

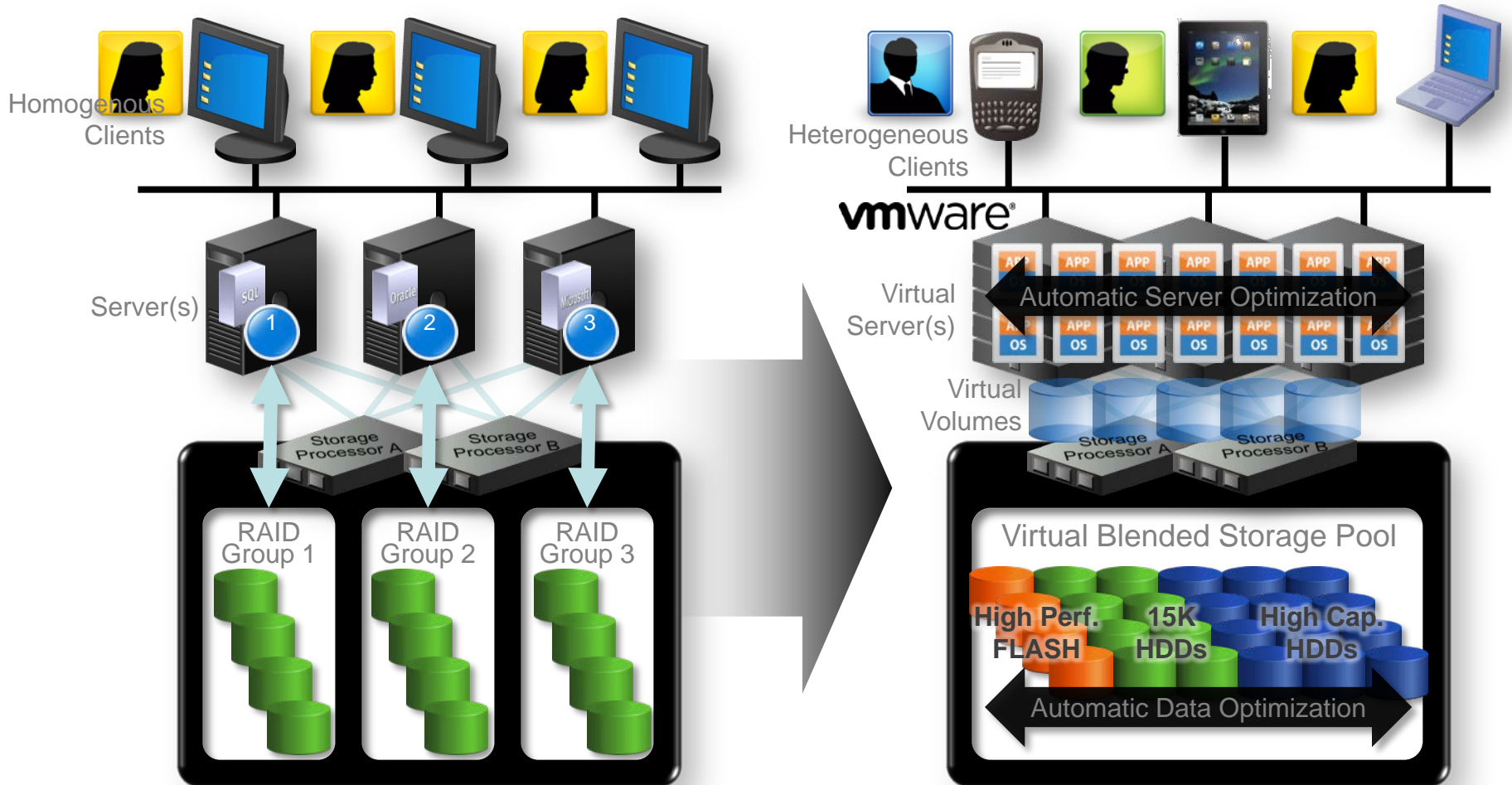


Managing Flash Storage in the Enterprise

Making Solid State Storage work for
your workloads – intelligently.

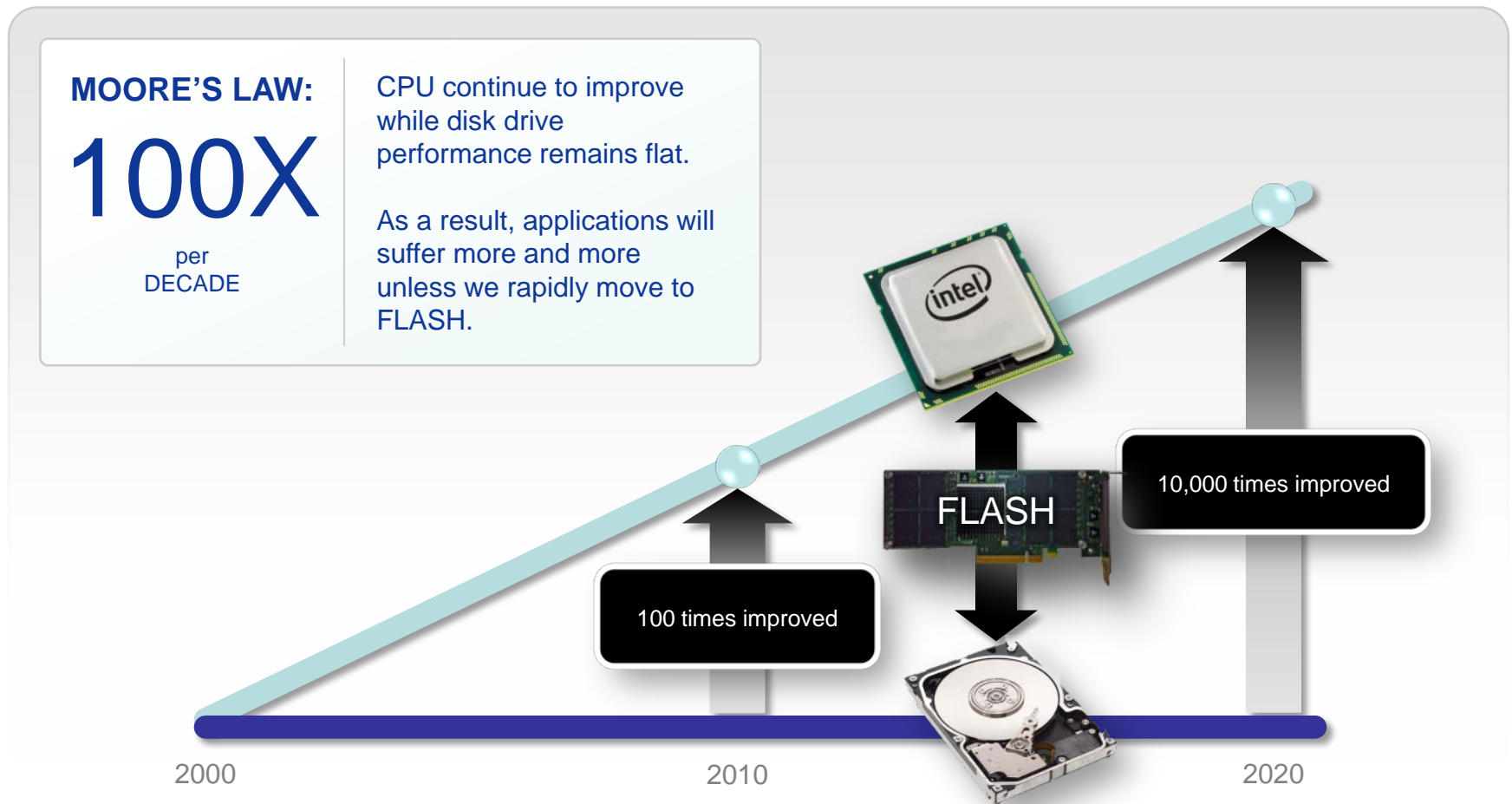
The new reality of storage

New data center paradigm demands new storage solutions



The CPU to HDD Performance Gap

CPU improves 100 times every decade – disk speed hasn't





The FLASH-First philosophy. What are my options?

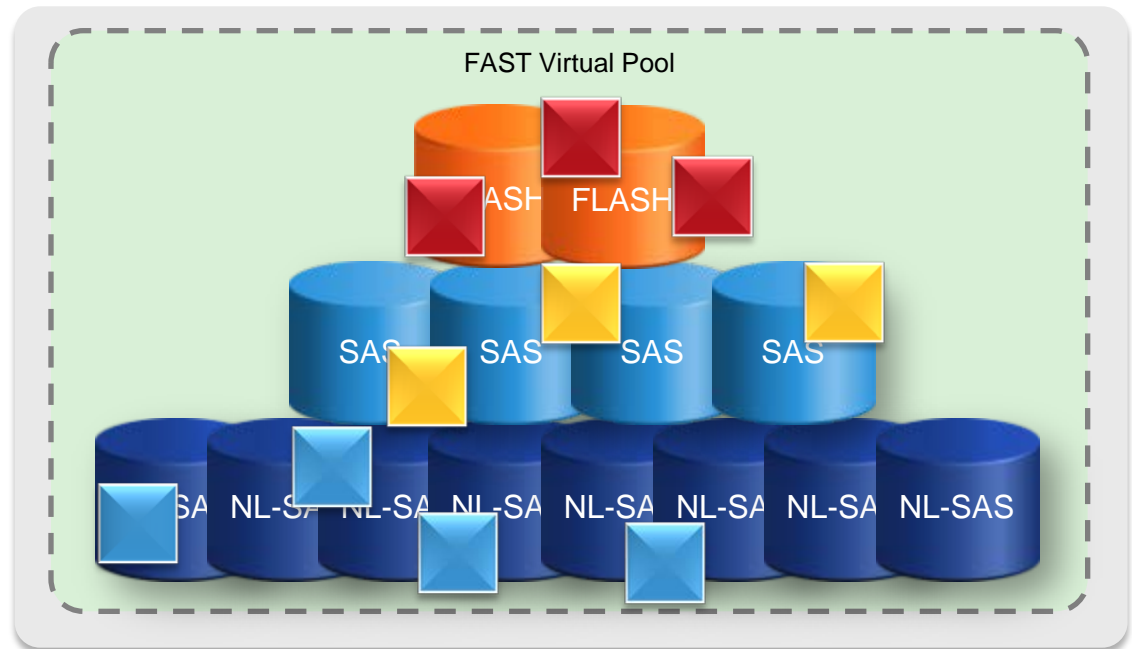
- Use Auto Tiering and gain more efficiency and cost-effectiveness.
- Add to your SP Cache by adding Flash Drives to the array.
- Add Flash Drives for your Mission Critical Tier-1 Apps.
- Get an All-Flash Array.
- Host based FLASH Caching.

FAST Suite in Action—FAST VP

FAST VP

tiers across drives in pool

- Optimizes drive utilization
- Relative ranking over time





FAST Suite—FAST VP + FAST Cache

FAST VP

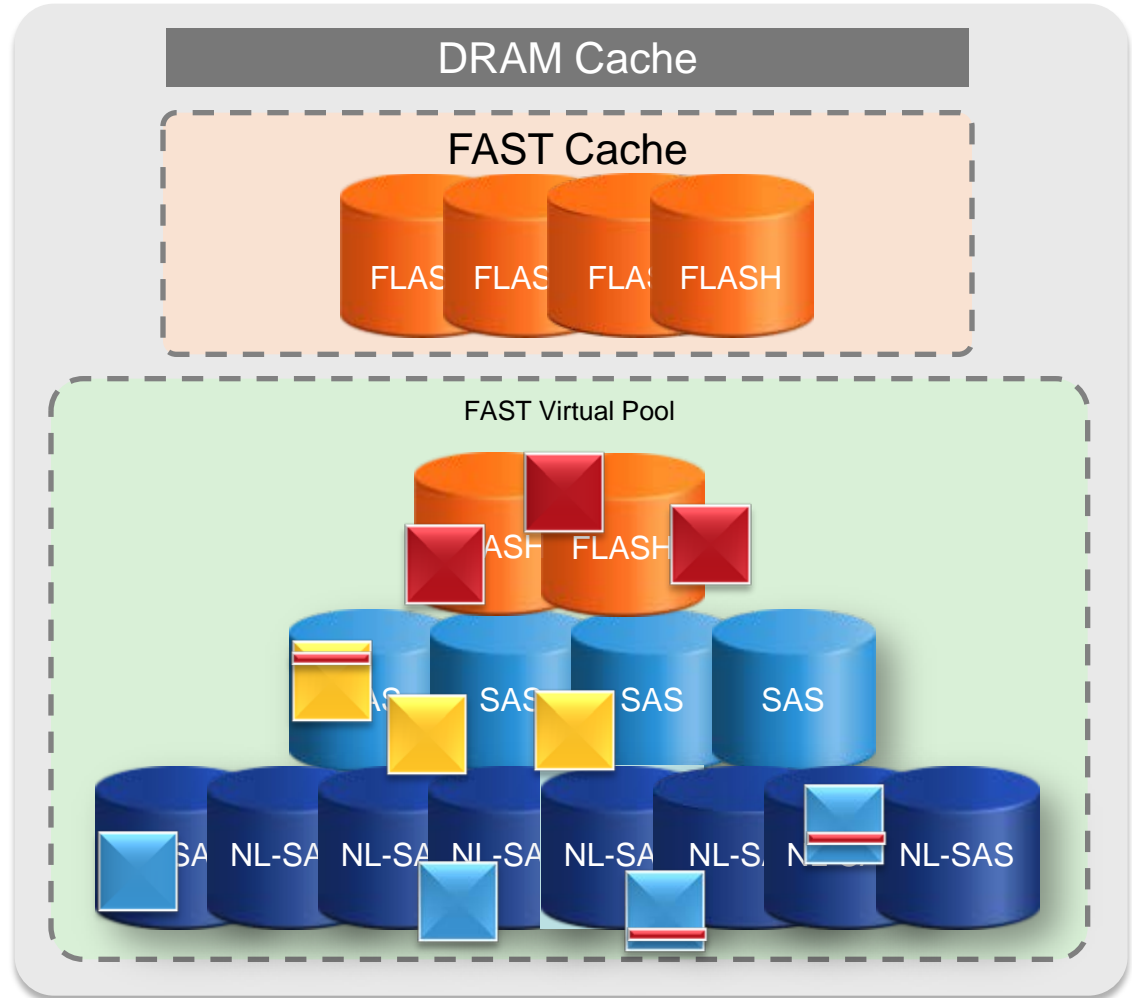
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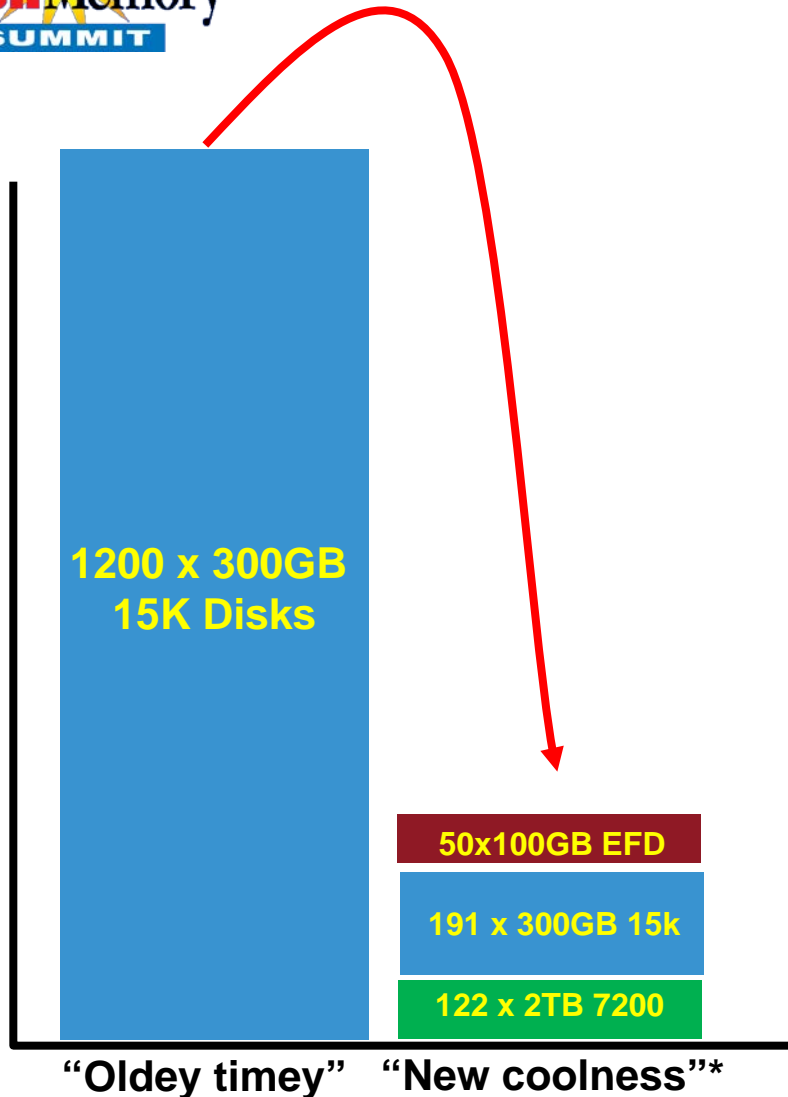
FAST Cache

copies hottest data to Flash

- Optimizes Flash utilization
- Dynamic movement in near real time
- 64 KB sub-slices ideal for bursty data



Savings compared to Traditional Methods



60% Lower Storage Costs
includes Reduced Maintenance

40% More Disk IOPS
180,000 vs 250,000 Aggregate disk IOPS

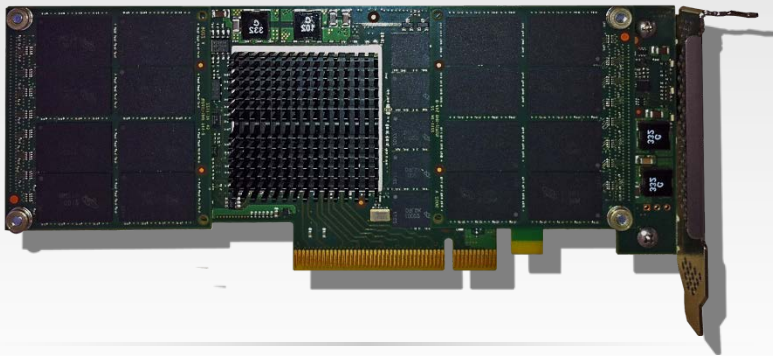
66% Less Power and Cooling
7.7kVA vs 22.38 kVA
22,800Btu/hr vs. 68,200 Btu/hr

70% Fewer Disk Drives
366 EFD+SAS vs 12,000 FC

Host Based FLASH Caching

Low latency PCIe form factor

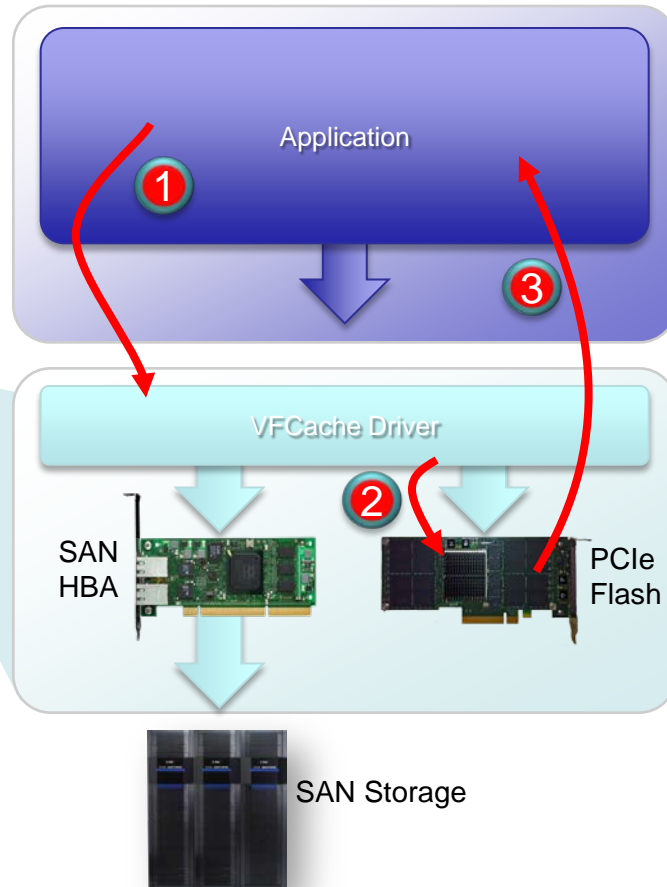
VFCache – PCIe FLASH



NAND Technology	34nm
SLC	
Capacity	300 GB
Random 4K Read IOPS	750K
Random 4K Write IOPS	91K
Sequential 128K Read	3GB/S
Sequential 128K Write	0.8GB/S
Latency	<50uS
Power	25W

- Lowest latency deployment
 - Raw performance vs real world applications
- Option of “split card” use
- Offloads storage array workload
 - Side effect: write performance
 - Scales with the number of hosts
- Targeted at read-heavy workloads

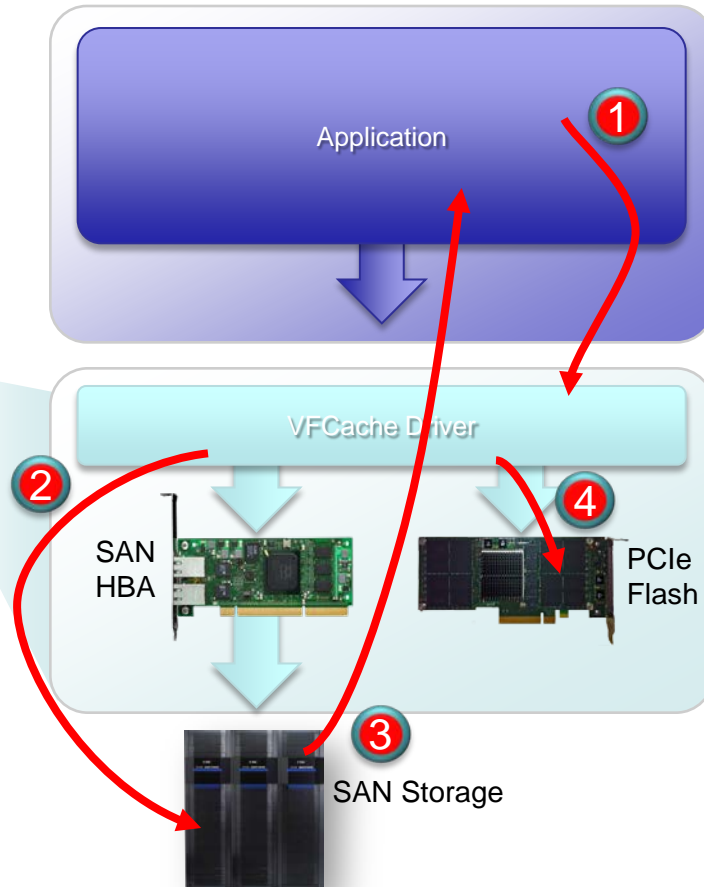
Read Hit Example



1. Read Request From Application To An Accelerated Array LUN
2. VFCache Driver Determines A Hit Occurred And Accesses Data From Flash Device
3. Data Returned From The Flash Device Forwarded To Application

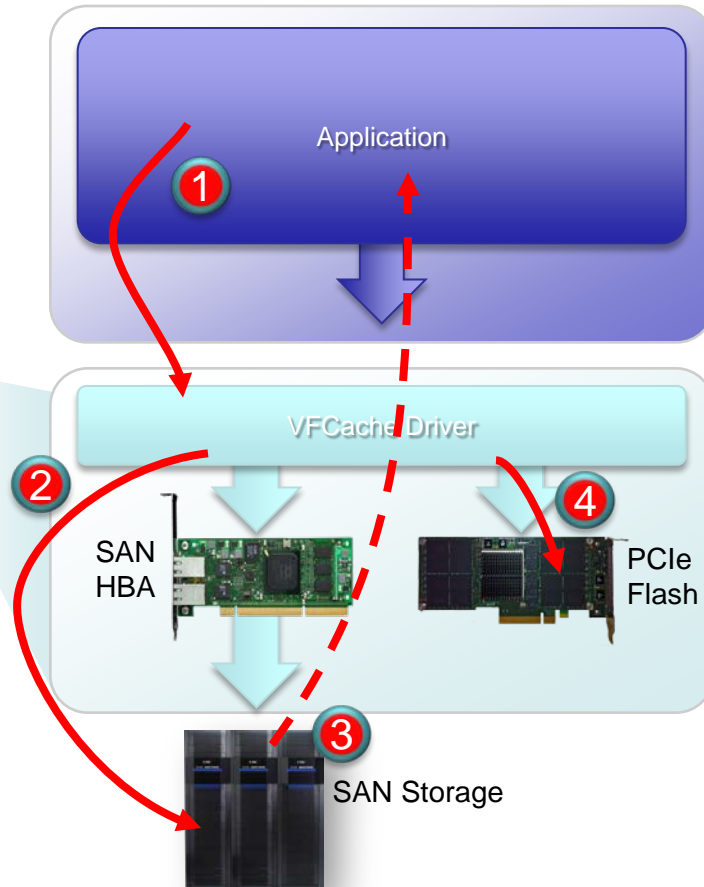


Read Miss Example



1. Read Request From Application To An Accelerated Array LUN
2. VFCache Driver Determines A Miss Occurred And Accesses Data From Array LUN
3. Data Is Read From The Array And Returned To Application
4. Read Miss Data Is Written To Flash Device

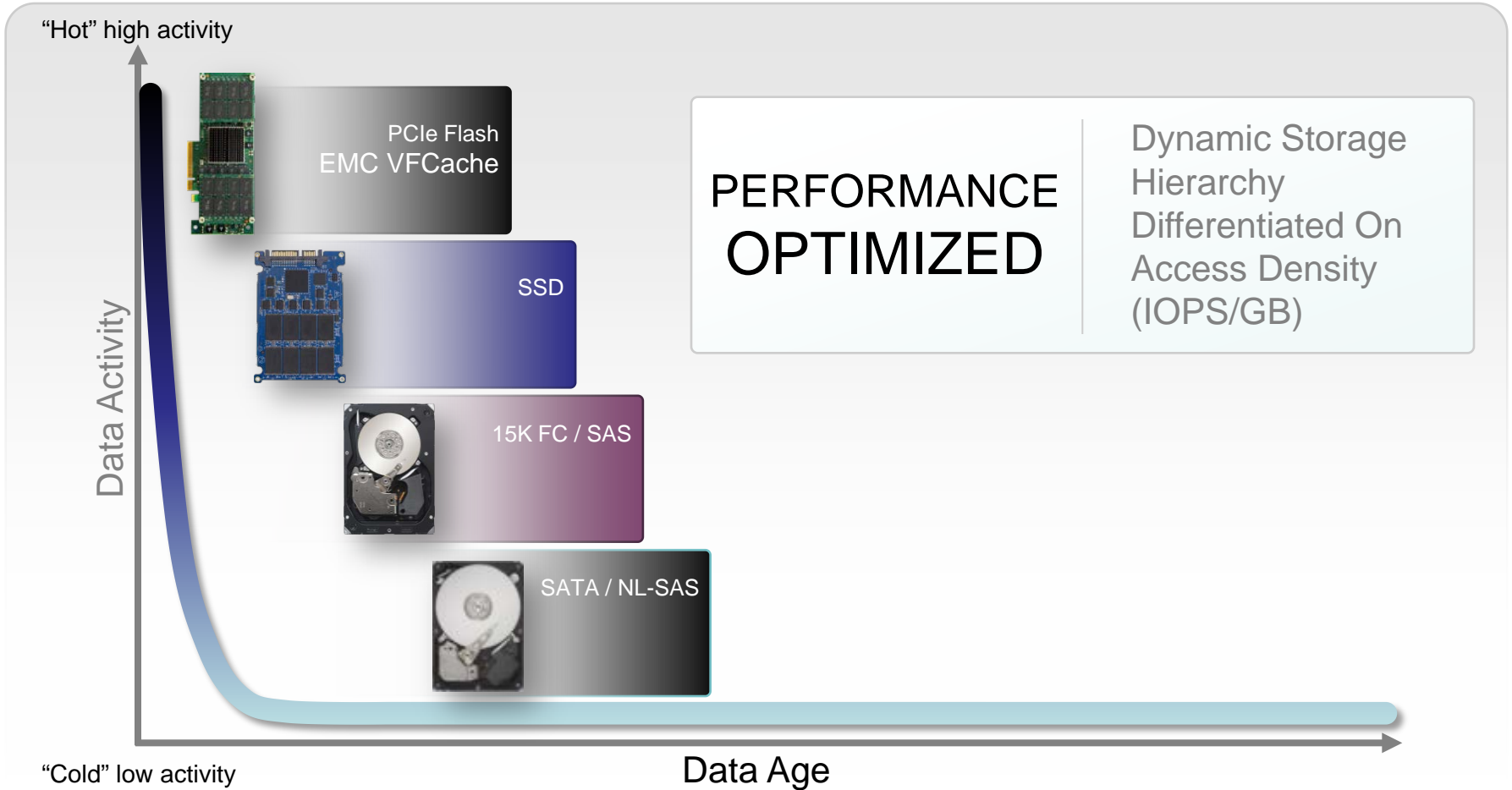
Write Example



1. Write Request From Application To An Accelerated Array LUN
2. VFCache Driver Writes Data To Array LUN
3. Application Write Acknowledged Upon Array Completion
4. Write Data Is Written To Flash Device

Data Continuum

As data “cools” and ages, different technologies apply





The EMC VNX 5500-F all Flash Array

Proven high availability and consistent high performance

10X
TRANSACTIONS

1/8th
THE COST



- 5 x 9's availability for mission critical applications
 - RAID data protection, proactive global sparing, replication, EMC quality Enterprise Flash
- Starter configuration at 2 or 4TB of Flash
 - 25 X 2.5" drives, with 100GB or 200GB SLC SSDs
- Advanced data efficiency services
 - Compression, De-dup, and Thin Provisioning doubles usable capacity
- Full unified protocol support
 - CIFS, NFS, pNFS, iSCSI, FCP and FCoE
- Expandable to Tiered Storage with FAST
 - From 49 TB of Flash to 675 TB of tiered storage (Flash, SAS, NL-SAS) as data ages



THANK YOU!

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