Flash Enables Server SAN

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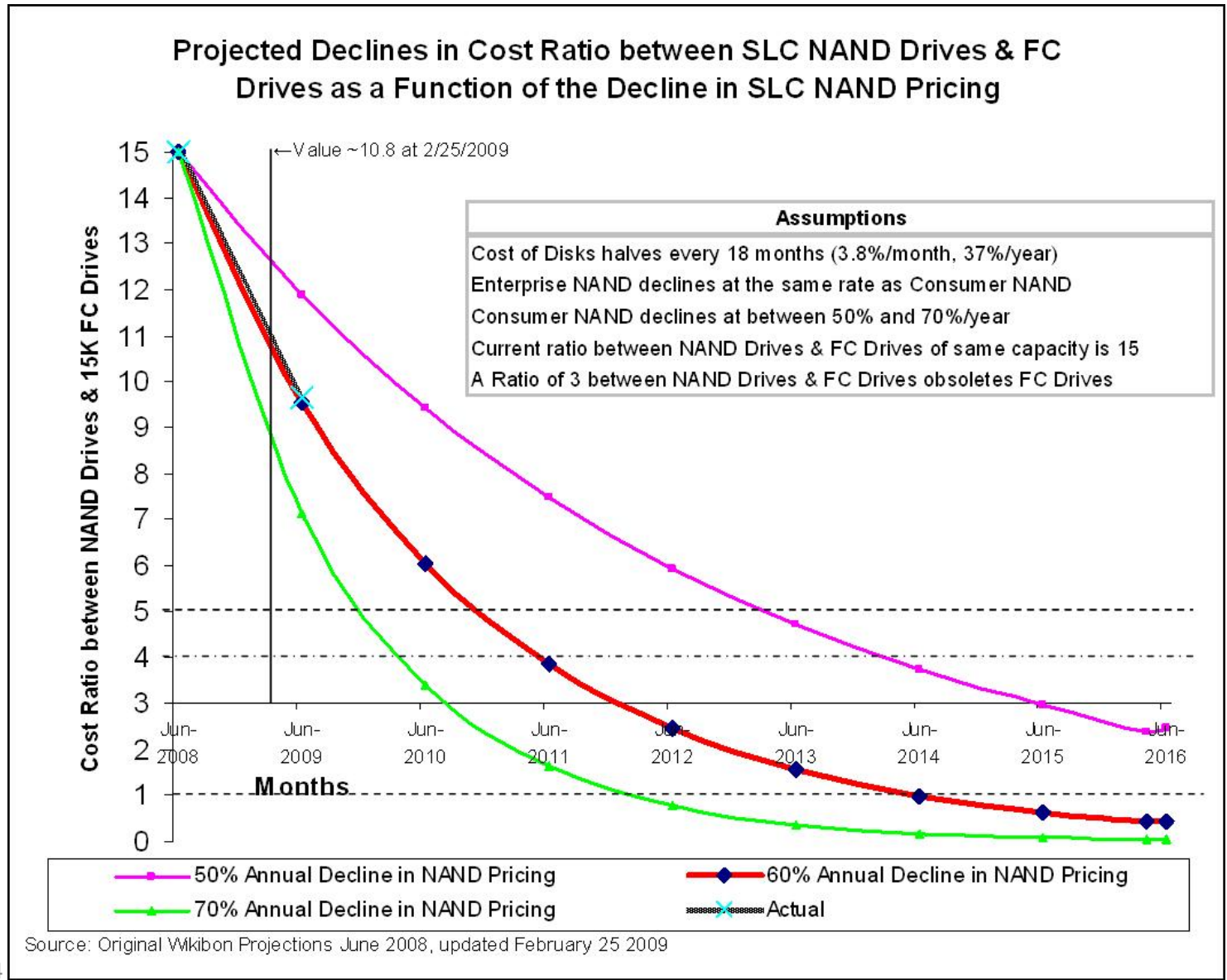
Forum D-12: Enterprise Storage Design

Agenda

- **What is Server SAN**

- How Flash Enables Server SAN

- Server SAN Projections

- Summary

What is Server SAN

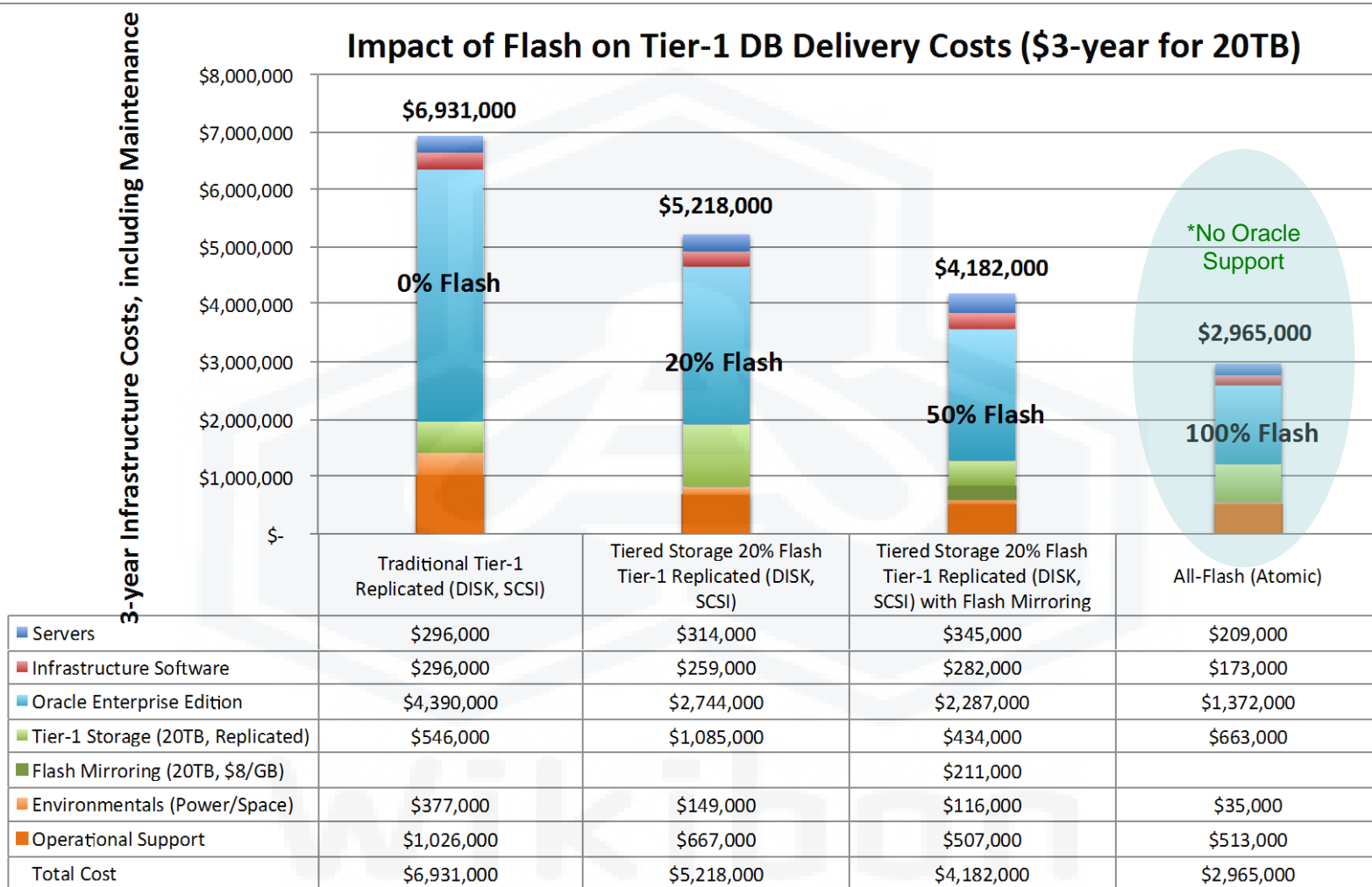- Server SAN is software-led storage built on commodity servers with directly attached storage (DAS)

- Back to the Future

- http://wikibon.org/wiki/v/The_Rise_of_Server_SAN

- http://wikibon.org/wiki/v/Server_SAN_Market_Definition

Agenda

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How Flash Enables: Active Data on Flash

Projected Declines in Cost Ratio between SLC NAND Drives & FC Drives as a Function of the Decline in SLC NAND Pricing

←Value ~10.8 at 2/25/2009

Assumptions

Cost of Disks halves every 18 months (3.8%/month, 37%/year)
Enterprise NAND declines at the same rate as Consumer NAND
Consumer NAND declines at between 50% and 70%/year
Current ratio between NAND Drives & FC Drives of same capacity is 15
A Ratio of 3 between NAND Drives & FC Drives obsoletes FC Drives

Y-axis: Cost Ratio between NAND Drives & 15K FC Drives
X-axis: Months (Jun-2008, Jun-2009, Jun-2010, Jun-2011, Jun-2012, Jun-2013, Jun-2014, Jun-2015, Jun-2016)

Legend:
— 50% Annual Decline in NAND Pricing
— 60% Annual Decline in NAND Pricing
— 70% Annual Decline in NAND Pricing
— Actual

Source: Original Wikibon Projections June 2008, updated February 25 2009

How Flash Enables: Lower Costs

Impact of Flash on Tier-1 DB Delivery Costs ($3-year for 20TB)

3-year Infrastructure Costs, including Maintenance

- $6,931,000 — 0% Flash
- $5,218,000 — 20% Flash
- $4,182,000 — 50% Flash
- $2,965,000 — 100% Flash — *No Oracle Support

	Traditional Tier-1 Replicated (DISK, SCSI)	Tiered Storage 20% Flash Tier-1 Replicated (DISK, SCSI)	Tiered Storage 20% Flash Tier-1 Replicated (DISK, SCSI) with Flash Mirroring	All-Flash (Atomic)
■ Servers	$296,000	$314,000	$345,000	$209,000
■ Infrastructure Software	$296,000	$259,000	$282,000	$173,000
■ Oracle Enterprise Edition	$4,390,000	$2,744,000	$2,287,000	$1,372,000
■ Tier-1 Storage (20TB, Replicated)	$546,000	$1,085,000	$434,000	$663,000
■ Flash Mirroring (20TB, $8/GB)			$211,000	
■ Environmentals (Power/Space)	$377,000	$149,000	$116,000	$35,000
■ Operational Support	$1,026,000	$667,000	$507,000	$513,000
Total Cost	$6,931,000	$5,218,000	$4,182,000	$2,965,000

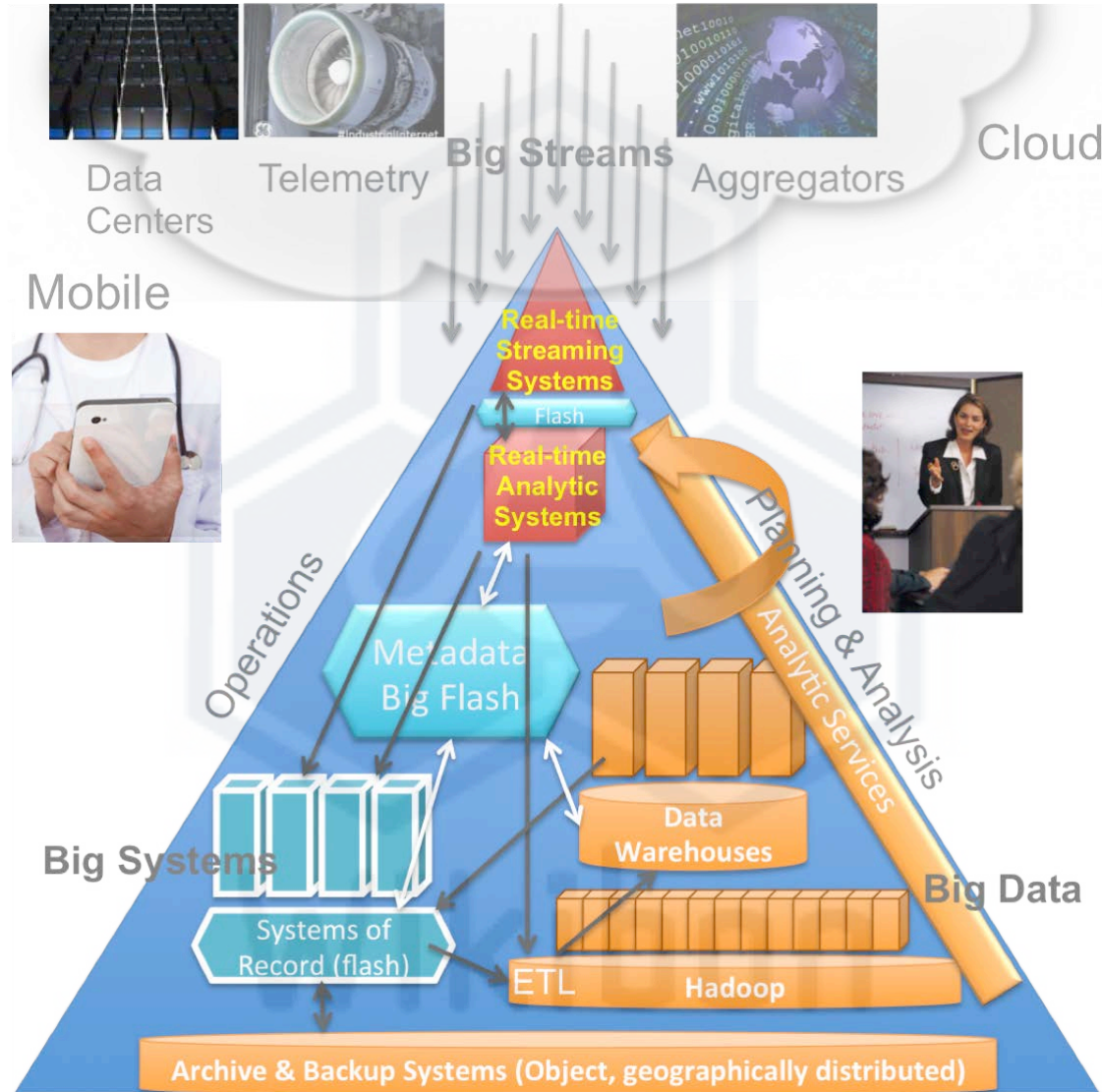*Source: © Wikibon August 2014*

How Flash Enables – Server SAN Basis for Real-time Computing

How Flash Enables Server SAN

- All Active Data on Flash

- Real-time Computing – Flash as an extension of Memory

- Flash obliterates value of Hard Disk IP

- Flash enables Virtualization & Meta-data management

- Virtual Switching faster/cheaper than Physical Switching

- Cost of Storage Software & Storage Management not tied to Array Architecture
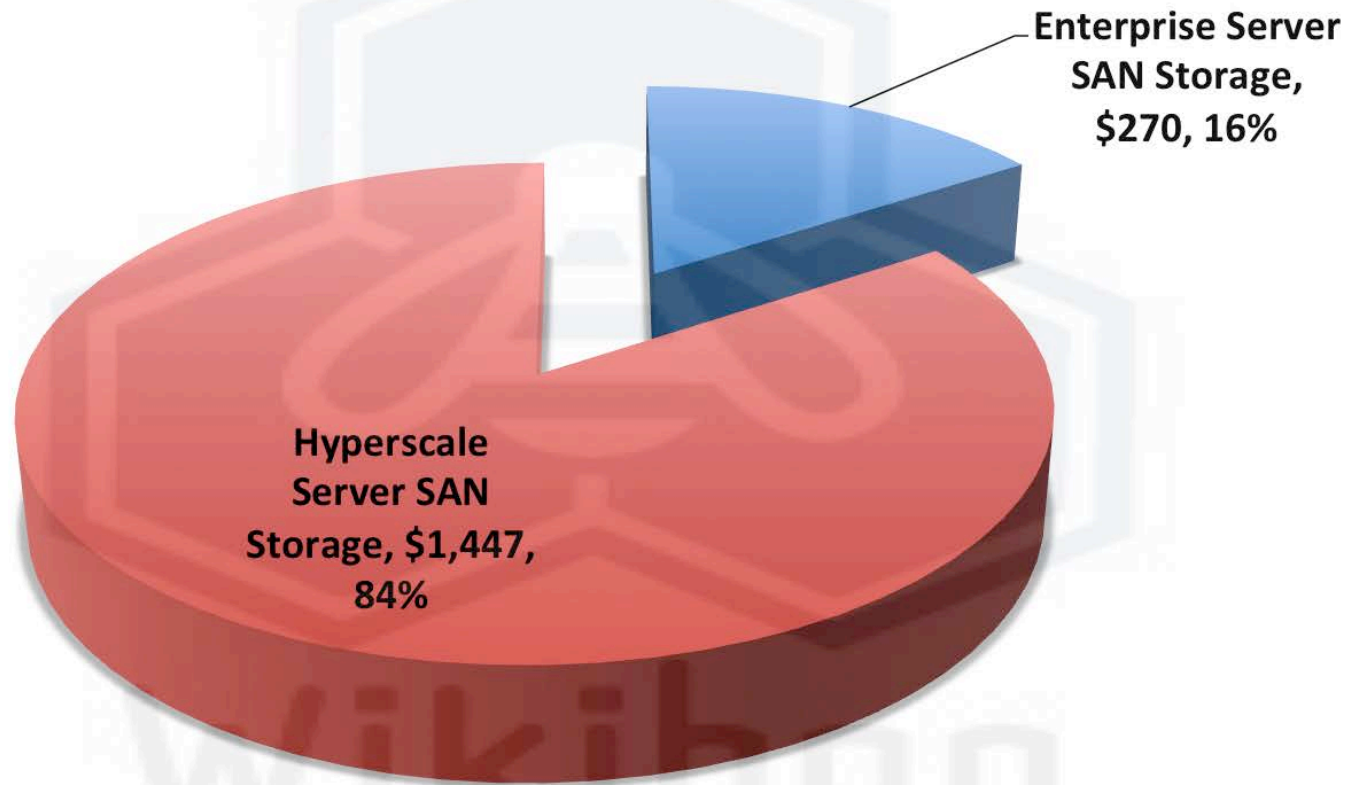
Agenda

- ## What is Server SAN

- ## How Flash Helps Server SAN

- ## **Server San Projections**

- ## Summary

Server SAN Projections: 2013 Actuals

Server SAN 2013 Storage Revenue ($million)
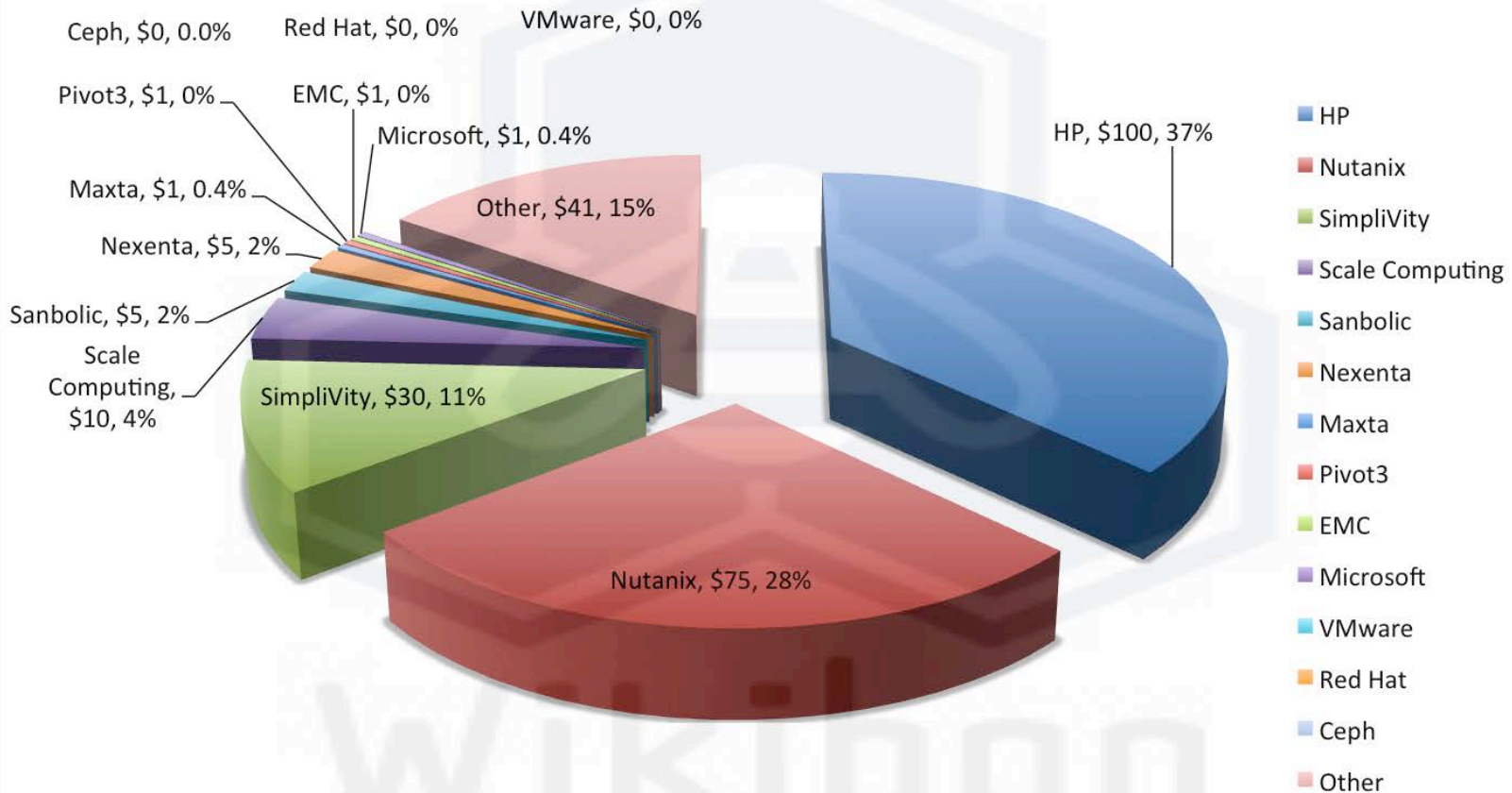Hyperscale vs. Enterprise (Total $1,717 million)

Enterprise Server SAN Storage, $270, 16%

Hyperscale Server SAN Storage, $1,447, 84%

Source: © Wikibon Server SAN Research Project 2014

Source: http://wikibon.org/wiki/v/The_Rise_of_Server_SAN

Enterprise Server SAN 2013 Revenue by Vendor Total 2013 Revenue of $270 million

Source: © Wikibon Server SAN Research Project 2014

Source: http://wikibon.org/wiki/v/The_Rise_of_Server_SAN

Server SAN Projections: 2012-2027

Traditional Enterprise Storage, Hyperscale Server SAN & Enterprise Server SAN Revenue Projections 2012-2027

Overall Growth of Enterprise (Server SAN & Traditional) & Hyperscale Storage is assumed to be (CAGR) 4.2%

Hyperscale Server SAN Storage

Overall Growth of Hyperscale Server SAN Storage is assumed to be (CAGR) 22.7%

Enterprise Server SAN Storage

Overall Growth of Enterprise Server SAN Storage is assumed to be (CAGR) 44.2%

Traditional Enterprise Storage (SAN, NAS + DAS)

Overall Growth of Traditional Enterprise Storage (SAN, NAS & DAS) is assumed to be (CAGR) -17.8%

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Hyperscale Server SAN Storage	$1,139	$1,447	$1,837	$2,333	$2,963	$3,764	$4,780	$5,927	$7,171	$8,606	$10,327	$12,392	$14,871	$17,696	$20,882	$24,431
Enterprise Server SAN Storage	$159	$270	$478	$903	$1,706	$3,225	$5,611	$9,483	$15,078	$21,712	$28,009	$31,930	$34,485	$36,381	$37,836	$38,404
Traditional Enterprise Storage (SAN, NAS + DAS)	$33,702	$33,879	$33,993	$33,798	$33,290	$32,110	$30,723	$27,823	$23,212	$17,487	$11,934	$8,538	$6,230	$4,373	$2,746	$1,797

Source: © Wikibon Server SAN Research Project 2014

Source: http://wikibon.org/wiki/v/The_Rise_of_Server_SAN

Summary & Conclusions

- Flash enables Virtualization & Metadata Management

- Flash as an extension to memory is higher performance & lower cost

- High-end availability & Performance & Low-end low cost disk will move first

- Open-source Software will play Pivotal Role

- High Potential for New Players