How Business Transforms With Flash

Randy Kerns, Senior Strategist, Evaluator Group
Bob Madaio, Senior Director, Product Marketing, Hitachi Data Systems
September 17, 2014
How Business Transforms With Flash

Flash technology presents an inflection point in information storage and retrieval. It is having a profound impact on IT as the technology continues to progress through rapidly changing cost and density dynamics. While much of the discussion has been on the technology and its detailed implementations, understanding its effect on business processes is key. Much of the vendor promotion has been “mine is faster” or “mine is cheaper” or “mine is bigger.” But the customers who benefit most from this technology will be those who use it to improve a critical business process. The good news is that continuing changes in flash technology will allow even more opportunities to transform business.

In this webinar, hear Randy Kerns, senior strategist, Evaluator Group, discuss the impacts of flash and the potential business transformation that will occur as this technology continues to evolve. You can expect to learn about:

- Business benefits currently being seen with the deployment of flash technology
- Technology advances to expect over the next few years
- Impacts from the next evolution of flash technology and its business advantages
- Strategic direction for businesses to maximize value from flash
Business Benefits of Flash Storage

- Background to understand benefits
  - Initial deployments in some very specific areas – reasons are:
    - Cost
    - Sales approaches
    - Products offered – capabilities, vendors
  - Flash storage is a dynamic area
    - Products
    - Cost reductions
    - Capacity increases
    - Familiarity
Business Benefits of Flash Storage

- **Most common benefits seen**
  - Applications
    - Acceleration – primarily with databases
    - More transactions per second, improved response time
    - Reduction in number of processors required for databases
      - License reduction or able to postpone major license expansion
      - Reduction in tuning required for operation
Business Benefits of Flash Storage

- Most common benefits seen - continued
  - Server virtualization deployments
    - Increase in number of virtual machines per physical server
      - VM density
      - VMware – faster access to VMDK files enables more VMx
  - Move stalled server virtualization projects forward
  - Allow performance critical workloads to be virtualized
Business Benefits of Flash Storage

- Most common benefits seen - continued
  - Virtual Desktop Initiative deployments
    - Support greater number of virtual desktops
      - I/O constrained for desktop support
    - Improve response time for desktop – success of VDI project with users
    - Handle boot storms
Areas of Usage

- HPC
- Data Warehouse
- Web Applications
- User Files
- Transaction Processing
- VM Infrastructure
- Online Archive
- More Capacity
- Less Capacity

Greater Performance
Solid State Storage - Review

- **No electro-mechanics**
  - Disk storage uses spin motors and actuators
  - Electro mechanical devices are limited by the mechanics
  - Mechanisms wear, generate heat, consume power

- **Faster and more reliable**
  - Electronic access speed
  - No physical wear
  - This CHANGES everything for storage
Value to IT

- Faster access to data
- With faster access – more processing can be done
  - Disparity – processor performance increase vs. HDD
  - Result - Storage performance is limiting factor in most environments
Where Flash Is Deployed

- **Solid State on Memory Bus in Servers**
- **Solid State Plug-in card in Servers**
- **All Solid State Storage Systems**
- **Flash PCIe cards**
- **Hybrid Solid State Storage Systems**
- **New designs**
- **Recent Offerings as DIMMs**
- **Flash added for Caching**
- **Solid State as Cache in Traditional Storage Systems**
- **SSDs and HDDs as tiers with Tiering software**
- **Dynamic Tiering in Traditional Storage Systems**

New designs
Current Offerings for Flash Storage

- All flash arrays – new design systems
  - Many from startup companies
  - Some acquired and offered by established vendors

- Hybrid arrays – new designs (designed for solid state)
  - Flash is really a cache
  - Disks are a backing store – no direct access to disk
  - Targeted at mid-tier market and below

- Traditional disk storage systems with flash added as tier
  - Most use SSDs – flash that mimics hard disk drives, some with more advanced flash designs
  - Some systems have modifications to optimize flash usage

- Server-level – PCIe cards and now Flash on motherboard
  - Special software required
Selection of Flash Storage

- Depends on what needs to be accomplished
  - Acceleration, server and desktop virtualization environments
  - Overall improvement of storage environment
    - Consolidation
    - Ability to introduce new workloads

- Confidence in flash storage system
  - From a major vendor
  - Valuable features available – does not disrupt current environment
  - Low-risk solution
  - Investment will be protected – updates and advances in technology
Areas of Usage

Current State

More Capacity

Less Capacity

Greater Performance

In Process

Future

Greater Performance

More Capacity

Less Capacity

In Process

Current State

Future
Transforming Business

- Expand workload usage for flash storage
  - Acceleration effect
  - Get more work accomplished per unit of time
  - Existing applications – improve execution
  - New applications – take advantage of response time improvement

- Workload usage expansion results in change in deployment for flash storage over time
  - Primary storage → solid state
  - Performance and economic benefits drive transition
Business value for primary storage must use different economic calculations
- Solid State increases performance
- Value is from performance increases, not from capacity measures

Measure of performance increase using solid state is increase in amount of work done
- Cost measure is value brought from solid state
- Simple measure is in $/IOP – but even that does not show value delivered from solid state
- Compare with storage capacity measure of $/TB
- New economics for storage
- Effect on entire system
Economics Example

- Solid State accelerates application – 1000 more transactions/second
  - More from investment - Ability to do more with existing systems
  - Expand business – quickly and without re-architecting systems and environment
- Acceleration means 1000’s more of I/O’s
  - 1000 transactions may be 8000 I/O’s for example
  - Use solid state system with 1M IOPs
- What is the value of 1000 more transactions
  - It’s not measured in $/GB

Application I/O Dependency

- CPU Execution 100 µsec
- I/O Operations 5,000 µsec
- CPU Execution 100 µsec

Per Application Response Time
Not aggregate I/O’s / sec
Transform Business Summary

- Solid state storage is an inflection point in the industry
  - Flash is the technology of the day
  - Investments for the future – advanced flash and other technologies

- Major business benefits
  - Performance
  - Space, power, cooling, reliability
  - Longevity

- Business value makes transition inevitable
  - Occurs over time
  - Too many advantages to ignore
Driving Business Outcomes with Flash

Bob Madaio, Senior Director, Product Marketing
Hitachi Data Systems
Accelerating Business Defined IT

- Business and IT teams are aligned on key initiatives

- A continuous cloud infrastructure can drive automation, agility, and availability

- But today’s real-time business environment means a massive leap in performance is needed
A single Hitachi Accelerated Flash device delivers >250x IOPS at a fraction of the response time of a high-performance disk drive.
200% Revenue Growth

1,000s Of Hitachi Flash Systems

>17.5PB Shipped Last Quarter
## Hitachi Perspective on Flash

<table>
<thead>
<tr>
<th>Our Goals</th>
<th>What We Realized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliver enterprise-ready flash solutions</td>
<td>Off-the-shelf hardware forced too many compromises</td>
</tr>
<tr>
<td>Introduce flash with minimum customer disruption</td>
<td>Most solutions were forcing flash “silos” on customers</td>
</tr>
<tr>
<td>Deliver unique solutions for flash-first data centers</td>
<td>Continued Hitachi innovation needed in both HW and SW</td>
</tr>
</tbody>
</table>
Hitachi Accelerated Flash storage

Designed for enterprise storage: enhanced durability and ECC, high-density, consistent performance

Hitachi flash software optimizations

Fundamental software modifications add “express” I/O processing and optimized cache management
Today’s Hitachi Flash Storage Portfolio

All Hitachi storage systems available as all flash, all disk or tiered.

SSD Support

Hitachi Accelerated Flash Support

Performance

Functionality / Scalability
Establishing Performance Leadership

**Hitachi Unified Storage VM All Flash**

- 4 Million IOPS Per System
- 1M Random Read IOPS
- >300TB Flash

**HUS 150**

SPC Flash Array Results

<table>
<thead>
<tr>
<th></th>
<th>IOPS</th>
<th>Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUS 150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBM® V7000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPC Flash Array Results**

- >300K SPC-1 IOPS

**Lowest Response Time Ever Recorded**

HUS VM + 2-Node HNAS 4100

**Unified HUS VM**

SPECsfs2008_nfs.v3 Results

© Hitachi Data Systems Corporation 2014. All rights reserved.
Garnering Industry Notice and Accolades

2014 DCIG Flash Buyer’s Guide

Hitachi HUS VM rated: **Excellent**

Ranked above EMC, PureStorage, NetApp, Dell, SolidFire, Violin, IBM flash offerings

**HDS gives EMC and NetApp a good benchmark kicking**

**EMC, how’s that ‘Speed 2 Lead’ campaign working out?**

By Chris Mellor, 10 Oct 2013

© Hitachi Data Systems Corporation 2014. All rights reserved.
Deliver Flash Performance, Not Flash Silos

Stand-alone flash approach
Point-product decisions lead to difficult management and increasing opex

Hitachi approach
Common software across platforms simplifies operations and lowers customer costs

Hitachi Command Suite

Flash  HDD  File  Tiered  3rd Party

Data Protection
If Business-Defined IT Is Flight ...

... Then Flash Storage Is ...
Hitachi Flash: Powering SAP

- Hitachi is the 1st company to OEM the SAP HANA platform
- Certified storage and solutions within SAP HANA Tailored Data Center Integration (TDI) program
- Hitachi Storage Adapter SAP NetWeaver LVM

75% Time Reduction For SAP Refreshes

“The Hitachi Flash Acceleration was so fast and displayed off-the-chart performance for these enterprise workloads …”

— Tim Waldock
Global Applications Infrastructure Leader, Owens Corning
Hitachi Flash: Accelerating Oracle

- **Centris challenge:** Oracle DB/DWH growth and performance
  - Drove an onsite vendor bakeoff

- **Chosen solution:** Hitachi Unified Compute Platform (UCP) for Oracle Database, featuring HUS 150 and Hitachi Accelerated Flash

“"The hardware is the enabler of our business, so everything must work perfectly”"

- Julian Portmann, Head of Software Development at Centris

---

**Hitachi Oracle integration**

- Oracle Enterprise Manager plug-in
- Oracle Recovery Manager adapter
- Oracle Virtual Machine plug-in
- Oracle storage reclaim (planned)
**REGION NORDJYLLAND**

- Runs healthcare IT system in the northern region of Denmark
- Purchase cost weighed against performance and availability
- Deployed a fully consolidated Hitachi infrastructure
- Leveraged Hitachi Accelerated Flash for critical Citrix VDI installation

“The Hitachi solution was able to meet all our needs for the VDI project as well as the larger vision for data center consolidation, the ability to reduce management tools, and a way to seriously uncomplicate the storage environment”

— Wes Wright, Vice President and CTO
Seattle Children’s Hospital
Flash is a critical part of a high-performance datacenter strategy ...

... but flash storage is not a strategy

Hitachi Data Systems has
- Leading enterprise flash storage
- A solutions-led mindset
- The ability to support your business direction

Learn more: www.hds.com/flash
Questions and Discussion
Upcoming WebTechs

- **WebTechs**, 9 a.m. PT, 12 p.m. ET
  - *Extend IT Beyond the Data Center*, September 24
  - *Building Continuous Cloud Infrastructures*, October 8
  - *The Rise of Enterprise IT-as-a-Service*, October 22

- **Check** [www.hds.com/webtech](http://www.hds.com/webtech) **for**
  - Links to the recording, the presentation, and Q&A (available next week)
  - Schedule and registration for upcoming WebTech sessions

Questions will be posted in the HDS Community: [http://community.hds.com/groups/webtech](http://community.hds.com/groups/webtech)
Thank You