The Future of Flash in the Data Center

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Agenda

- What the analysts are saying
  - Enterprise
  - Cloud/Hyperscale
- Today’s Reality—Islands of Flash
- Enterprise Use Cases
- Cloud Use Cases
- Summary
Market Update—IDC’s 3rd Platform

Defined by:

- Scale-out Open Source DB Software
- Commodity Servers
- DIY (McGuyer IT dudes)
- Server-Side Flash
- Software-Defined
- Massive Scale
- Analytics
“Making server-side flash a global resource increases management flexibility, efficiency and broadens its use cases to include cluster support. Making server-side flash a global resource also expands available capacity, which makes its use as DAS even more attractive.”
451 Breaks It Down

- **All-Flash Arrays**
  - In Use: 8
  - In Pilot: 3
  - Within 6 mo: 5
  - 6-18 Mo: 11
  - >18 mo: 3
  - Not in Plan: 67
  - Don't Know: 3

- **Flash in Servers**
  - In Use: 25
  - In Pilot: 3
  - Within 6 mo: 3
  - 6-18 Mo: 6
  - >18 mo: 2
  - Not in Plan: 58
  - Don't Know: 3

- **Flash in SAN/NAS Arrays**
  - In Use: 67
  - In Pilot: 15
  - Within 6 mo: 7
  - 6-18 Mo: 18
  - >18 mo: 1
  - Not in Plan: 1
  - Don't Know: 1

- **Total**
  - 266 mid-sized and large enterprises

**July, 2014**
451 Breaks it Down

- **Databases**: 38%
- **VDI**: 19%
- **Analytics**: 16%
- **Real-time Applications**: 13%
- **Web UI**: 3%
- **CRM**: 3%
- **Other**: 8%

266 mid-sized and large enterprises
July, 2014
Today’s Server-Side Flash Reality

2nd Platform

Need more IOPs for performance & headroom

Improve CPU/Core utilization—license costs

Architectural/Management “Fit”

Dominated by “Monolithic” Arrays

3rd Platform

High latency across distributed nodes

Inefficient storage utilization

Massive server sprawl

Dominated by Commodity Servers
Server-Side Flash in the Enterprise
Enterprise Use Cases—SQL Server (DAS)

**Before**

- Monolithic Storage Arrays
- Proprietary Replication
- 2 Days to Render Billing Reports
- Annual Support Fees $120,000

**After**

- Server-Side PCIe Flash
- Microsoft AlwaysOn Replication
- 2 Hours to Render Billing Reports
- Annual Support Fees $8,000
Enterprise Use Cases—VMware VDI (DAS)

**Before**
- **View Servers**
- **Domain Controller**
- **SAN**
- **VDI Cluster (& Personas)**

15-18 Virtual Desktops per Hour
10-15 Linked Clones Recomposed per Hour
30 Hosts for 1000 VMs

**After**
- **View Servers**
- **Domain Controller**
- **Ethernet**
- **VDI Cluster (& Personas)**

500 Virtual Desktops per Hour
500 Linked Clones Recomposed per Hour
3 Hosts for 1000 VMs
Enterprise Use Cases—SQL Server 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

Flash + Caching SW
Enterprise Use Cases—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
Server-Side Flash in The Cloud
Cloud Use Cases—PCIe SSDs vs. SATA for NoSQL & MySQL (DAS)

**Before**

NoSQL Using Disk Form-Factor SATA SSDs  
Exponential Growth Drove Massive Server Sprawl  
Escalating Space/Power and Operations Expense  
Large Storage Infrastructure: High Management Costs

**After**

3:1 Server Consolidation & 6:1 Rack Consolidation  
3x Increase in IOPs & 50% Reduction in Latency  
Reduced Management Costs  
60% TCO Improvement
Cloud Use Cases—Clustered Caching for MySQL

**Before**

All Flash Array on SAN Had Unacceptable Latency for Indexing Algorithms
Latency Measured in Milliseconds

**After**

Transparent Acceleration for AFA SAN
Latency of 40 uSec
Cloud Use Cases—HA Software for NoSQL (MongoDB)

**Before**

- MongoDB Query Router
  - MongoDB Shard 1
    - Secondary
    - Heartbeat
  - MongoDB Shard 2
    - Secondary
    - Heartbeat

- “Eventual Consistency” Compromises RPO/RTO
- Read Preferences Off-loaded to Secondary
- Double the Server Count (Server Sprawl)

**After**

- MongoDB Query Router
  - MongoDB Shard 1
    - Primary HA store for Shard1
    - Secondary HA store for Shard1
  - MongoDB Shard 2
    - Primary HA store for Shard2
    - Secondary HA store for Shard2
  - Pacemaker
  - Corosync

- “No Compromise” Synchronous Replication
- 2:1 Server Consolidation, 50% TCO Savings
- Flash Removes Need to Off-load Reads
Cloud Use Cases—SSD Clustering 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
Summary

- Flash is now mainstream
- Server-Side Flash is growing rapidly
- Many different high-value Use Cases
  - Cloud
  - Enterprise
- Server-Side Software is the key to enabling new use cases