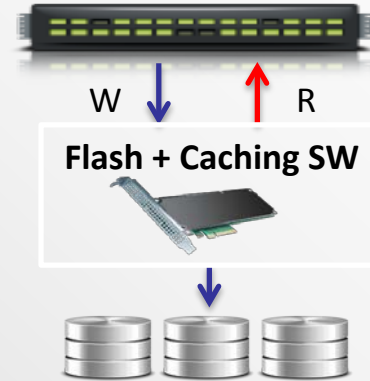
Microsoft® SQL Server – Flash Caching

Before



Reads and Writes from Local SAN
Milliseconds of Latency
Low IOPS, thus Lower Transaction Speed

After



Write-Through Caching for Data
Consistency Microsecond Read Latency
No Changes to Operations or Management
7x Improvement in IOPs

Server-Side Flash For 3rd Platform (Cloud)



What does 3rd Platform Mean for Flash?

2nd Platform - Shared Storage



- ✓ Shared with many servers
- ✓ Maximizes Utilization
- ✓ Central Data Management Built In
- ✓ 25 years of “tradition”

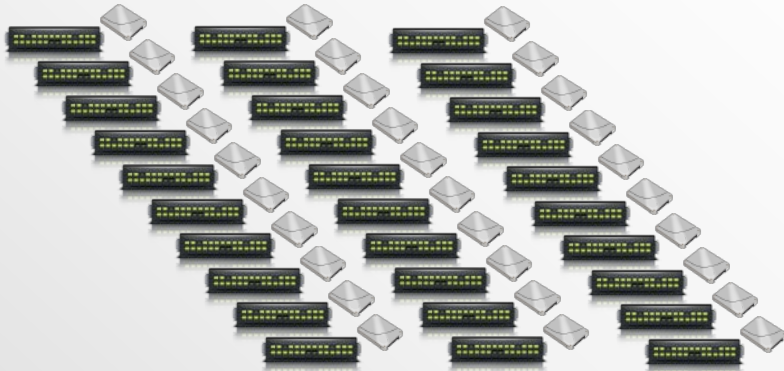
3rd Platform – Shared Nothing



- ✓ Flash in all servers and servers deployed in a cluster
- ✓ Applications provide built-in data management
- ✓ Data replicated/distributed automatically
- ✓ Many Read-Only copies (master-slave) are possible
- ✓ Workloads are Read-Dominated – 70% to 90% Read

Cloud Use Cases – PCIe Flash for MySQL

Before



MySQL using disk form-factor SATA SSDs
Massive server sprawl
Escalating space/power/operations expense
High management costs

After



3:1 server consolidation & 6:1 rack consolidation
3x increase in performance
Increased revenue
Excellent user response times
Reduced capital expenses

Clustered Caching for MySQL

Before



High Latency AFA SAN for Indexing Algorithms
Latency Measured in Milliseconds
100M Uniques/Month
50B Recommendations/Month

After



Transparent Acceleration for AFA SAN
Latency of 40 uSec
400M Uniques/Month
150B Recommendations/Month

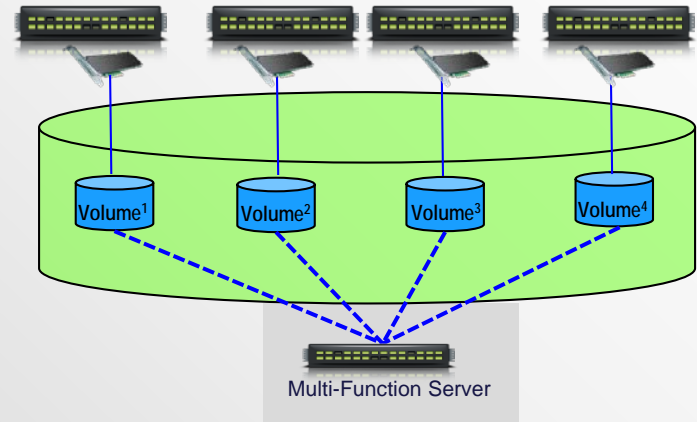
SSD Clustering “Flash Pools” for MySQL

Before



Dedicated Asynchronous Replication Pairs
Slaves for Read Off-load
Inefficient Server Utilization
Server Sprawl

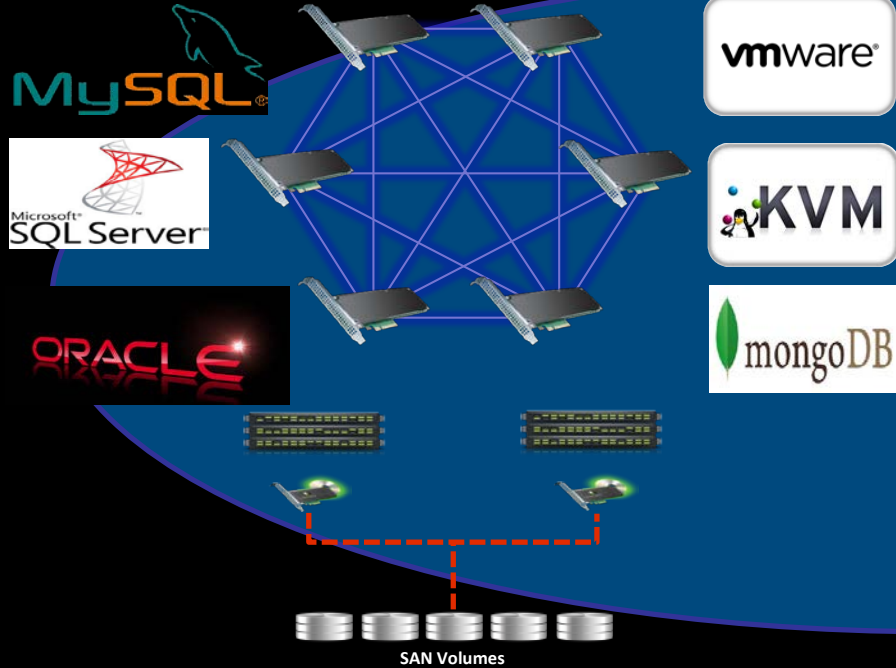
After



Shared, Clustered “Multi-Function” Server
8 Servers to 5, 38% Consolidation
Fully Mirrored Pool of Flash
Any Server to Any Volume

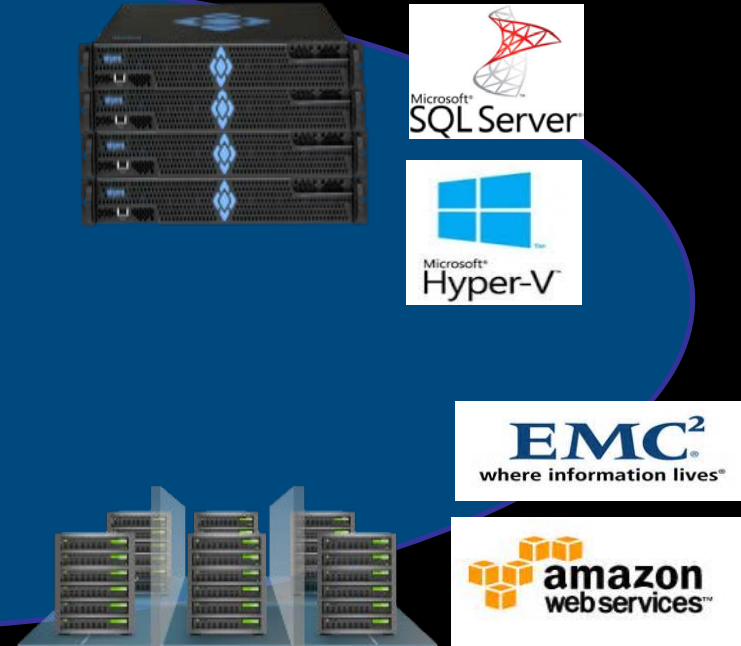
Putting It All Together

Flash in Servers for Ultimate Performance



"Tiering" to Active Archives and Hybrids for Local Capacity

Flash Systems for High Density Storage



Interfaces to Private & Public Clouds for Remote Capacity and DR

EMC²
where information lives[®]

amazon
web services[™]

