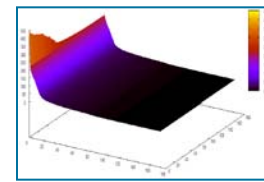
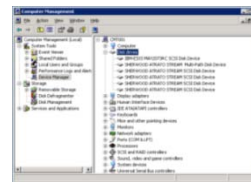
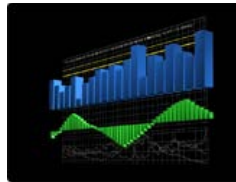


Hybrid Storage Architecture Marries Performance and Efficiency

Bill Mottram

VP of Marketing at Atrato



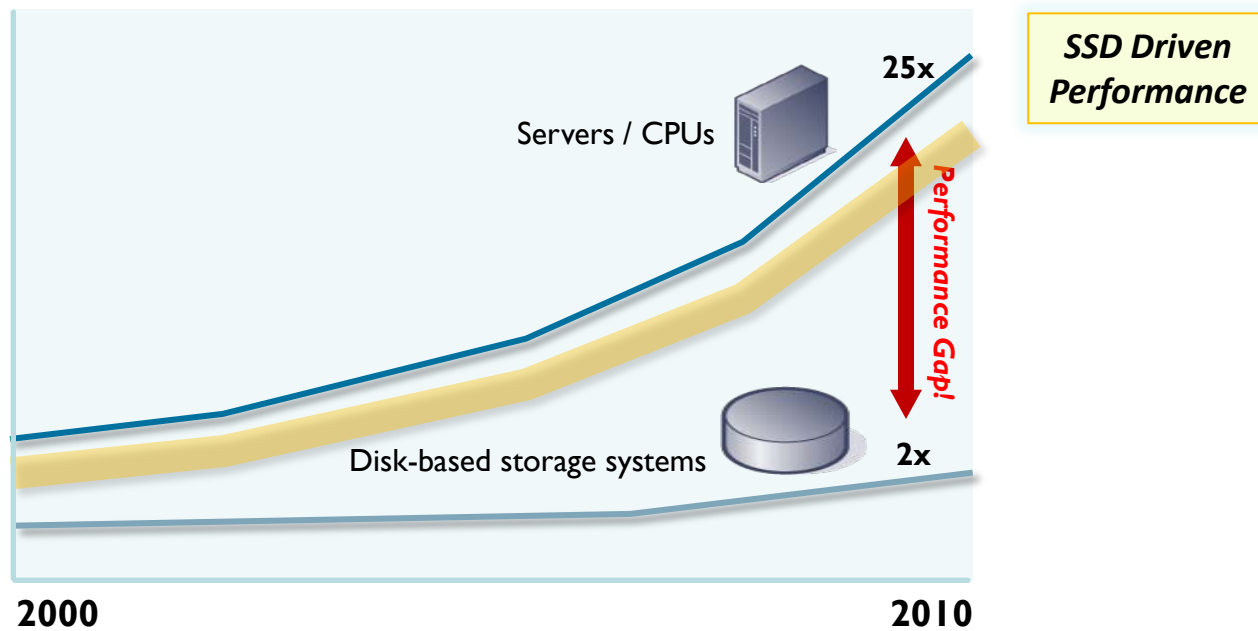
Au·to·nom·ic [aw-tuh-nom-ik]

–adjective The ability to manage or improve operation with little or no human intervention

1. What do I mean by
“Hybrid Storage, vLUN” ?
2. What do I mean by *“performance”* ?
3. What do I mean by *“efficiency”* ?
4. What do I mean by
“green data storage” ?

The Storage Dilemma

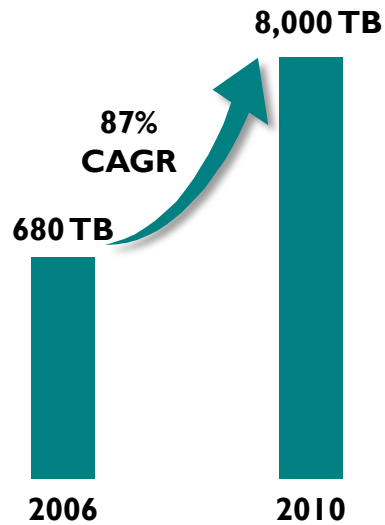
Increasing Performance Gap between Servers and Storage



- Increasing server performance
- Traditional disk performance

Compounding Pain Points

Explosive data growth in typical Fortune 1000 enterprise



Source: InfoPro TIP
Wave 9

Data centers are running out of power

33% of Data Centers expected to be out of power



2007

97% of Data Centers expect to be out of power



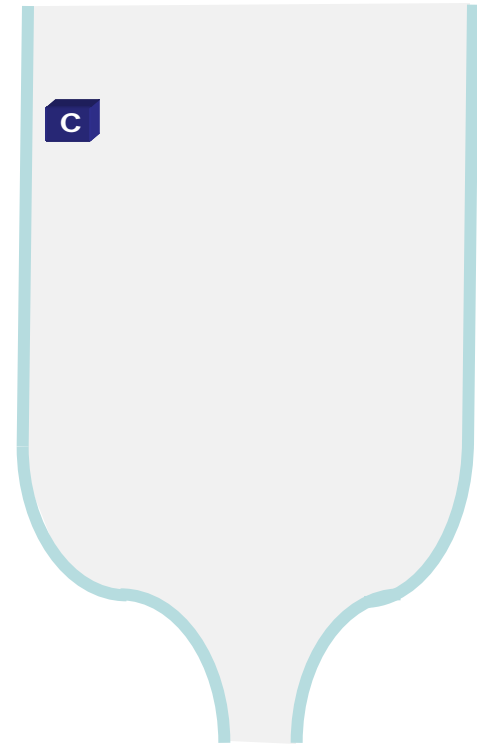
2011

Source: Liebert
Systems, Inc.

“Performance Starved Applications”

PSAs are applications where performance is negatively impacted (bottlenecks) because;

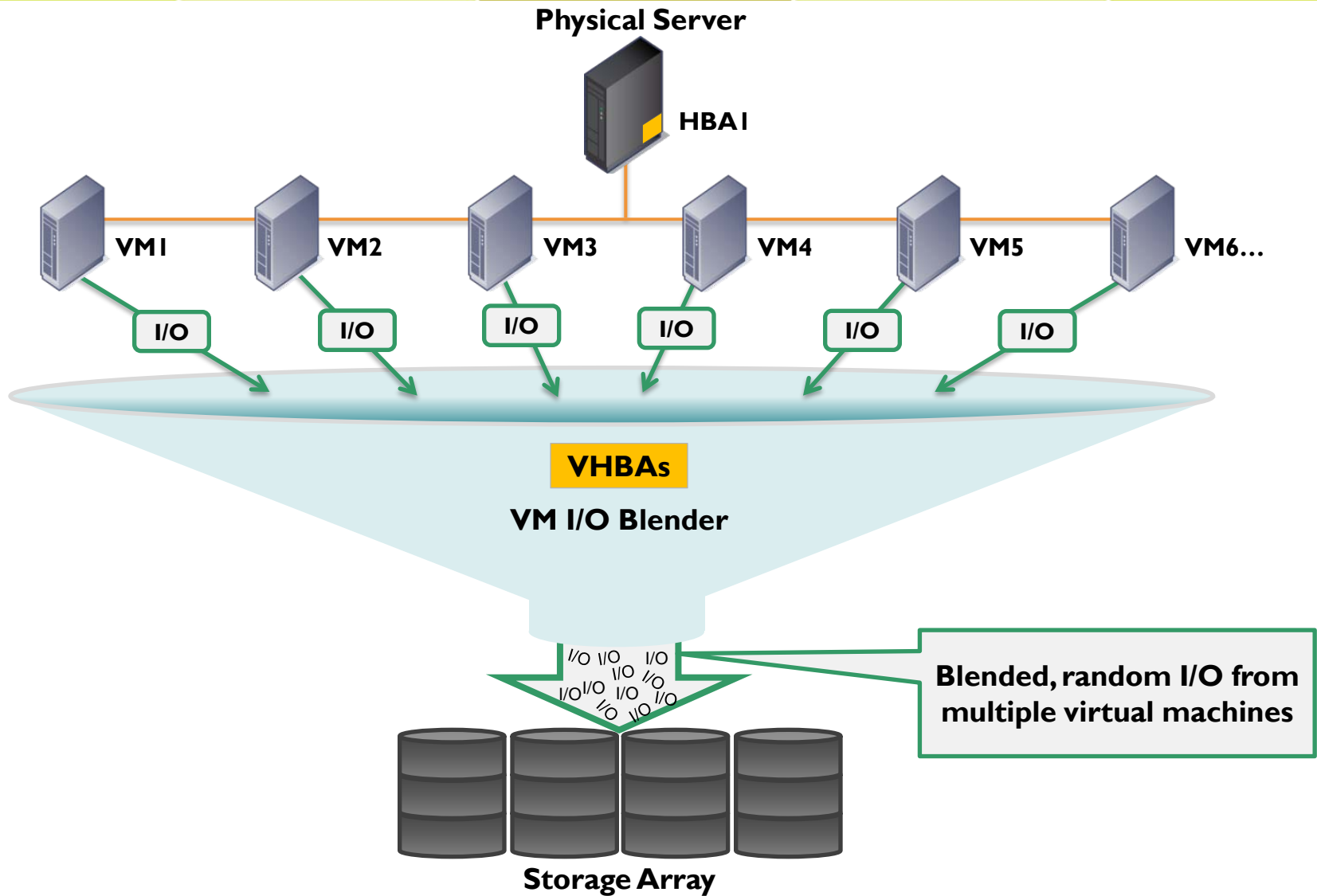
- a. CPU is I/O bound or,**
- b. Disk storage is I/O bound or,**
- c. Other**



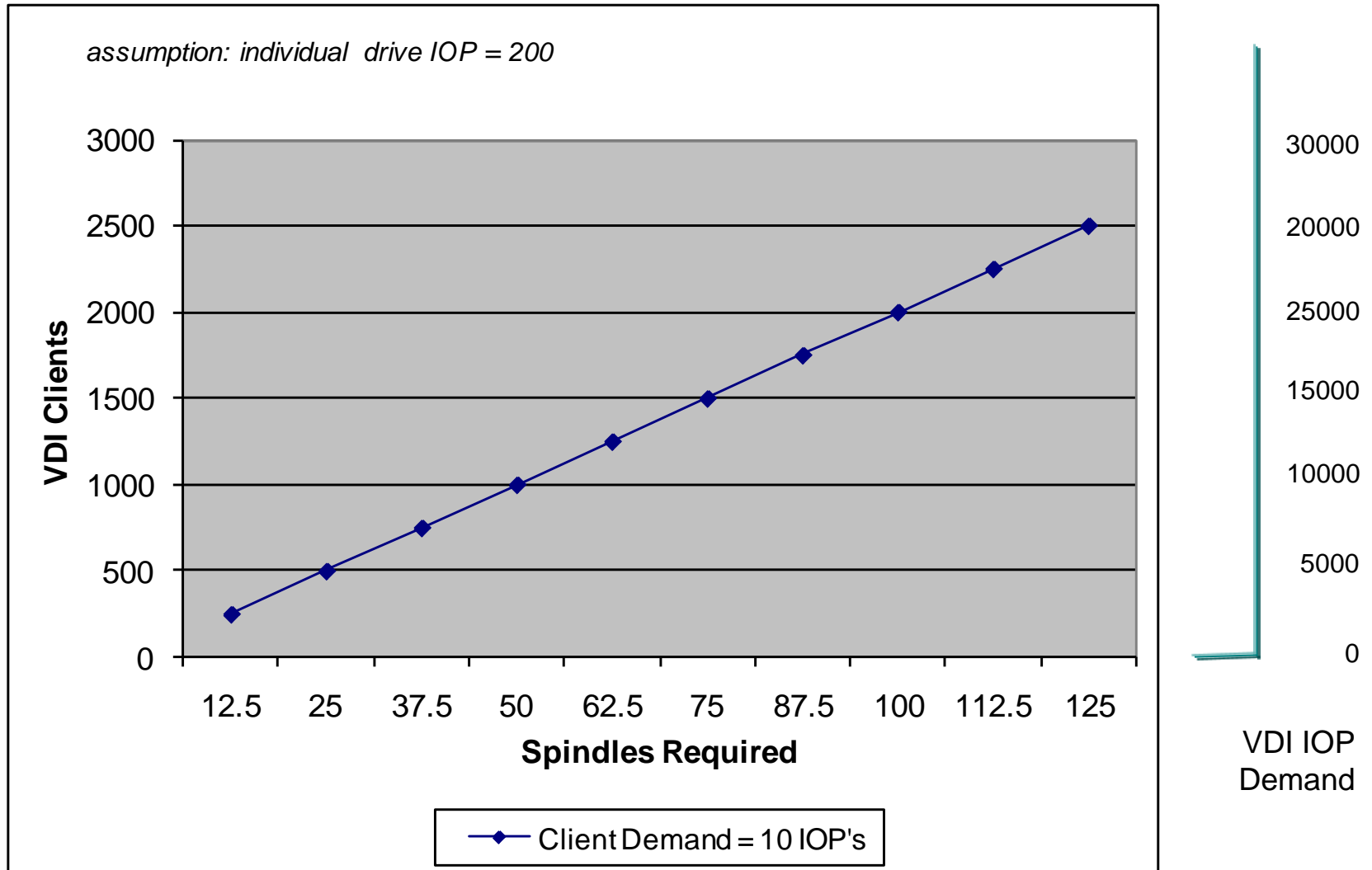
Potential Performance Starved Applications

1. Transaction dominated, data intensive database applications such as data mining and data warehousing
2. Web facing applications that support ecommerce
3. Enterprise messaging (email)
4. Virtual machine deployment (VMotion)
5. Virtual desktop deployment (VDI)
6. Analytics (financial, business, seismic, etc)
7. Decision support systems (BI)
8. Metadata indexing and logs
9. Digital media analytics
10. High-speed data acquisition

The "I/O Blender" Challenge

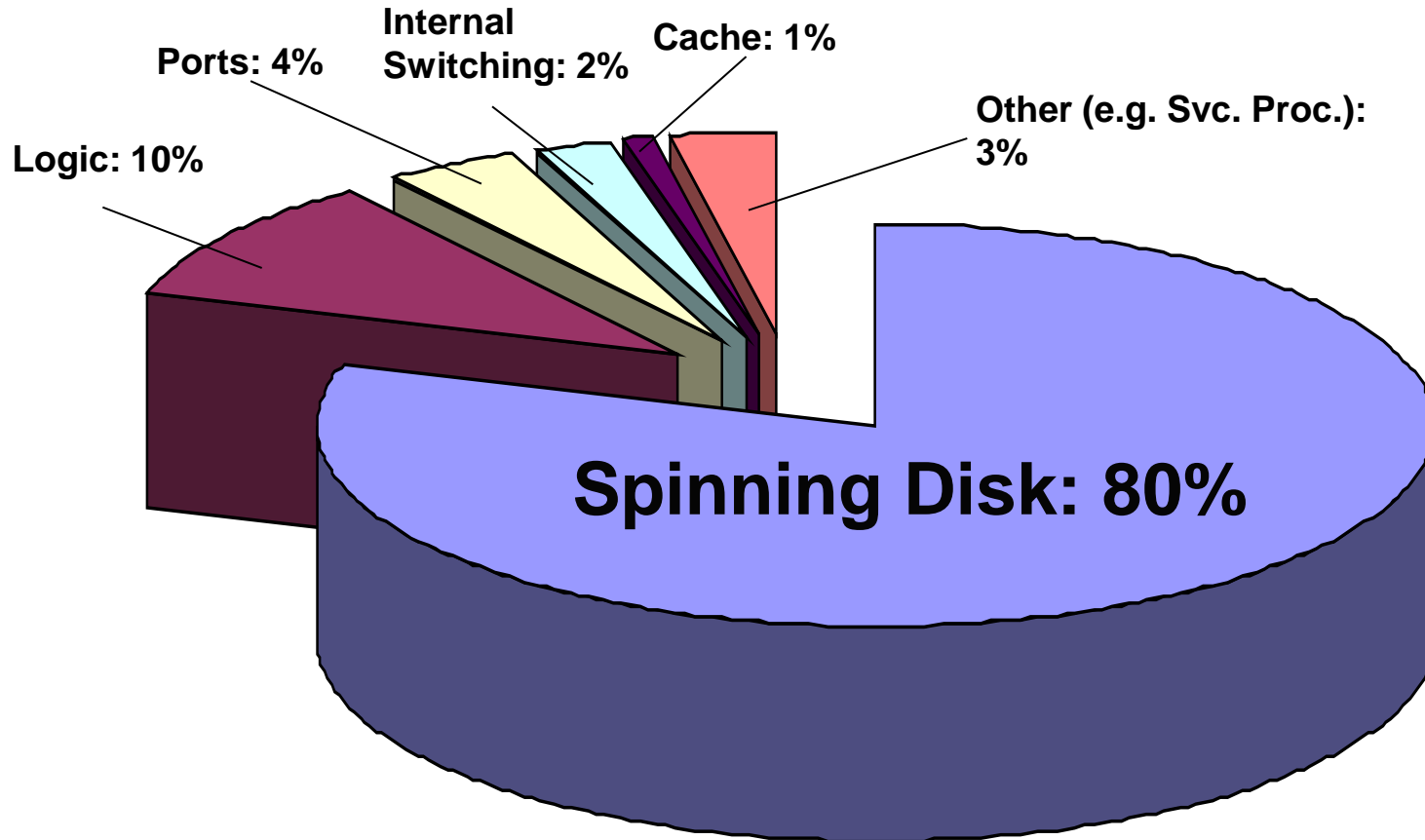


Relationship between VDI Client Growth and Storage IOP Requirements



The Energy Glutton

Projected 2008 Energy Consumption (\$) by Component

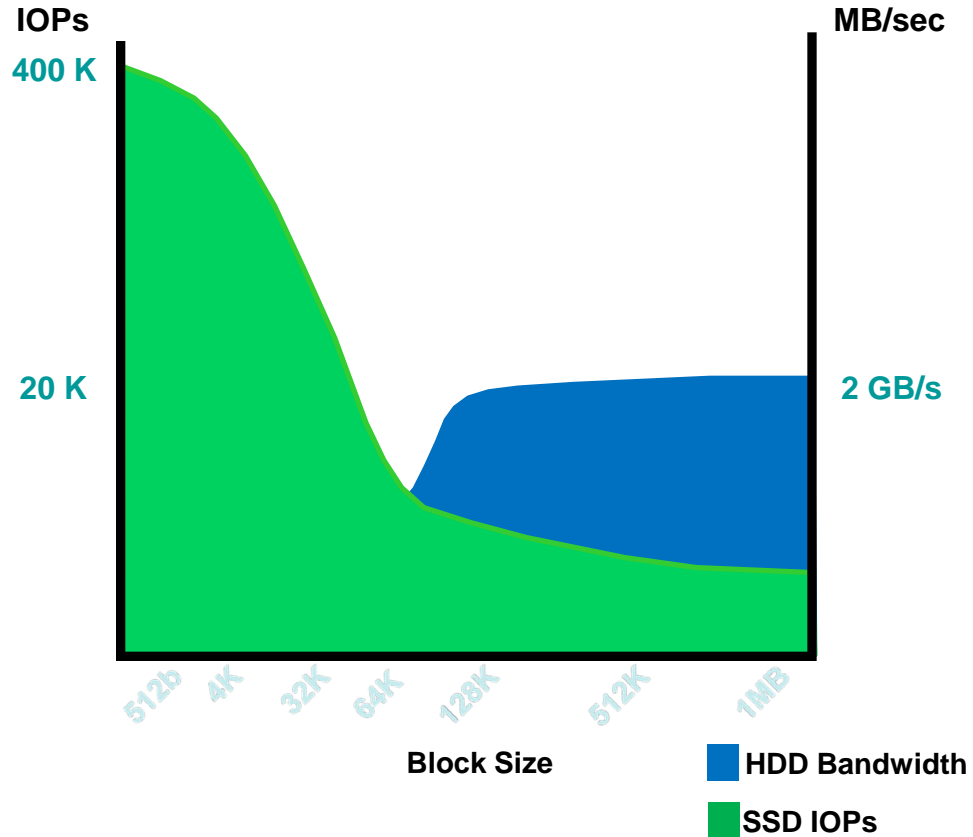


Source: Wikibon.org

Solution – A Technology that Blends Strengths of HDD and SSD

Spinning disk delivers large block size bandwidth

SSD delivers high Data Access (IOPs) at low block sizes



*What if we blended both SSD and HDD in a Hybrid Solution?
And what if the system was autonomic and self-optimizing?*

Autonomic Management Optimizing Access to Data Exhibiting Unpredictable Access Patterns

Access Profiler

- Adaptive histogram, highly compressed, scales to PB
- Accelerates IO for high access content

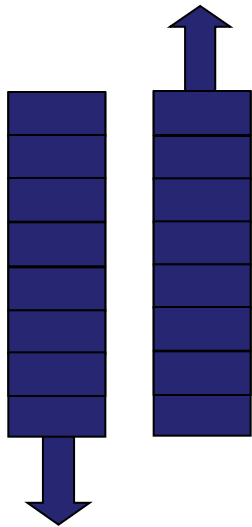
TME (Tiered Management Engine)

- Dynamic block migration with access pattern change
- Mix profiling: block level and file level, very precise

Managing Disparate Workloads

Sequential

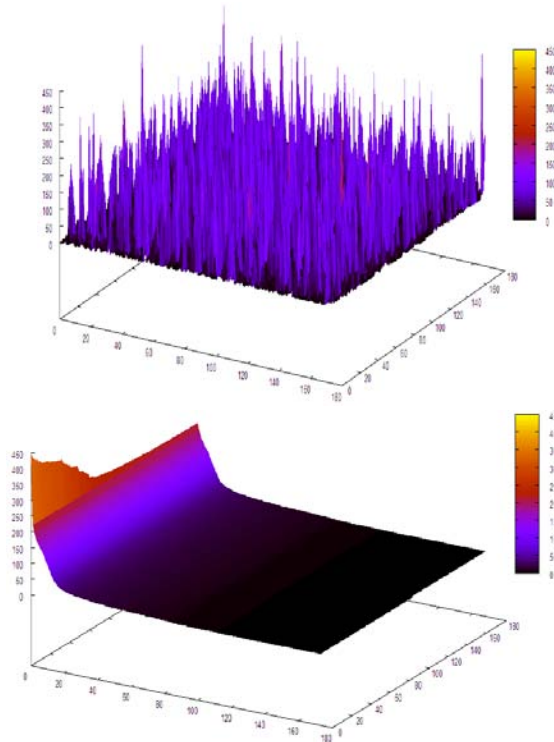
Egress IO read-ahead



Ingest IO reforming

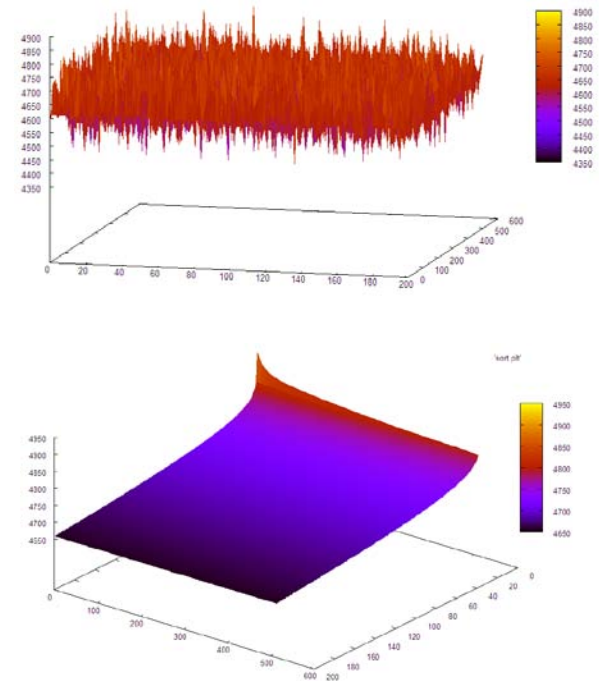
Fully Predictable
(SLC/RAM FIFOs)

Hot-Spots



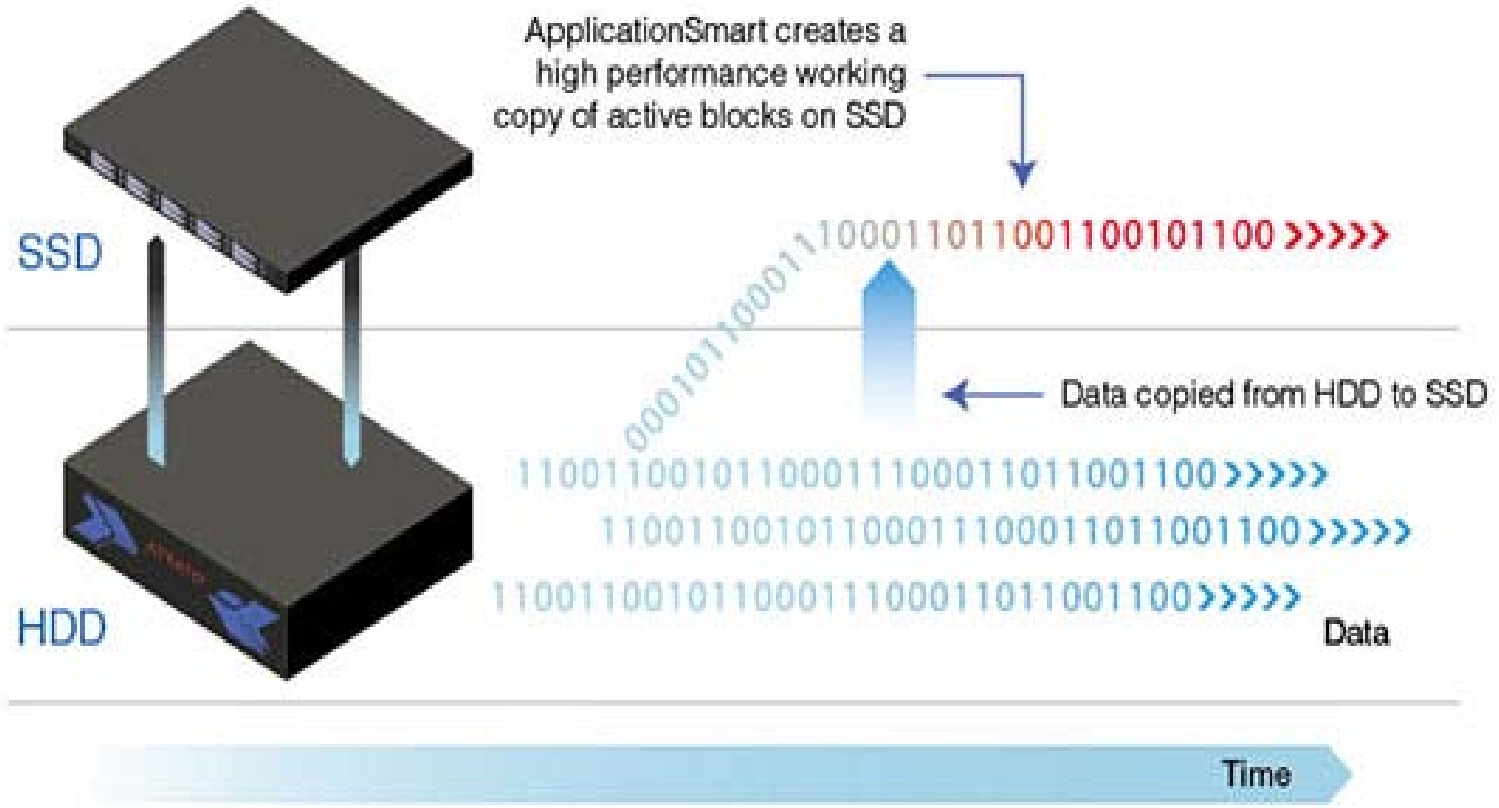
Semi-Predictable
(Scalable Flash)

Random

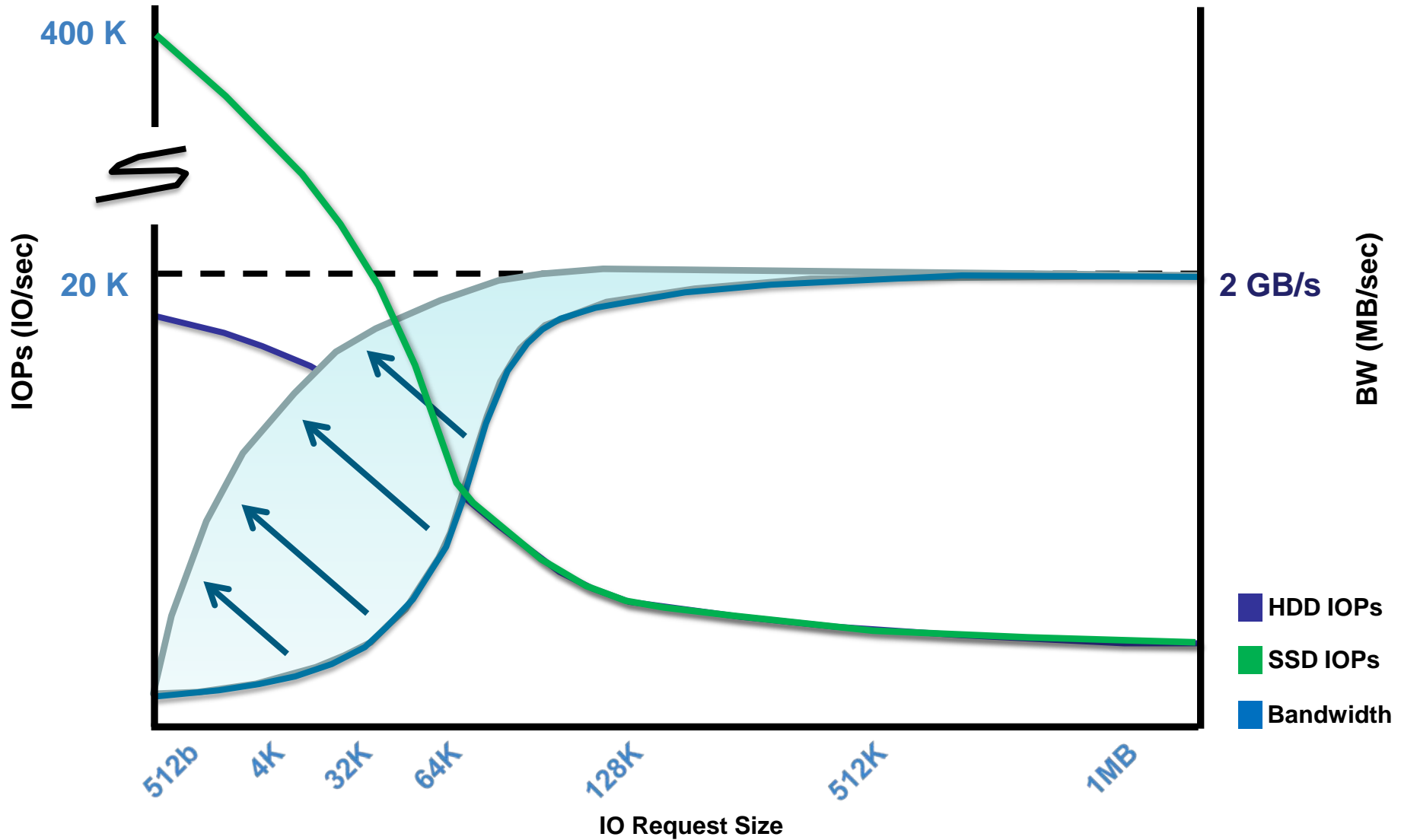


Non-Cacheable
(High spindle density or SSD)

What is a Hybrid VLUN?

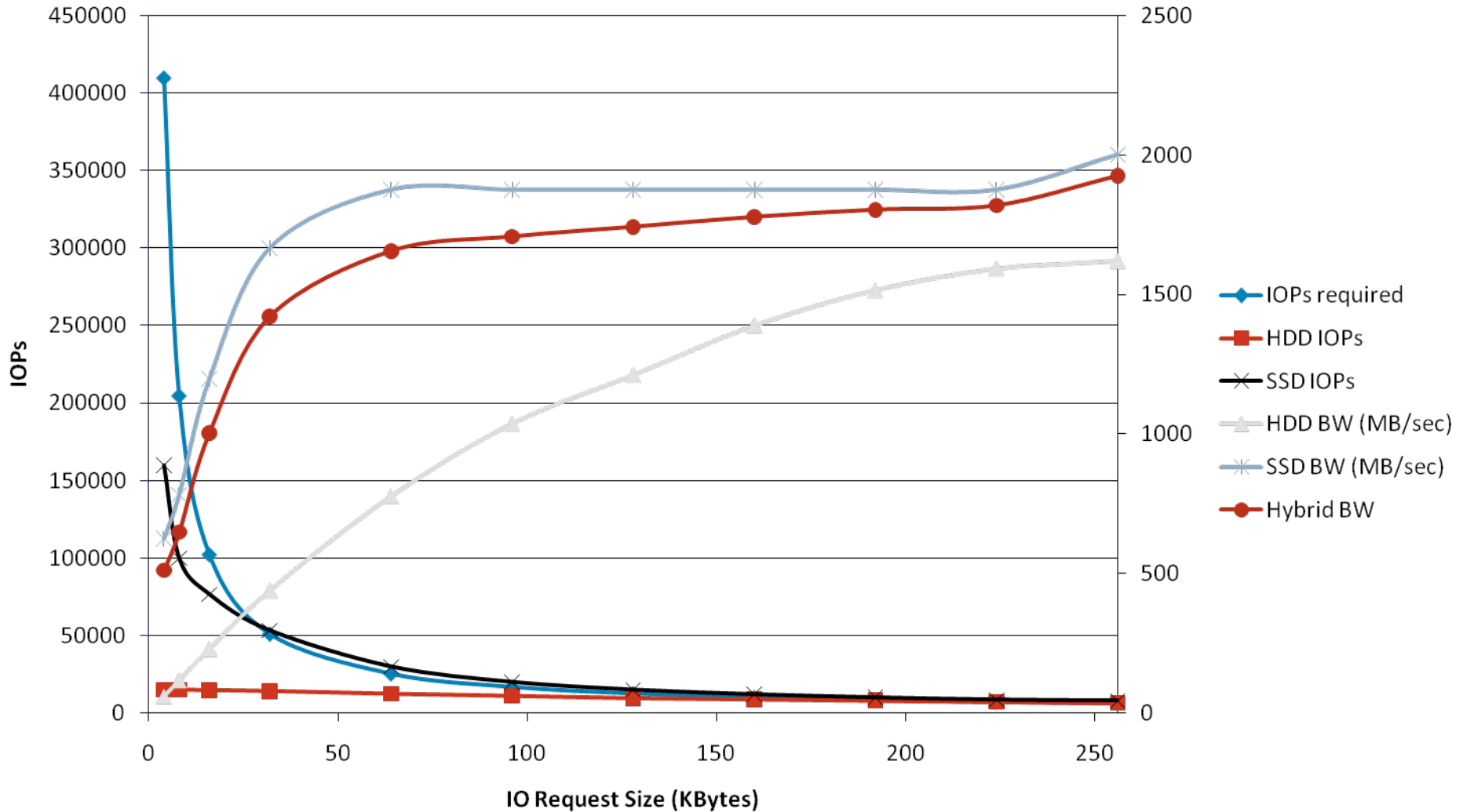


Performance Increase with SSDs



Actual Performance of Hybrid VLUN from 2U SSD and SAID

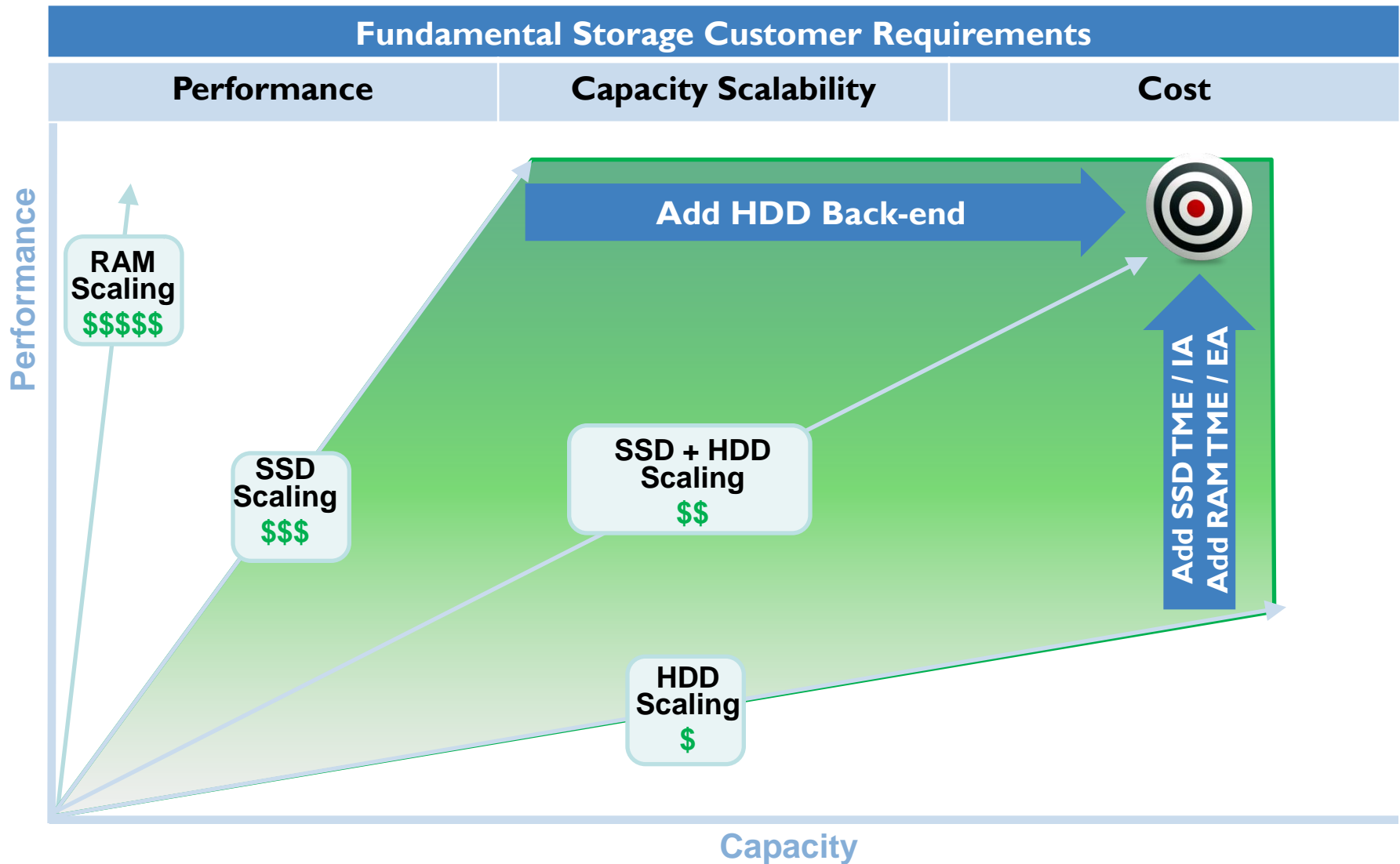
SSD + HDD Hybrid VLUN Performance Summary



Key Attributes of Effective “Performance” Tier Management

- Eliminate Management Complexity
- Real Time Responsiveness
- Meaningful Granularity
- Synergistic Blending of the Attributes of Disparate Storage

The Bottom Line - Flexibility to Solve Performance Problems



Traditional thinking will not solve tomorrows performance challenges!!



Thank You!

