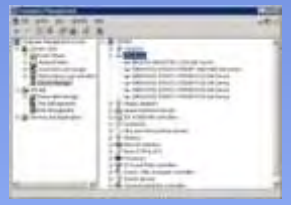
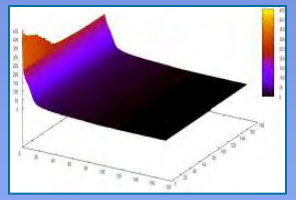
# Accelerating Performance in Virtual Environments

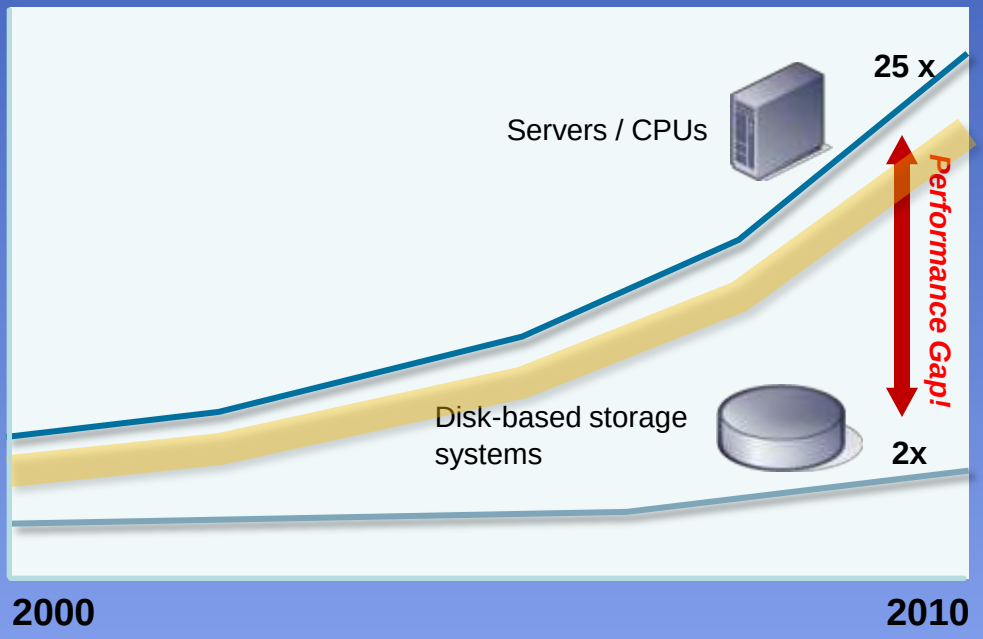
Bill Mottram, VP of Marketing at Atrato



# The Storage Dilemma

*Increasing Performance Gap between Storage and Servers*

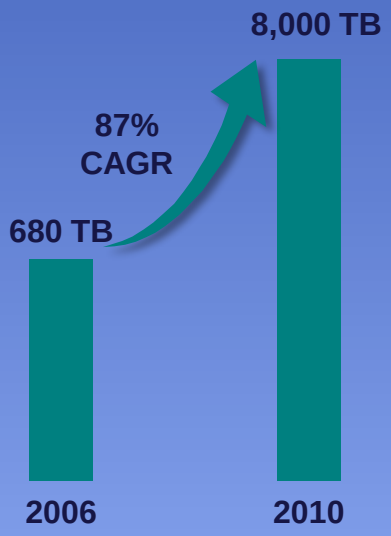



***SSD Driven Performance***

- Increasing server performance
- Traditional disk performance

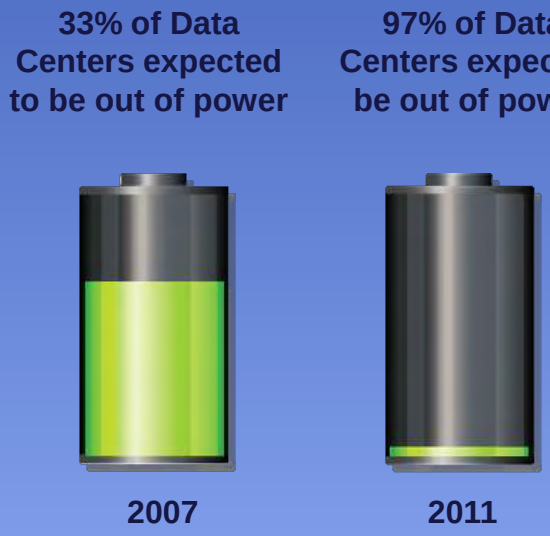
# Compounding Pain Points

**Explosive data growth in typical Fortune 1000 enterprise**




*Source: InfoPro TIP Wave 9*

**Data centers are running out of power**




*Source: Liebert Systems, Inc.*


# Getting on the Same Page

1. What do I mean by *"Hybrid Storage, vLUN" ?*

2. What do I mean by *"performance" ?*

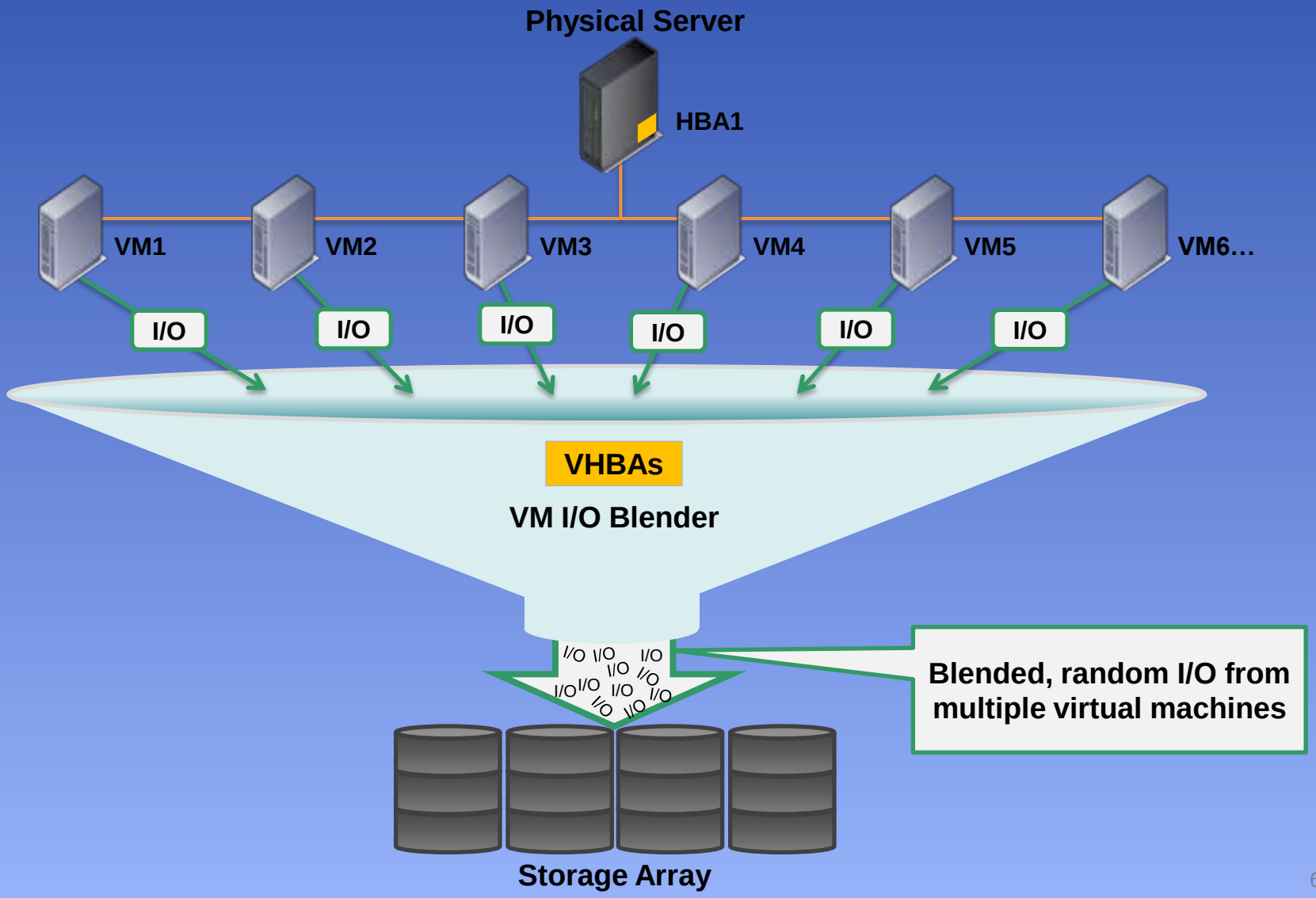
3. What do I mean by *"efficiency" ?*

4. What do I mean by a *"performance starved application" ?*

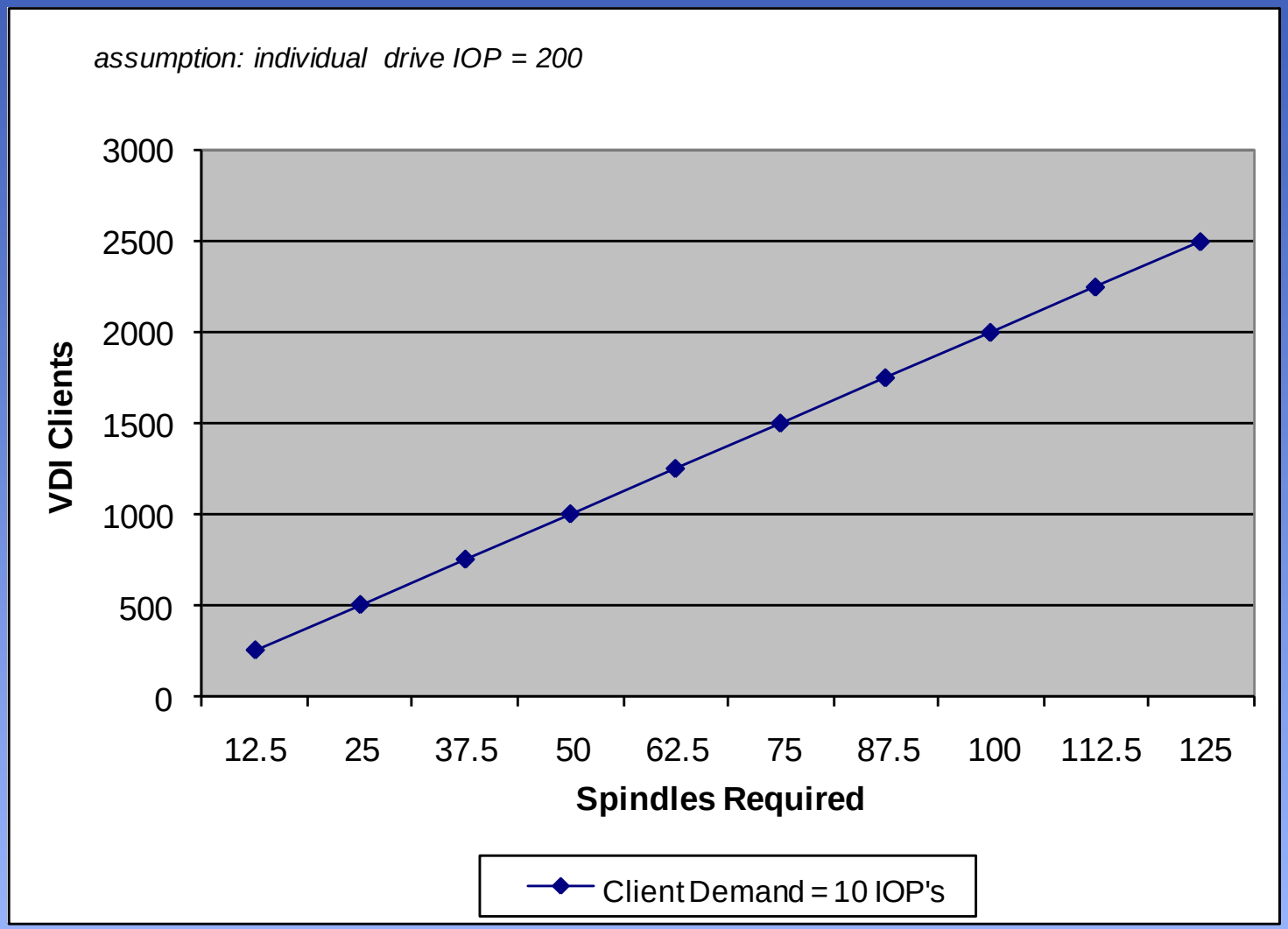

# Potential Performance Starved Applications

1. Transaction dominated, data intensive database applications such as data mining and data warehousing
2. Web facing applications that support ecommerce
3. Email exchange
4. Virtual machine deployment (VMotion)
5. Virtual desktop deployment (VDI)
6. Analytics (financial, business, seismic, etc)
7. Decision support systems (BI)
8. 3D rendering
9. Digital Media analytics
10. Video Surveillance analytics

# The *"I/O Blender"* Challenge



# Relationship between VDI Client Growth and Storage IOP Requirements




VDI IOP Demand

30000
25000
20000
15000
10000
5000
0

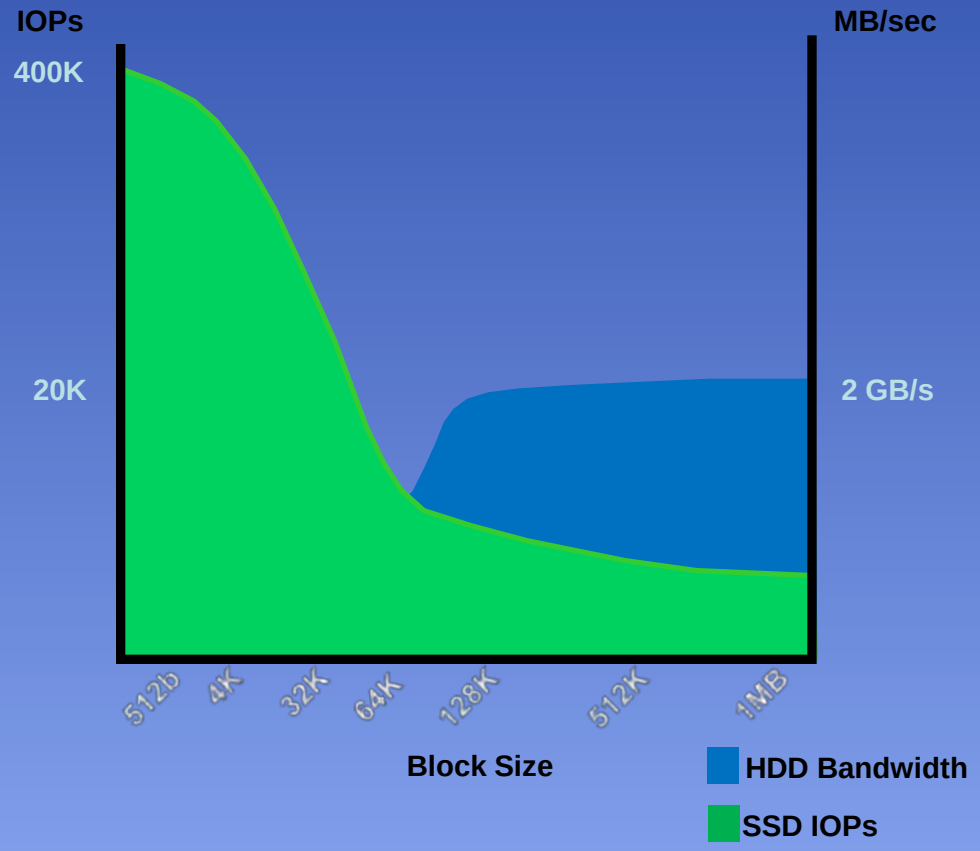

# SSD = High Performance Green Storage

- One SSD/SLC drive  can deliver the same performance as 10 short stroked FC 15k drives
- Replacing 10 short stroked FC drives with one SSD/SLC drive realizes 98+% savings
- Caution: SSD is not the complete solution

# What is Needed is a Solution that Blends the 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?***


# Intelligent Tiered Storage Management

*Autonomic Management of Unpredictable Access Patterns*

**Access Profiler**

- Adaptive histogram, highly compressed, scales to PB
- Drives TME to accelerate 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

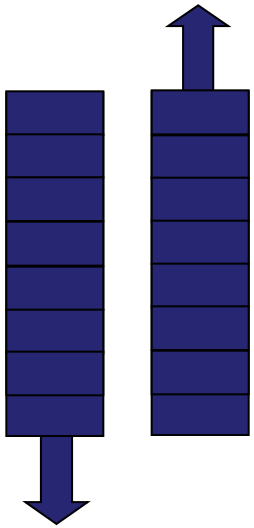
**Ingest Accelerator**

- Tuned for RAID access (FIFO with back-end IO reforming)
- Lower latency, higher throughput, higher access

# Spectrum of Workloads

Sequential

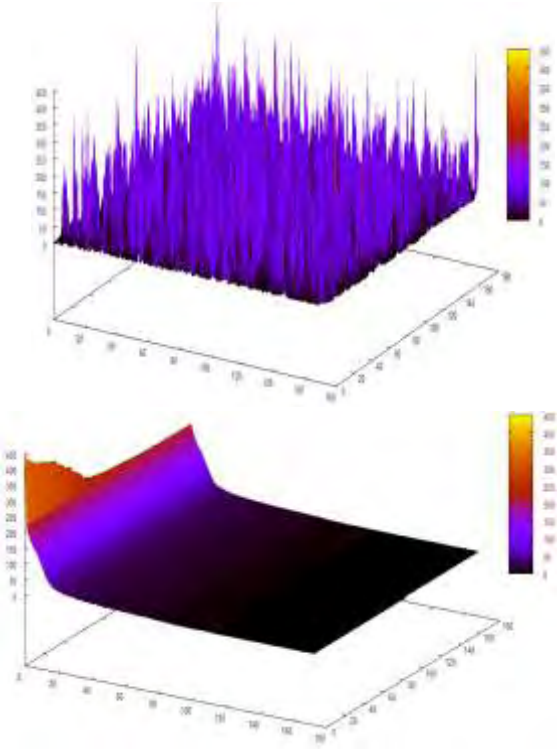
Egress IO read-ahead



Ingest IO reforming

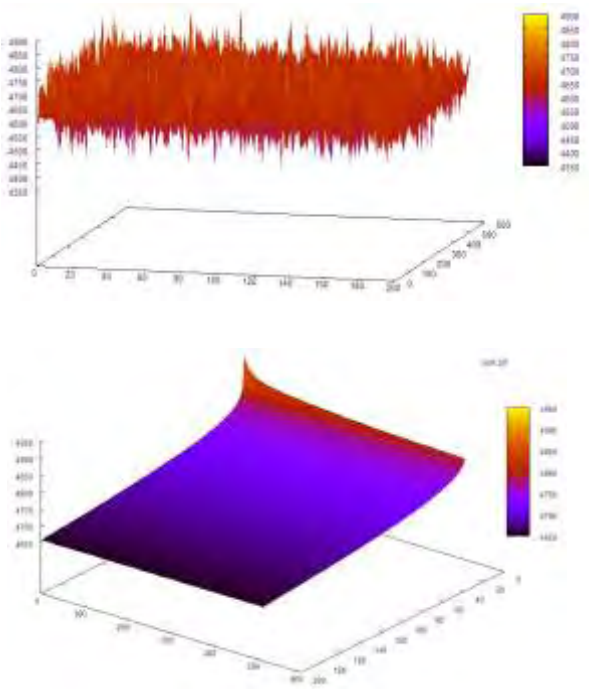
Fully Predictable
(SLC/RAM FIFOs)

Hot-Spots



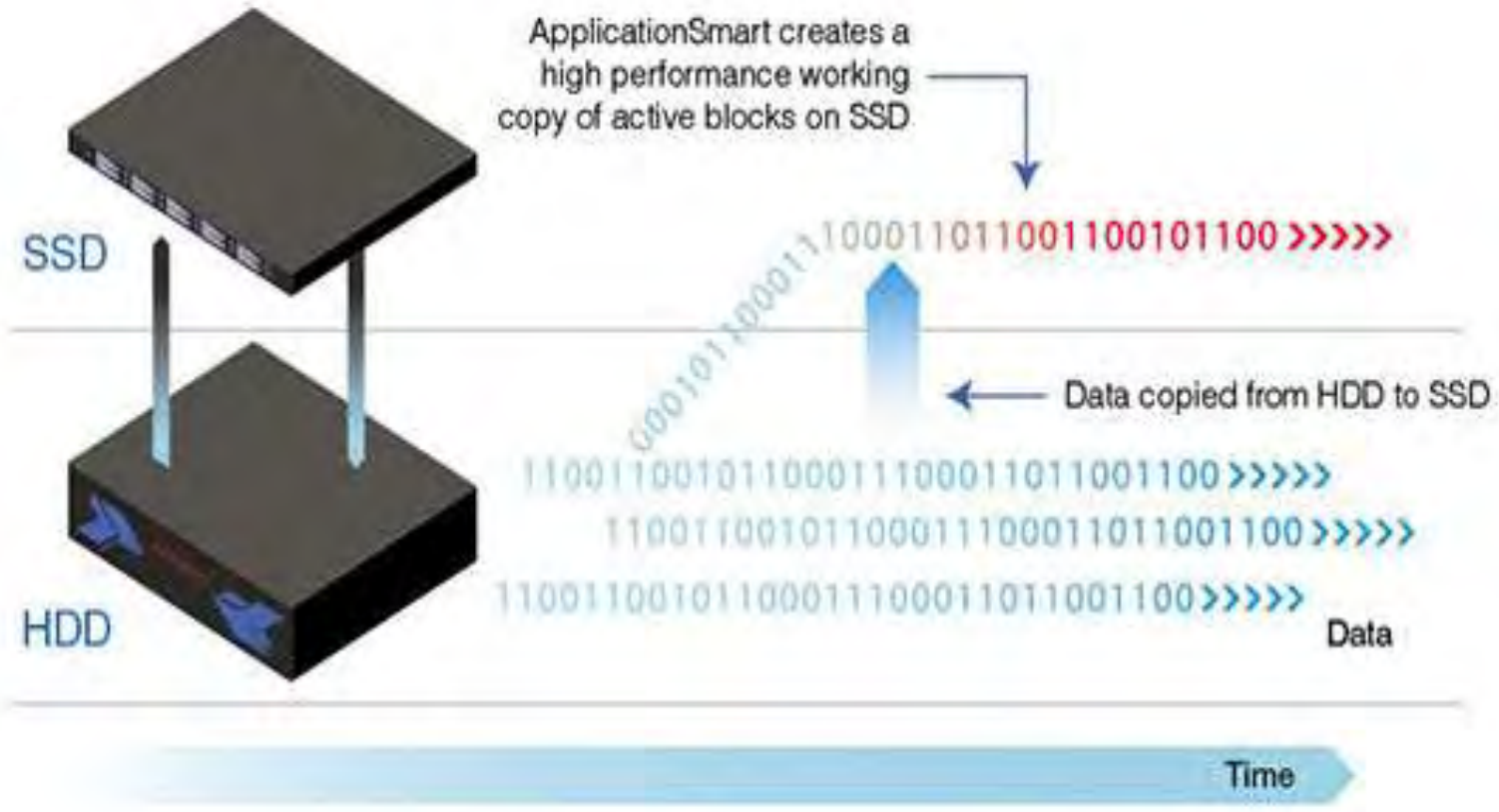
Semi-Predictable
(Scalable Flash)

Random

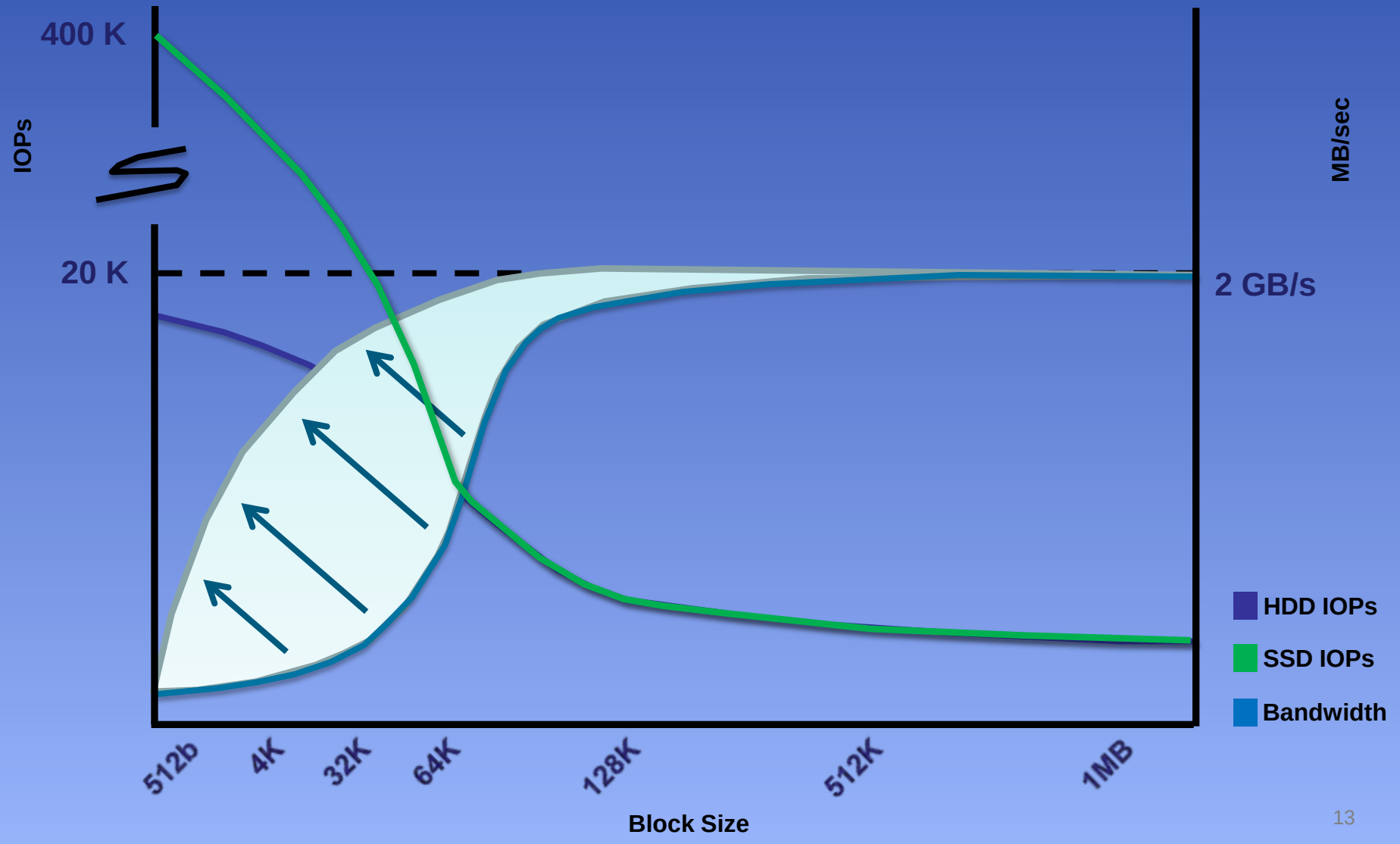


Non-Cacheable
(Solved by high spindle density or SSD)

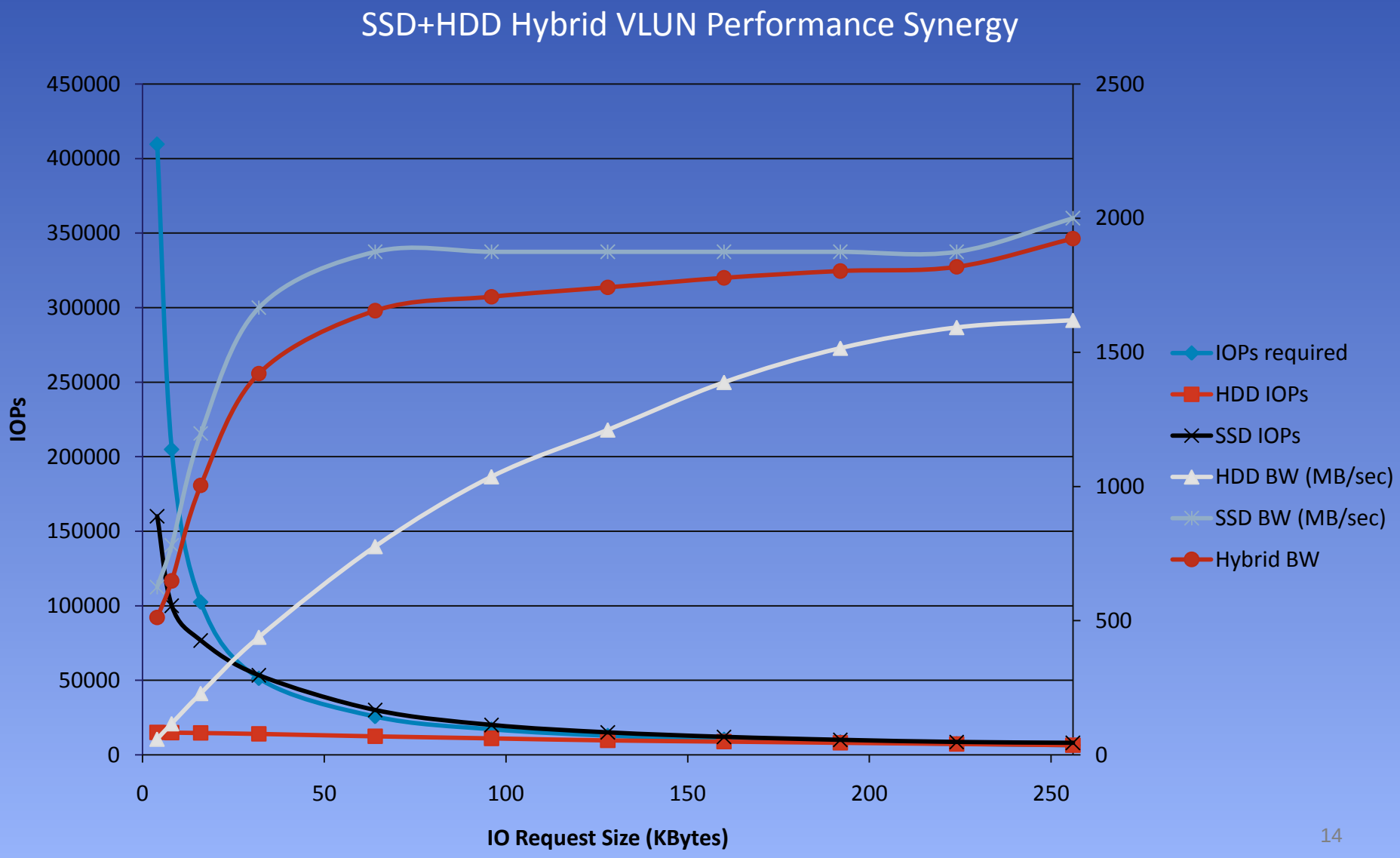
# What is a Hybrid VLUN?



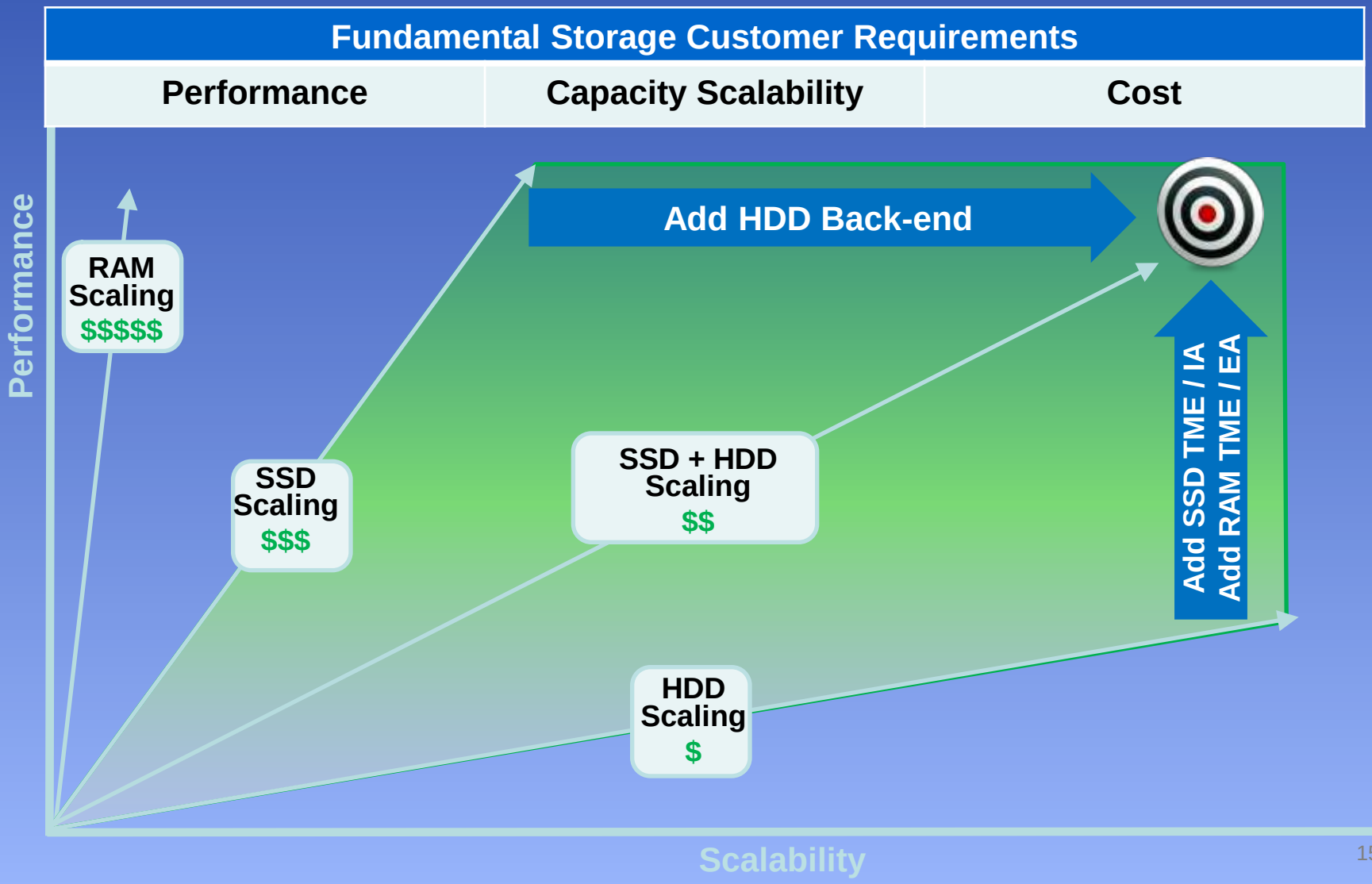
# Expanding the Performance Envelope



# ACTUAL Performance of Hybrid VLUN from 2U SSD and SAID



# The Bottom Line - Flexibility to Solve Specific Performance Problems



# Traditional thinking will not solve tomorrows performance challenges!!

Flash Memory SUMMIT

# Questions?

## Thank You!