Disk is Dead!
Storage Buyers at a Crossroads…

Flash Memory Summit 2015
Andrew Chen
VP, Product Management, Violin Memory
achen@vmem.com
The Journey to the All Silicon Data Center

- Tier-0
- Tier-1
- Tier-2, -3 & -4

Disk/Hybrid
Flash
The Journey to the All Silicon Data Center

- Performance, Performance, Performance
- Lowest $ per IOPS
- Lowest TCO for Performance Intensive Applications

Diagram:
- Tier-0
- Tier-1
- Tier-2, -3 & -4

Legend:
- Disk/Hybrid
- Flash
The Journey to the All Silicon Data Center

- Virtualized Environments
- In-Line Data Reduction lowers $ per GB and Increases Capacity Scale

Flash Memory Summit 2015
Santa Clara, CA
The Journey to the All Silicon Data Center

- Comprehensive Data Management Services
- The End of Compromises
- +Legacy Technologies Increasingly Fail to meet IT Demands of Present and Future

- Primary Storage (Tier-0, -1, -2)
- Tier-2, -3 & -4
- Disk/Hybrid
- Flash
Enterprise Primary Storage Requirements

The First Era

The Final Missing Link

The Second Era

PERFORMANCE

CAPABILITY

CAPACITY
Past and Future – A Tale of Two Technologies

**Hard Disk Drives**
- Declining in Volume Base
- Performance Stagnation
- Prohibitive Investment Requirements

**NAND Flash**
- Consumer Demand Provides Volume Scale
- Multiple Technology Innovations Ahead
Acceleration of Flash Adoption

- Lower TCO
- In-Line Data Reduction
- Full Feature Set Equivalent CapEx
- 3D NAND, TLC

Cost vs. Time vs. Market Penetration

SLC
MLC

Flash Memory Summit 2015
Santa Clara, CA
SSD Retrofit

Benefits:
✓ Rich Feature Set

Drawbacks:
• Low Performance
• High Cost
• Low Density

SSD-Based All-Flash Array

Benefits:
✓ In-line Data Reduction → Low $/GB Effective

Drawbacks:
• Low Performance
• Low Density
• Limited Features

Purpose Built All-Flash Array

Benefits:
✓ Most Effective Use of Flash

Drawbacks:
• High Investment to Develop
Enterprise Primary Storage Requirements

- PERFORMANCE
  - Writes
  - Sustained

- CAPABILITY
  - Extensive Data Management Services
  - RASM
  - Integrated, No Compromises

- CAPACITY
  - Investment Protection
  - Seamless Capability and Manageability
  - Cost
  - Scale
  - Choice
  - Density
Flash Drives Consolidation

- Storage Latency
- Inflicted I/O Wait

- Underutilized CPU

- Overprovisioned Storage
- Hybrid Sizing Complexity

- Accelerated and Consolidated

All-Flash
Flash Fulfills the Promise of Cloud

Performance Constrained Application Niches

Virtualization and Private Cloud

OLTP  BI  DW  VM

Silo’d Apps

Servers

Network

Databases

Mixed and Multiple Workloads on Shared Infrastructure

Hybrid Cloud

Public Cloud

Cloud Burst
The Effects of Flash in a Data Center

- **APPLICATION PERFORMANCE**: 20X increase
- **STORAGE CONSOLIDATION**: 90% reduction
- **POWER AND COOLING**: 90% reduction
- **SERVERS**: 80% reduction
- **SOFTWARE LICENSES**: 80% reduction
- **RETURN ON INVESTMENT**: <1YR
The Rewards

Business Transformation
• Enabling Workflows
• Meeting Customer SLA’s
• Speed to Insight as a Differentiator
• New Revenue Sources

Data Center Transformation
• Consolidation and Build Out Avoidance
• Power, Cooling, Space
• No More Compromises Required
Who is Flash For?

EVENYONE!
Thank You!