Violin MEMORY

Silicon Storm: The Inevitable Enterprise Silicon Data Center

Dr. Donald Basile Ph.D.
CEO & President

Real Time Data Access is a Reality

Dr. Donald Basile, Ph.D.

Chief Executive Officer & President

Violin Memory, Inc.

Leading Enterprise Memory company – delivering unlimited persistent memory to Enterprise, Clouds & Web Scale companies

Previous

- Angel Investor, Chairman and CEO of Fusion-io
- MS and Ph.D. Electrical Engineering

STANFORD UNIVERSITY

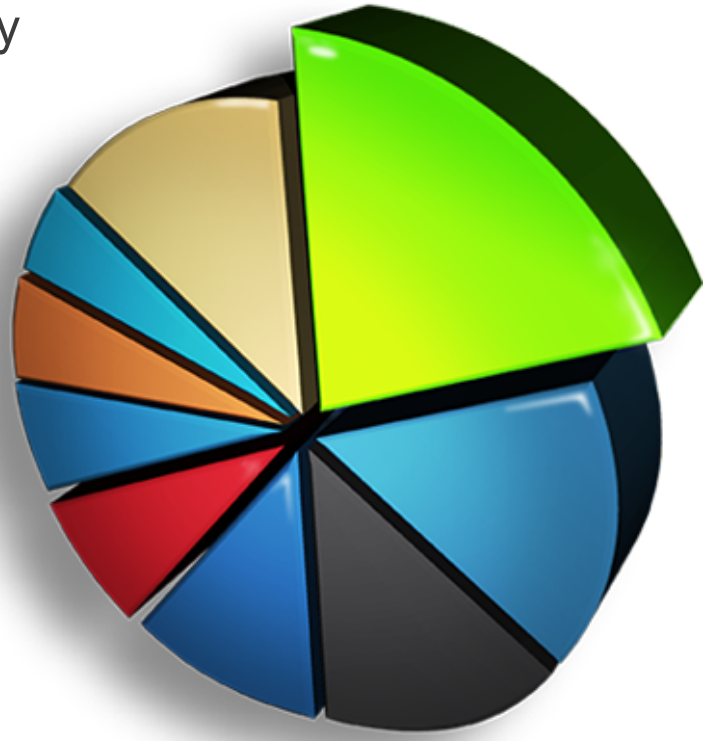
Violin MEMORY

Violin Leads the Pack

Gartner #1 Marketshare Flash Memory Array

#1 Flash Storage Array
Market Share Leader

Gartner



- **19% Violin Memory**
- 16% EMC
- 15% IBM
- 11% NetApp
- 7% Hitachi
- 6% N
- 6% P
- 5% W
- 14% Other

"The big winner was not EMC or NetApp but Violin Memory"
- GigaOm.com

Violin MEMORY

Violin Delivers Storage @ the Speed of Memory

Memory Arrays

Enterprise Applications on Memory Storage

Memory Cache

Enterprise Applications on Legacy Storage

Memory Cards

Scale-Out Applications on Server-based Flash

Violin Symphony

Predictive, Automated and Centralized control

Memory Software

vMOS™

Violin MEMORY

Violin *V*^{3} – Memory Cloud Platform

Violin MEMORY

New Platform for Business Applications

Real Time Data Access is a Reality

Prediction (from June 2010 Research Board talk)

Data Center 2020

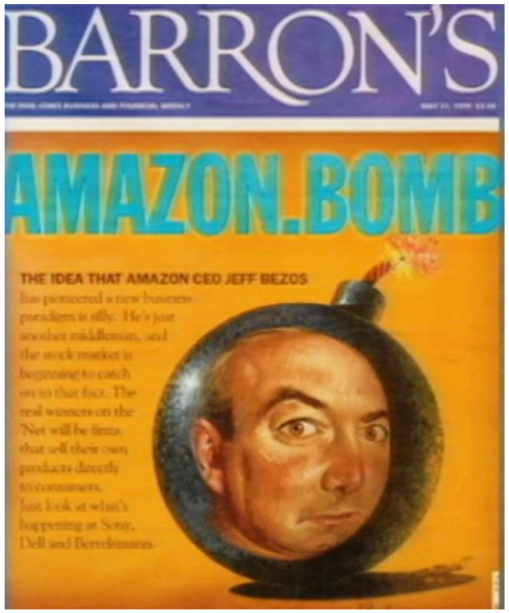
- You will be connected to vast quantities of real time data…
  - From your customers
  - From your customers customers
  - From devices, sensors, markets…… real-time
  - 24x7x365 x *Globally*
- Everything you compute will run IN MEMORY
  - Return to the 60's????
- Most of you will care about Internet Scale
  - somewhere between Amazon, Facebook, Google
- There be no mechanical systems (disks) left
  - (except for archive)

Predictions…

Some People Laughed at PC & Internet

There is no reason anyone would want a computer in their home.

- Ken Olsen
(Founder)
Digital Equipment
1977



May 1999

Violin MEMORY

Predictions…

“The ultimate software optimization is hardware”

Larry Ellison

CEO Oracle

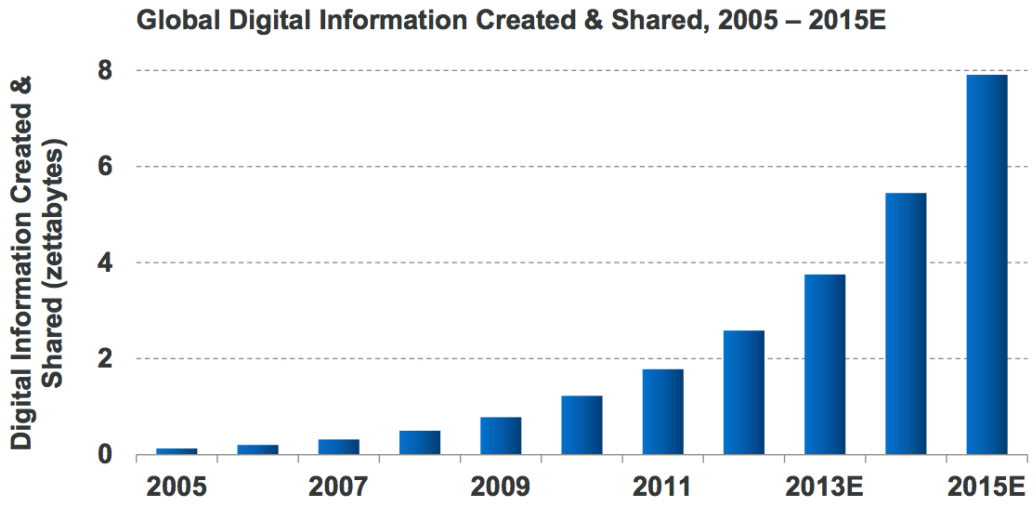
T5 product launch 2013

Violin MEMORY

Information explosion

World's Content is Increasingly Findable + Shared + Tagged - Digital Info Created + Shared up 9x in Five Years

Amount of global digital information created & shared
– from documents to pictures to tweets –
grew 9x in five years to nearly 2 zettabytes in 2011, per IDC.*



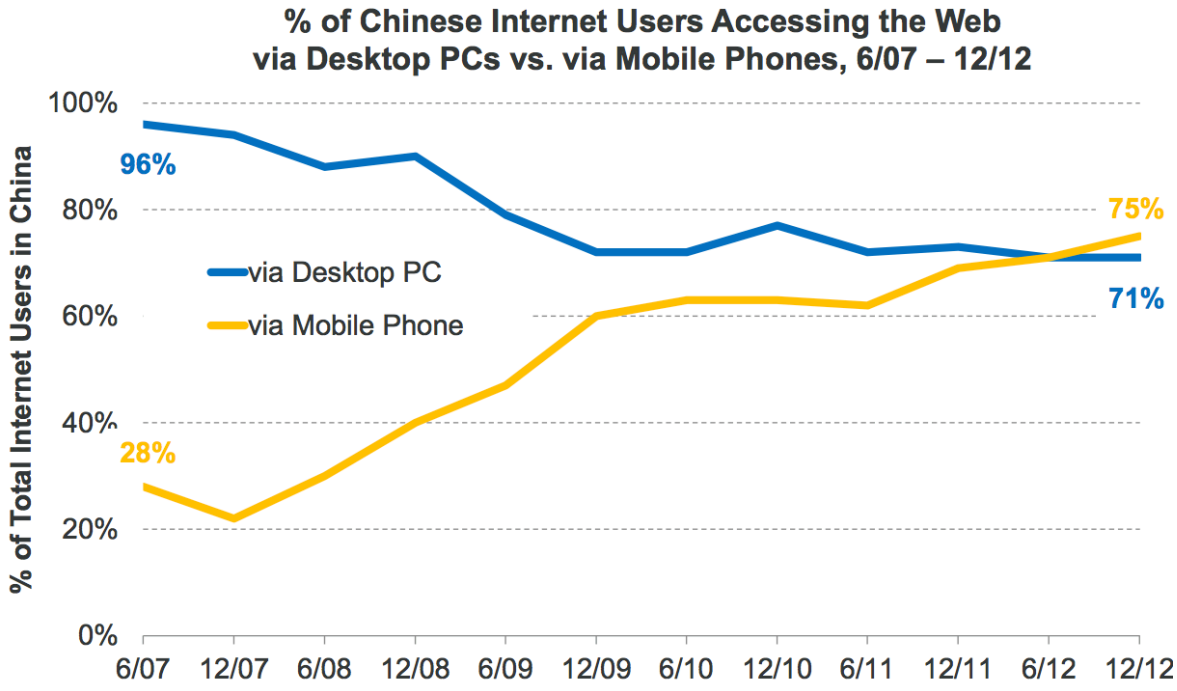
KPCB

Note: * 1 zettabyte = 1 trillion gigabytes. Source: IDC report "Extracting Value from Chaos" 6/11.

Violin MEMORY

Mobile is dominating

China –
Mobile Internet Access Surpassed PC, Q2:12



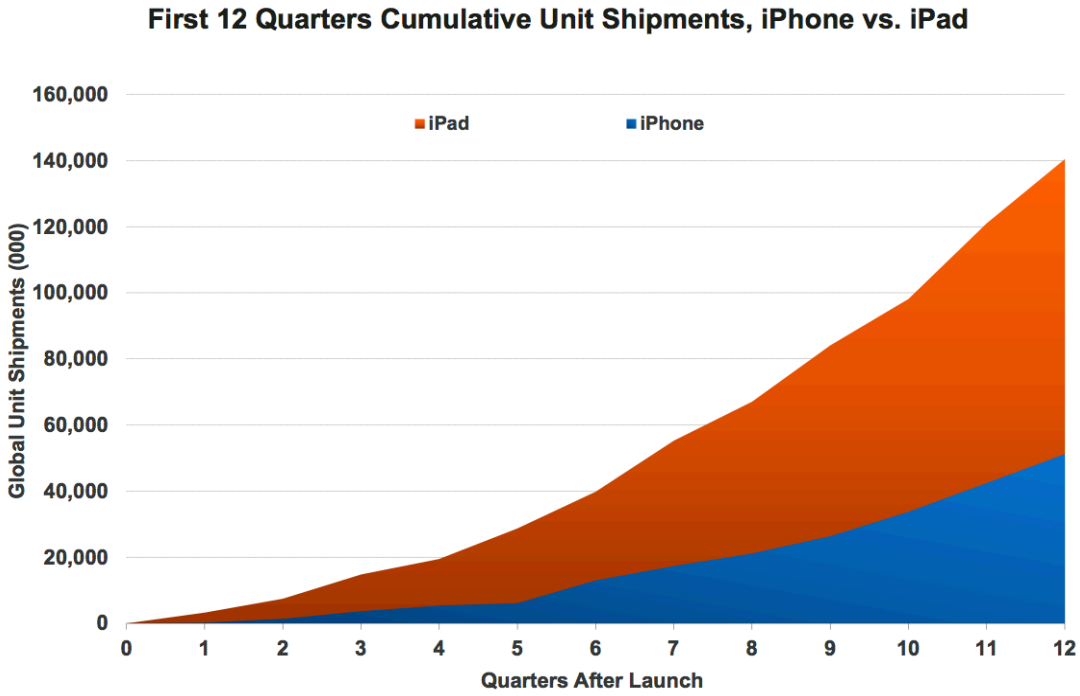
KPCB

Source: CNNIC, 1/13.

Violin MEMORY

Memory devices conquer….

Tablet Growth =
More Rapid than Smartphones, iPad = ~3x iPhone Growth



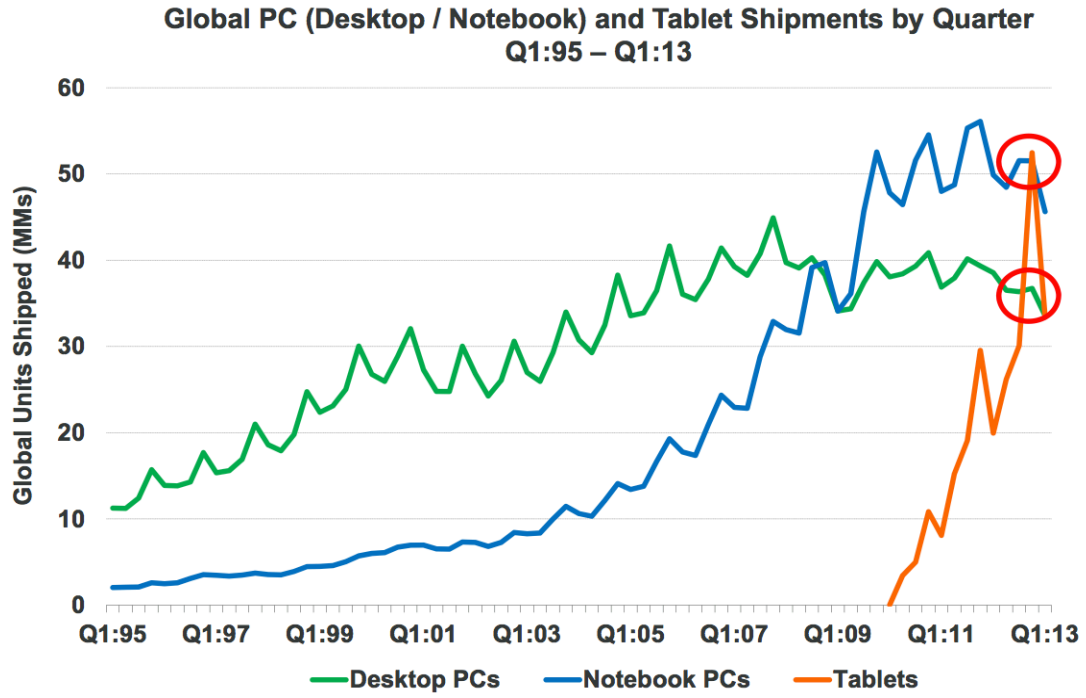
KPCB

Source: Apple, as of CQ1:13 (12 quarters post iPad launch).
Launch Dates: iPhone (6/29/07), iPad (4/3/10).

Violin MEMORY

Tablets rule….

Tablet Shipments =
Surpassed Desktop PCs & Notebooks in Q4:12, < 3 Years from Intro



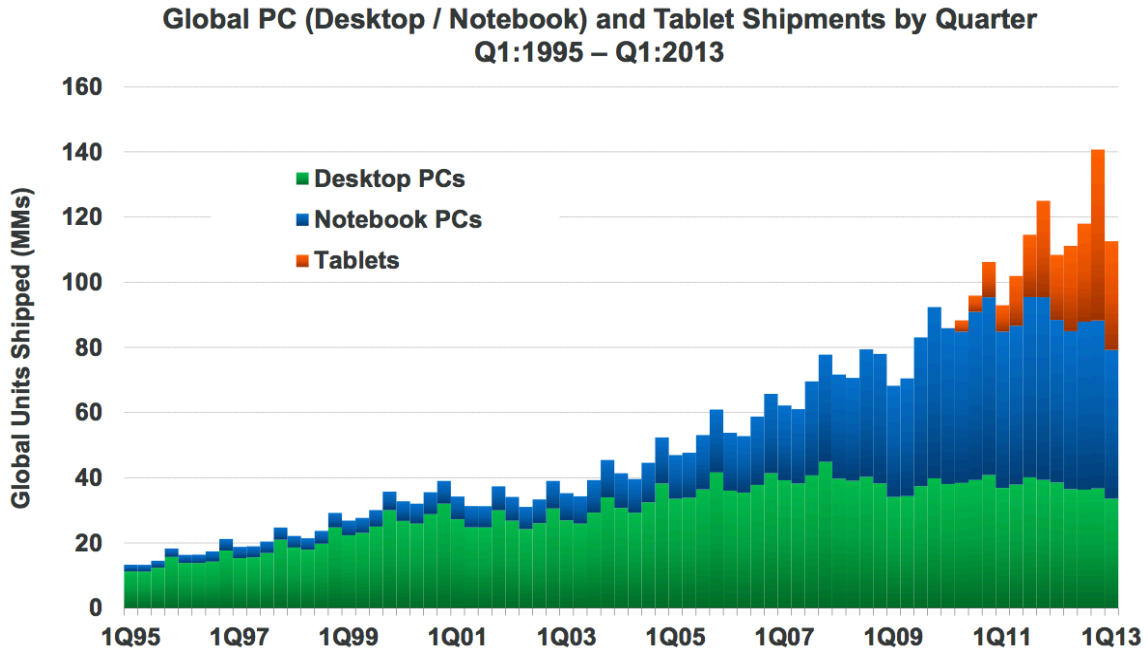
KPCB

Note: Notebook PCs include Netbooks.
Source: Katy Huberty, Ehud Gelblum, Morgan Stanley Research. Gartner. Data as of 4/13.

Violin MEMORY

Tablets = Mobile

Demand for Large-Screen Computing Devices is Robust, But Mix Favors Tablets, Not Notebooks & Desktops



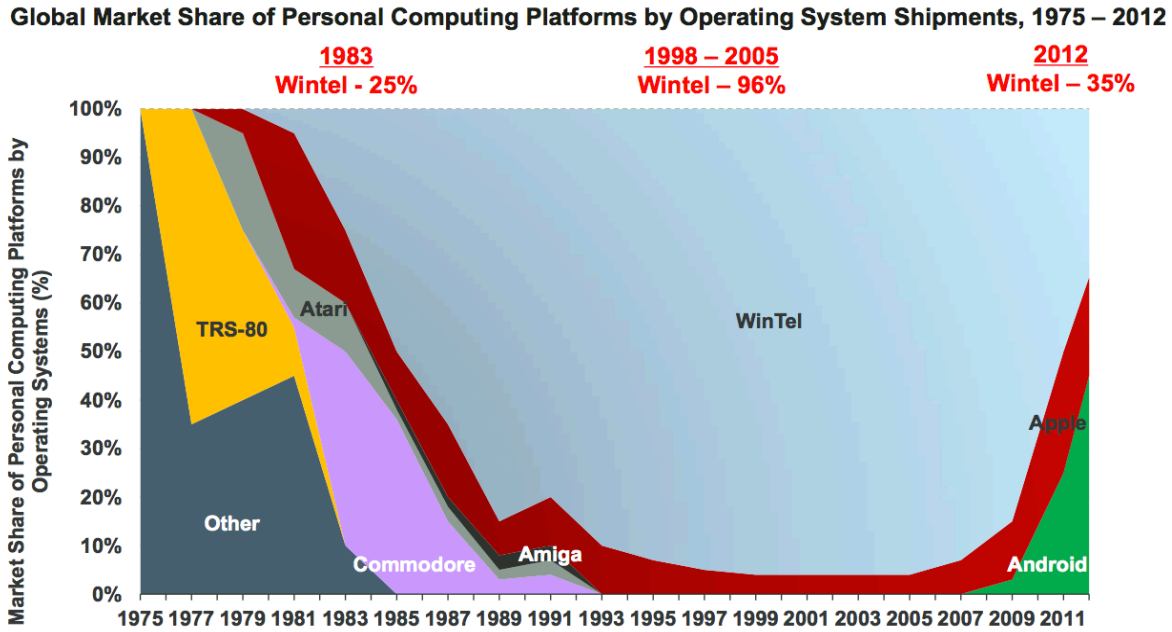
KPCB

Note: Notebook PCs include Netbooks.
Source: Katy Huberty, Ehud Gelblum, Morgan Stanley Research. Gartner. Data and Estimates as of 4/13.

Violin MEMORY

Mobile domination

Re-Imagination of Computing Operating Systems - iOS + Android = 60% Share vs. 35% for Windows



KPCB

Source: Asymco.com (as of 2011), Public Filings, Morgan Stanley Research, Gartner for 2012 data.

Violin MEMORY

NEXT (from June 2010 Research Board talk)

Billion of devices, the Internet of Things

- Its coming for your company…
  - 24 x 7 x 365 x *Global*
- Now can you
  - Get Internet scale?
  - Analyze?
  - Make decisions?
- What if you don't
- Does someone have competitive advantage?
  - Google?
  - the competitor next door?

All Silicon Data Center Is the Only Approach

Business Transformation is Underway

Personalized Customer
Promotions at POS

Faster Transactions
Real Time Risk Assessment

Immediate Market Insights
Faster Responses

In-game Sales
Improved User Experience

Call Analysis & Delivery
New Data Services

Increase end-user productivity
Lower OPEX/CAPEX

Violin MEMORY

How Violin Helped Tyson Foods Runs 3x to 20x Faster

2nd largest food production company in the Fortune 500

2011 revenue of $32.3 Billion

Key Takeaways

3x to 20x performance improvements. Dramatic improvements in application response times.

Running SAS and Microsoft SQL Server on Violin Memory is enabling Tyson to stay ahead of Wal-Mart demands and better predict their needs.

Challenge

- Nightly sales data from Wal-Mart too slow to load in Microsoft SQL Data Warehouse, affecting supply planning and ability to sell
- Queries not allowed during data ingest, restricting analysts ability to derive insights from sales data

Solution

- One 6616 Flash Memory Array
- SAS on Microsoft SQL Server 2012

Benefit

- 3 times faster data ingest, no missed SLAs.
- Ability to concurrently load and query data while maintaining low response times for SAS
- Able to stay ahead of Wal-Mart demands and better predict their needs

3x faster Data-Warehouse load times, 3x to 20x faster queries, and dramatically improved end-user experience. Simply by migrating to Violin Memory

Violin MEMORY

How Violin Helped Pella Drive Down Operational Costs

Innovative leader designing, testing, manufacturing and installing quality windows and doors.

Fortune 500. Privately held.

Key Takeaways

Pella replaced its estate of HP P9500 with Violin Memory 6000 Series Flash Memory Arrays to reduce operational costs over coming 3 years.

Lower power and space requirements, as well as reduced Database license costs as a result of the Violin Effect.

Challenge

- CIO looking for $200k Opex reduction over 3 years
- Focusing on business critical Oracle and Microsoft SQL databases
- No room for business disruption

Solution

- 60 TB of usable capacities delivered by two 6616 and two 6232 Flash Memory Arrays, across production and DR sites.

Benefit

- Massive consolidation of power and datacenter footprint
- Dramatic DB license cost avoidance thanks to the Violin Effect

Pella Replaced its Legacy Storage with Violin 6000 Series Flash Memory Arrays and Leveraged the Violin Effect to Aggressively Reduce Operational Costs

Violin MEMORY

How Violin Helped Service Provider Become 50% more Efficient

Large Service Provider

Key Takeaways

DB productivity increase by nearly 2X allowing for more real time analytics

Operational and Capital Expenditure reduction while meeting business objectives that will provide end users a more reliable experience

Challenge

- Real time monitoring of mobile switching network needed to ensure optimal network performance
- Legacy spinning disk was resulting in 5 minutes to do full database table scans. Target: 15-30 seconds

Solution

- 2X 6616 Flash Memory Arrays beat out Oracle Exadata, Fusion I/O ION and TMS offering
- 17 seconds to do full scans with just these 2 arrays.
- No system issues compared to competitive offerings

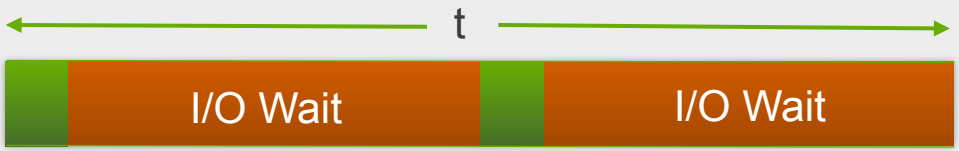
Benefit

- 90% improvement in random/sequential Reads
- <1ms versus >8ms on read latency for near real-time reads
- Substantial OPEX Savings: 1/13th Power consumption, 1/14th BTU/hr, 1/35th Rack Space

Meeting 15X performance targets was only the beginning
Saving significant expense with room to grow, only Violin could deliver

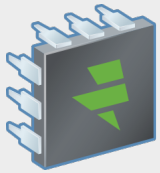
Eliminating Latency – The Key to Higher Efficiency

CPU Cycle with
Magnetic Disk:

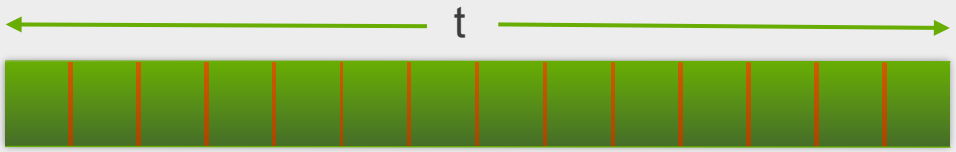


80%
Wait

20%
Work



CPU Cycle with
Memory Storage:



5%
Wait

95%
Work

Orders of Magnitude More Work In the Same Time

Violin MEMORY

The World is Rapidly Changing for the Better

2011

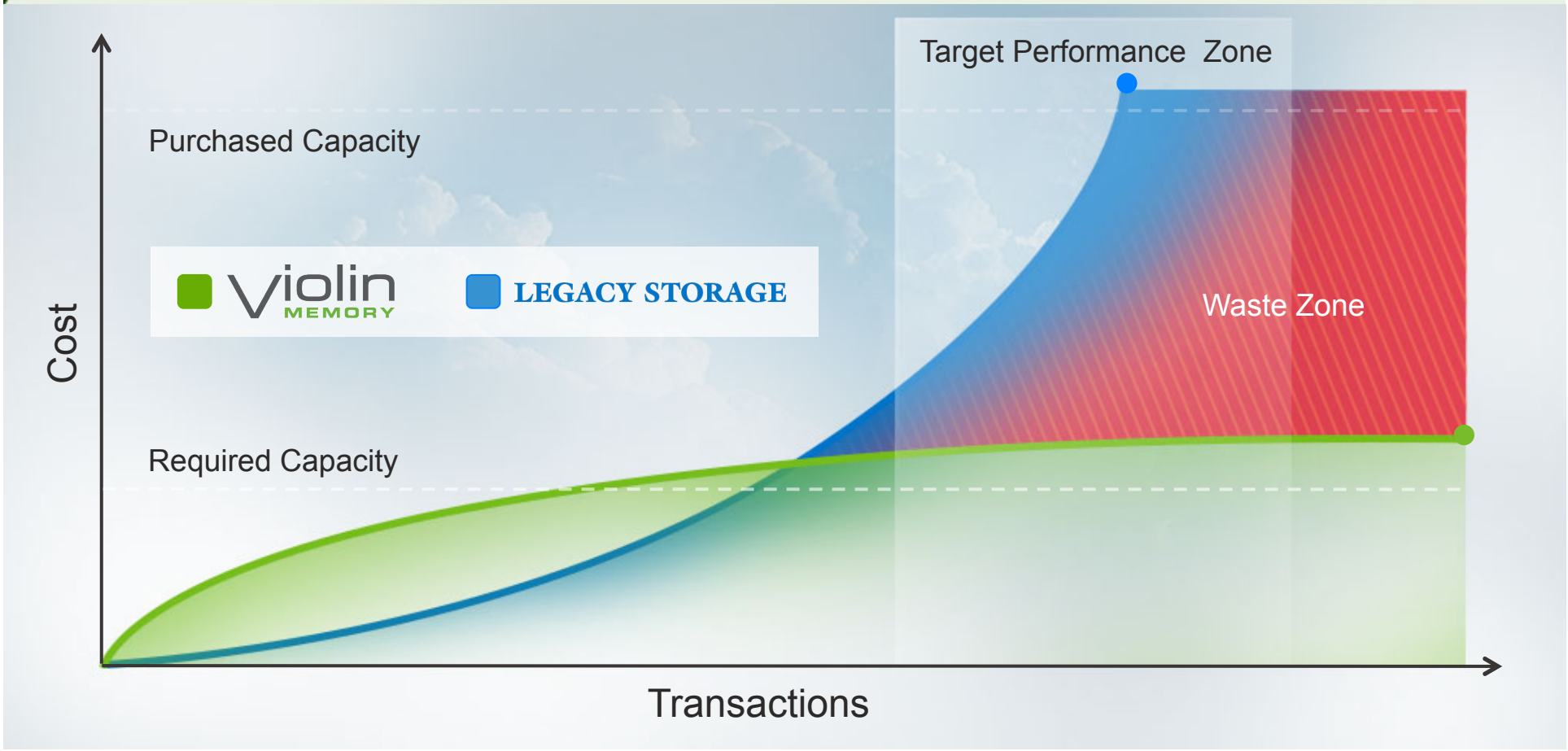
8 Engines, 960 drives
1 Million Read IOPS (16 VM's)
5 Racks or 210RU – 32,000 Watts

2012

2 Violin 6616 Memory Arrays
1 VM at 1 Million IOPS (Random R/W Mix)
6 RU (*97% less*) – 3,600 Watts (*90% less*)

Violin MEMORY

Violin Memory Delivers Radical Economics



Prediction (from June 2010 Research Board talk)

Data Center 2020

- You will be connected to vast quantities of real time data…
  - From your customers
  - From your customers customers
  - From devices, sensors, markets…… real-time
  - 24x7x365 x *Globally*
- Everything you compute will run IN MEMORY
  - Return to the 60's????
- Most of you will care about Internet Scale
  - somewhere between Amazon, Facebook, Google
- There be no mechanical systems (disks) left
  - (except for archive)

The Road to the Enterprise Silicon Data Center is paved with Flash