Why Solid State is Changing IT

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What is driving the need for Solid State Storage?

Processor:
10,000x performance improvements
•Frequency
•Multi Core

Memory:
• Larger Footprint
• Higher Bandwidth

Hard Disk Storage:
2x Performance improvements
• Cheaper $/GB, not faster

Performance

1980   1990   2000   2010

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Solid State Storage
100 to 10,000 greater performance
•Better $/IOP than Hard Disk

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Solid State Deployment Models

SSD as a tier of storage

- Multiple capacity points, max counts
- Multiple technologies: SLC, MLC
- All SSD Tier
- LUN & Sub-LUN tiering technologies

SSD or Flash optimized array

- Flash optimized – performance, density, latency
  - Option for spinning media if needed
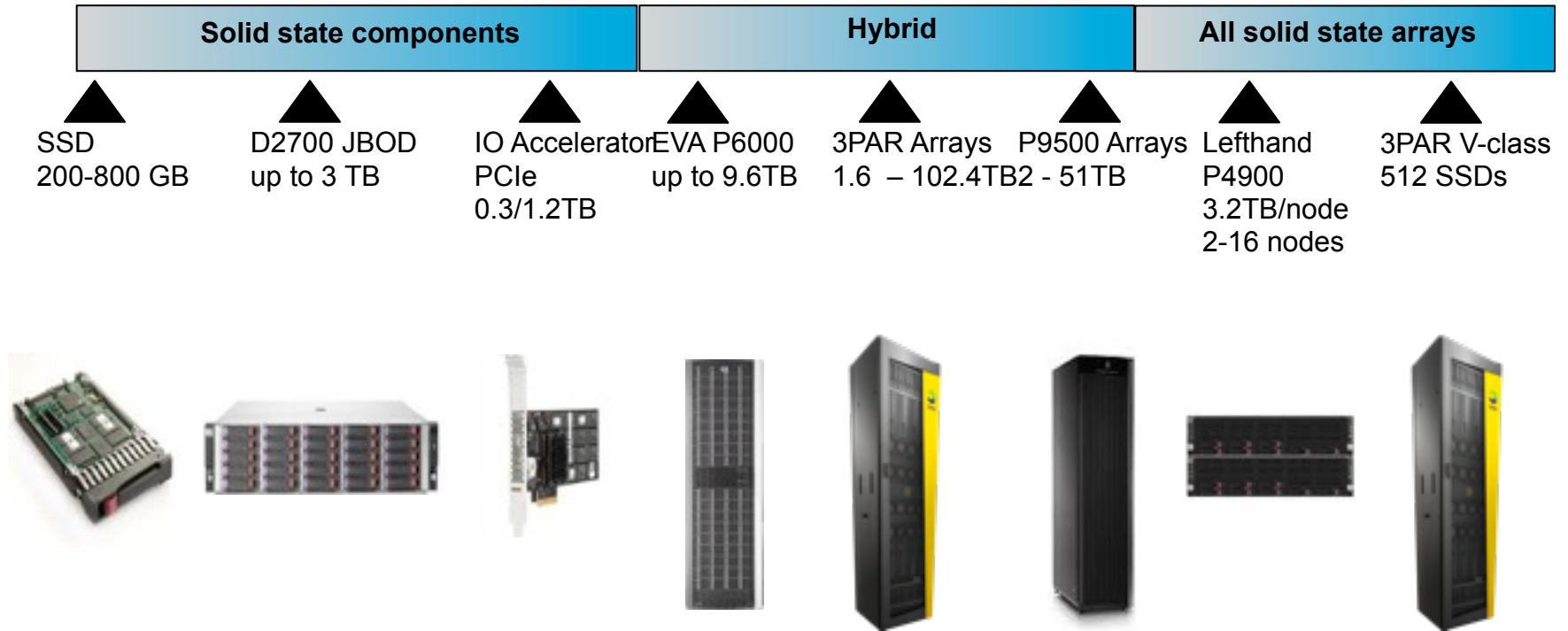- Key differentiation is in Software Data Services
- Virtual SAN Appliance

Flash Cache

- Host based flash caching
- Storage based flash caching
- Collaborative host/storage flash caching
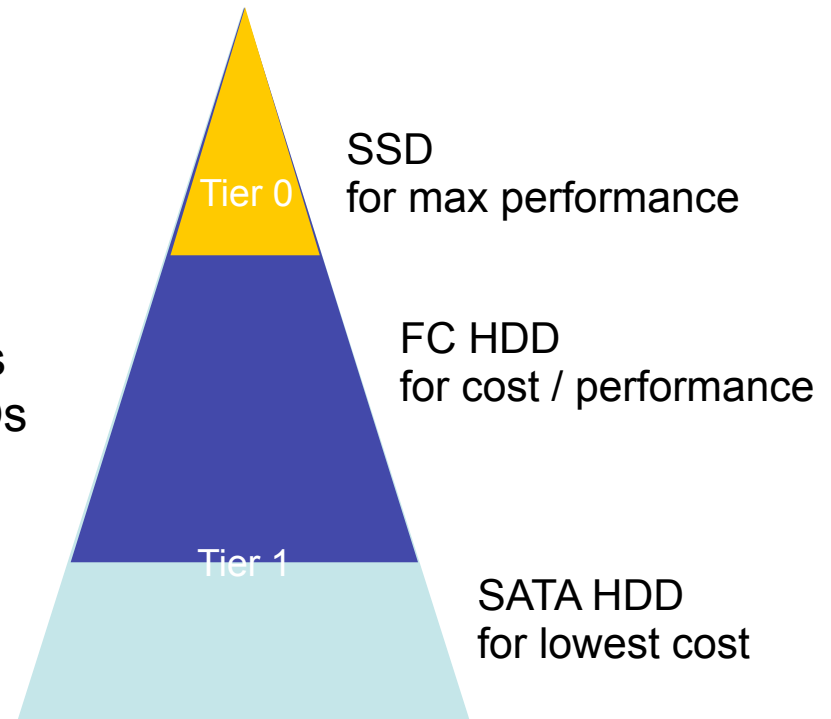
HP Solid State Storage offerings today

Solid state components			Hybrid			All solid state arrays	
SSD 200-800 GB	D2700 JBOD up to 3 TB	IO Accelerator PCIe 0.3/1.2TB	EVA P6000 up to 9.6TB	3PAR Arrays 1.6 – 102.4TB	P9500 Arrays 2 - 51TB	Lefthand P4900 3.2TB/node 2-16 nodes	3PAR V-class 512 SSDs

Storage Tiering

Tiering: "Hot" data is located on Tier 0, "Cold" data on Tier 2

Typical data access profile

Data location profile

100%

75%

50%

25%

0%
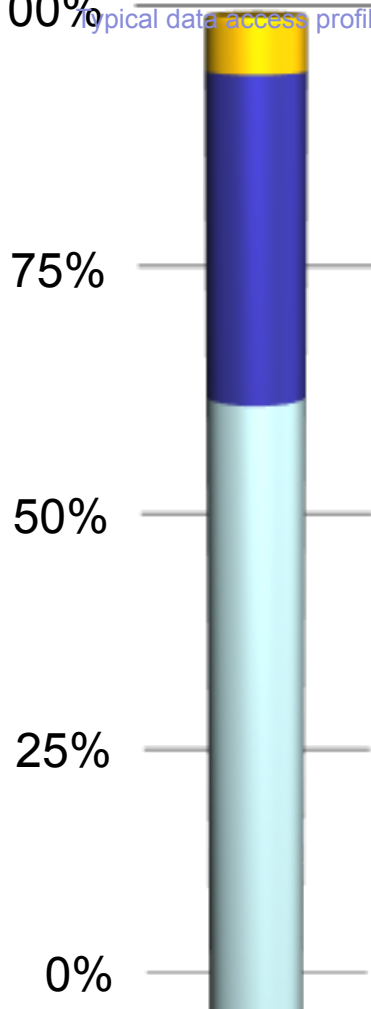
- 🟨 Most of the IOs
- 🟦 Some of the IOs
- 🟦 Few of the IOs

Tier 0 — SSD
for max performance
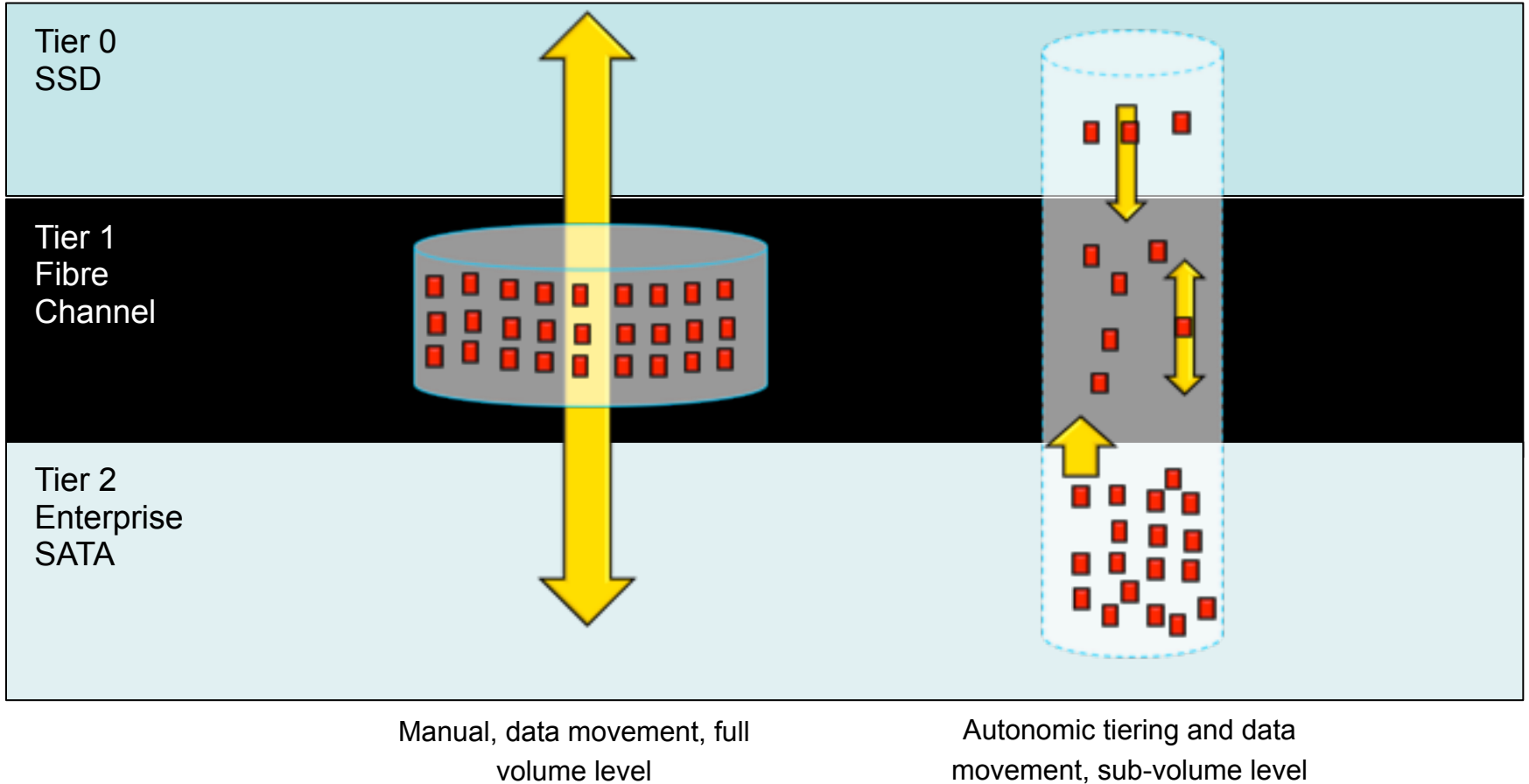
FC HDD
for cost / performance

Tier 1 — SATA HDD
for lowest cost

Most applications have a small portion of the capacity receiving most of the IOs.

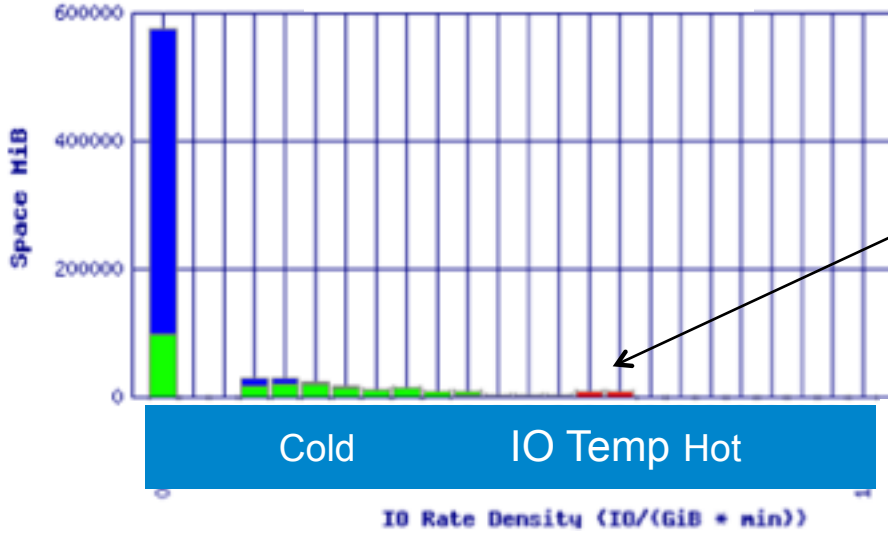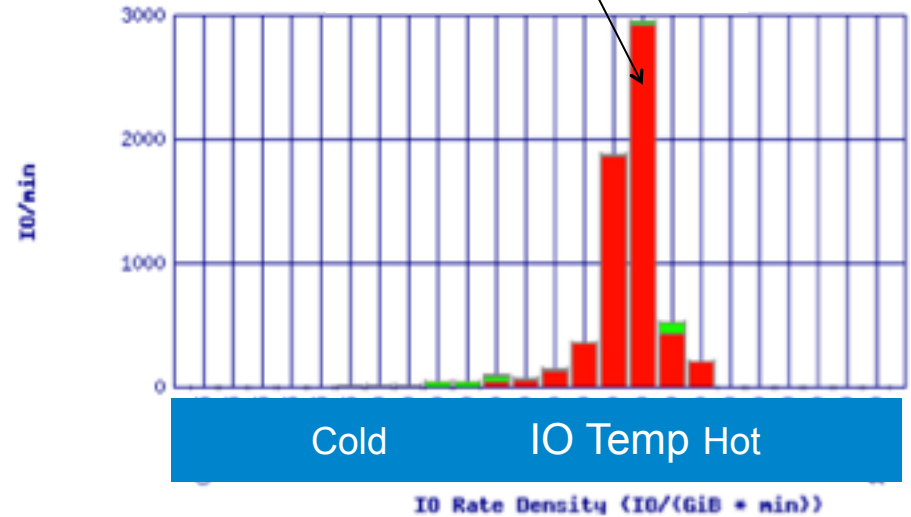Full LUN tiering — Sub LUN tiering

Adaptive Optimization: Performance Needs Met with Small Amount of SSD

Capacity Usage

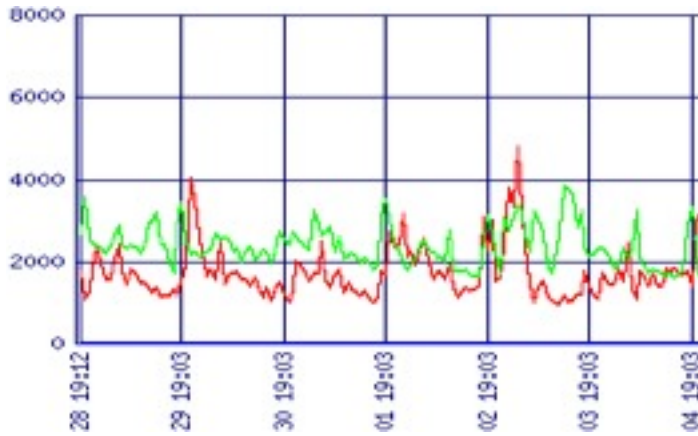SSD: <u>Small</u> space used, but a <u>lot</u> of IO

Performance

Tier 0: SSD, RAID 1
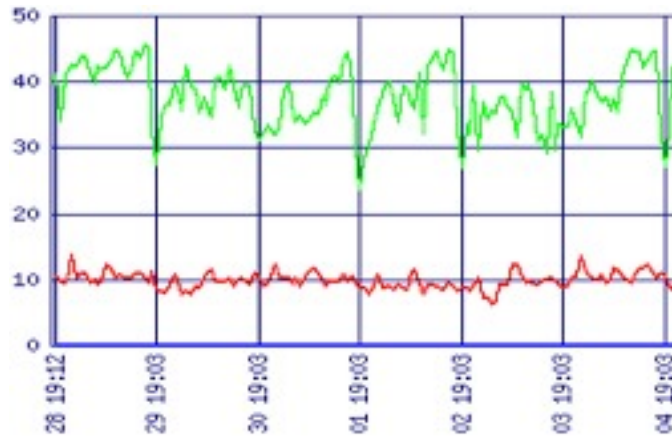
Tier 1: Fibre Channel, RAID 5

Tier 2: Nearline, RAID 6

Adaptive Optimization Success Story

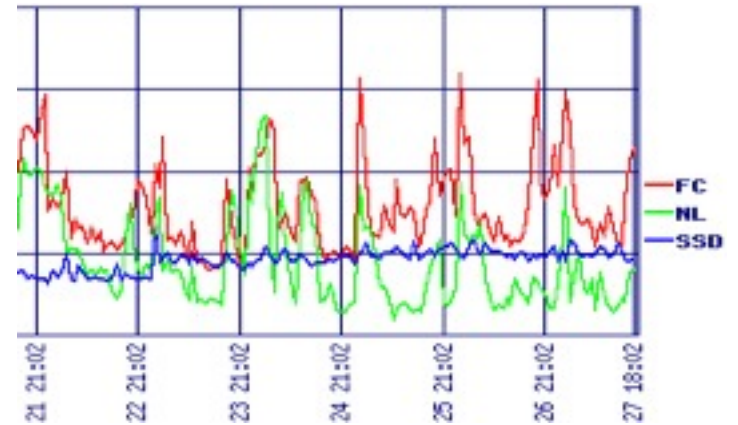"…so HP 3PAR Adaptive Optimization really lets us to grow our environment on a more economical scale while still giving us improved performance,"

New All Solid State P10000 Lowers Costs

- Decrease $/IOP by 70% and $/Kwatt/Hr by 80+%

- Leverage 3PAR advanced software data services + All Flash

- Ideal for applications where **response time** (low latency) and **performance** (IOPs) are a higher priority than capacity

* compared to an all FC solution with the same performance

Host Flash Cache

- ## Improves Service Levels
  - Higher performance by moving IOPs closer to the application
  - Significantly Lower latency
  - Augment host cache size at a lower $/GB vs DRAM

- ## More Array IOPs available for a larger number of applications
  - Offload IOPS from Array to Host
  - Server Storage Collaboration

- ## Suitable for performance intensive environments:
  - Oracle (Non-RAC, unshared)
  - VMware, SQL, RAC (clustered shared environments)

Summary

- **Flash Solid State Storage is a disruptive technology**

- **Value is delivered by Innovative Software**
  - Management, Simplicity, Functionality

- **Customers are deploying across several use cases**

- **HP is investing in current and next generation of solid state technology**