



Flash on the Memory Bus

Session 202-A

9:45am to 10:50am Aug 6, 2014

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THE HIGH COST OF LATENCY



“...every 100ms of latency cost them 1% in sales”



“...an extra 500ms in search page generation time dropped traffic by 20%”

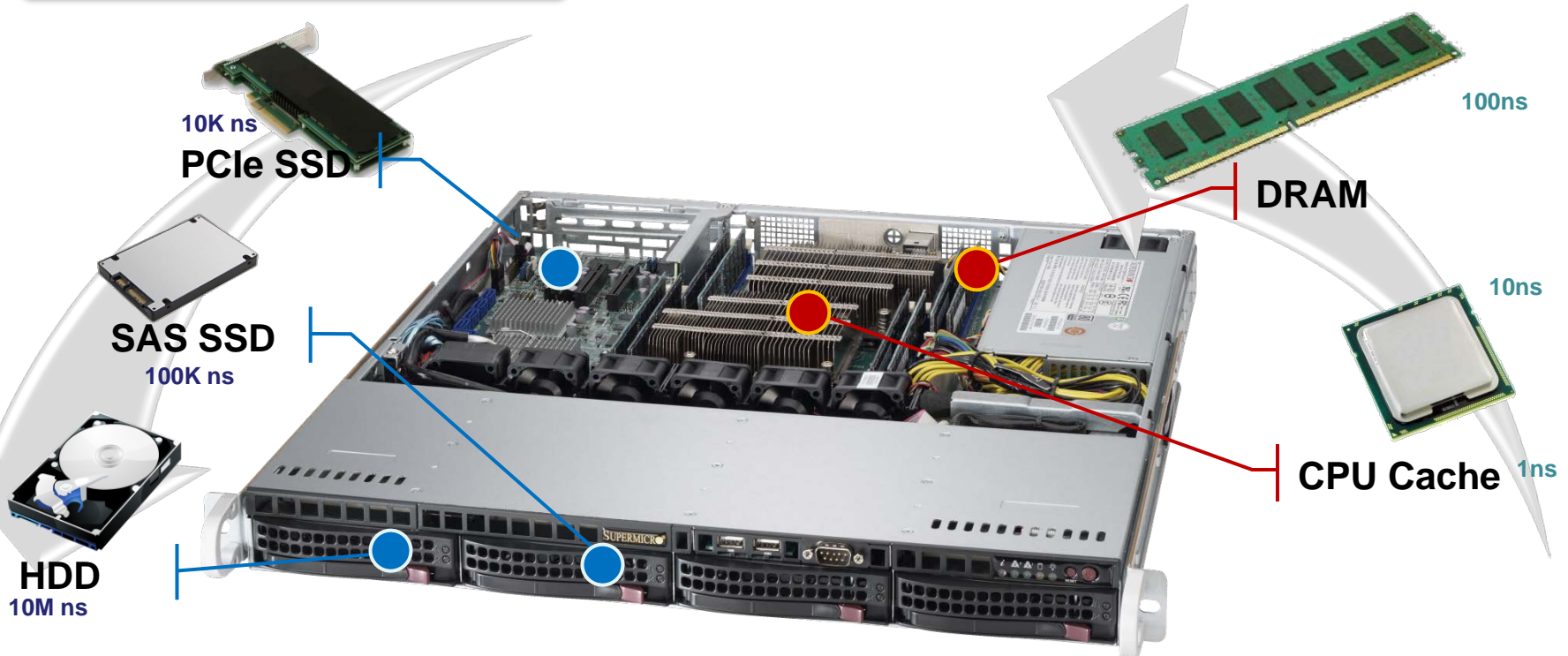


“...a broker could lose \$4M per millisecond if their electronic trading platform is 5ms behind the competition”

The Memory / Storage Problem: Latency

NON-VOLATILE MEMORY HIERARCHY

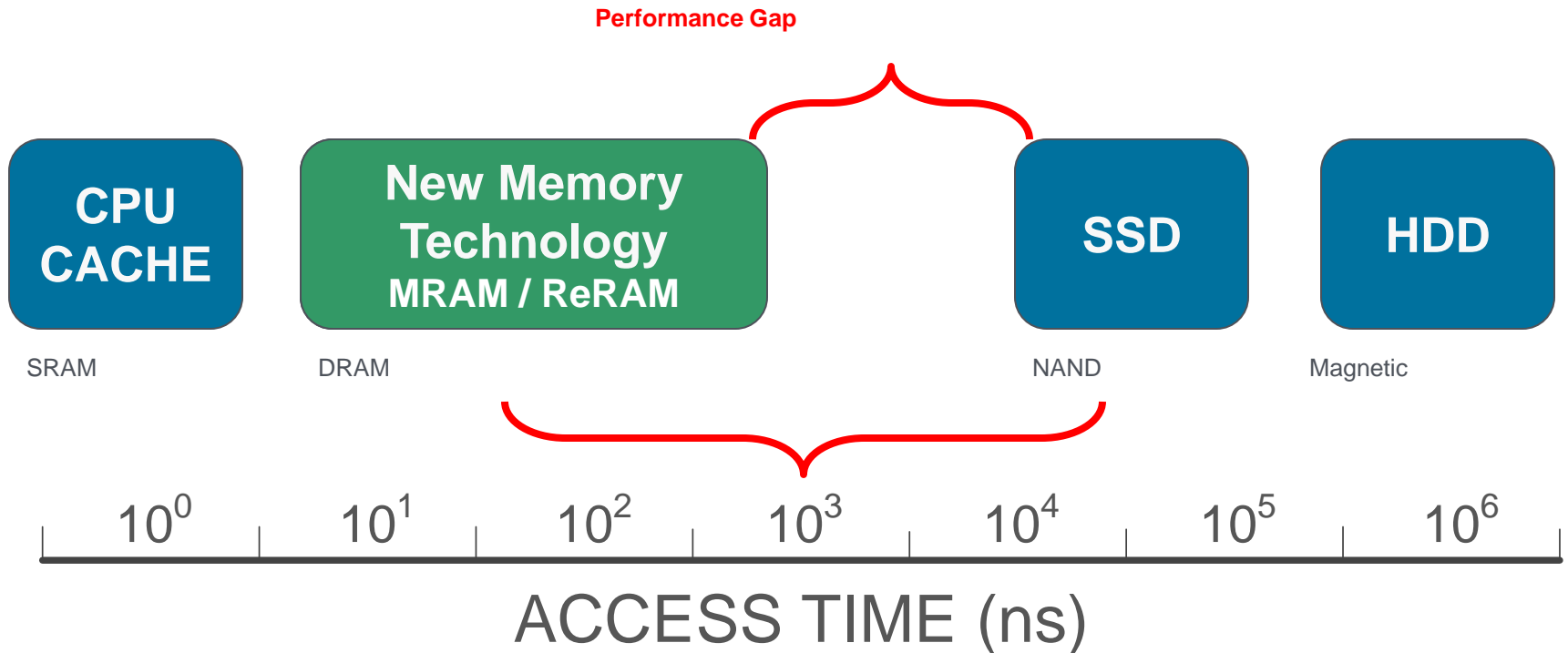
VOLATILE MEMORY HIERARCHY



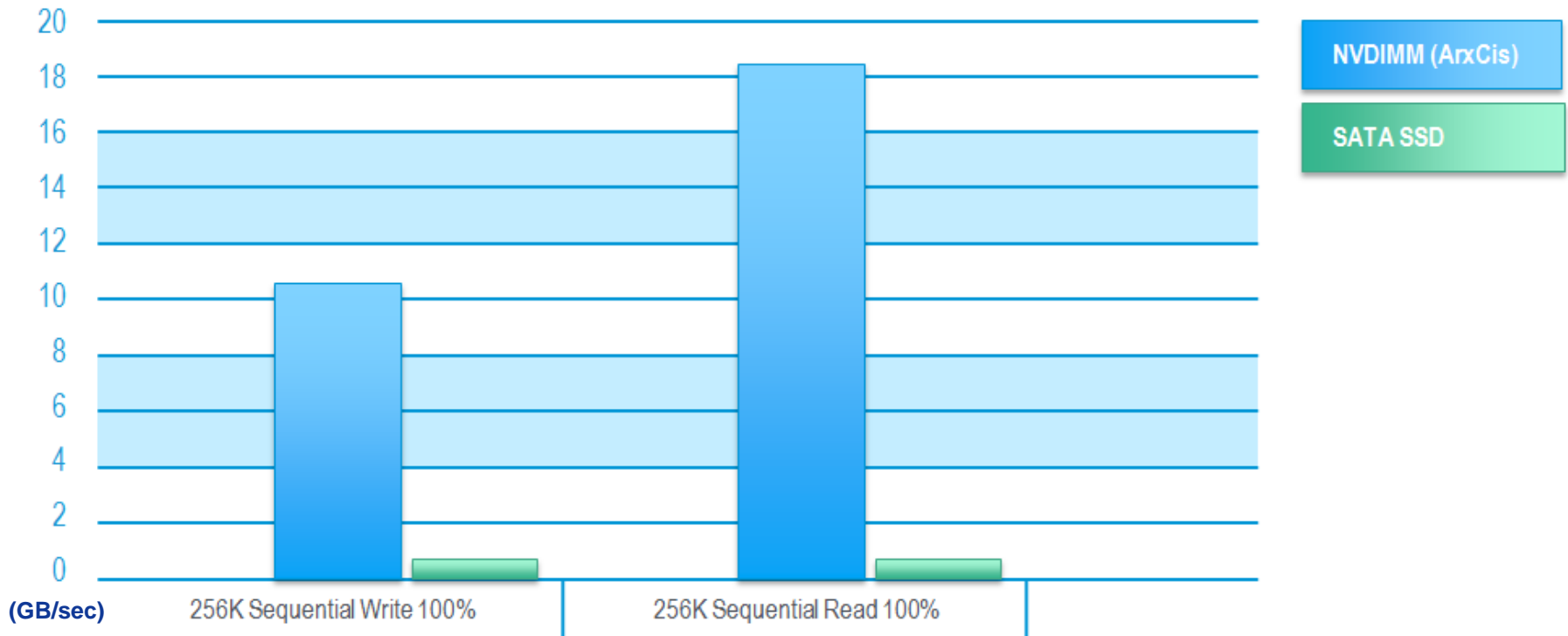
- As CPU technology scales, storage I/O creates performance bottlenecks
- The latency gap in memory / storage hierarchy needs to be bridged
- NVDIMM offers a solution today (Storage with low DRAM Latency)

Memory/Storage Hierarchy

- Data-Intensive Applications Need Fast Access To Storage
- Large Performance Gap Between Main Memory And HDD
- SSDs Have Narrowed The Gap, But a Big Gap Still Exists



NVDIMM PERFORMANCE



Benchmark: VDBENCH, Platform: Intel Sandybridge, Linux, Two DDR3-1333 NVDIMMs as interleaved pair (channel interleaving)

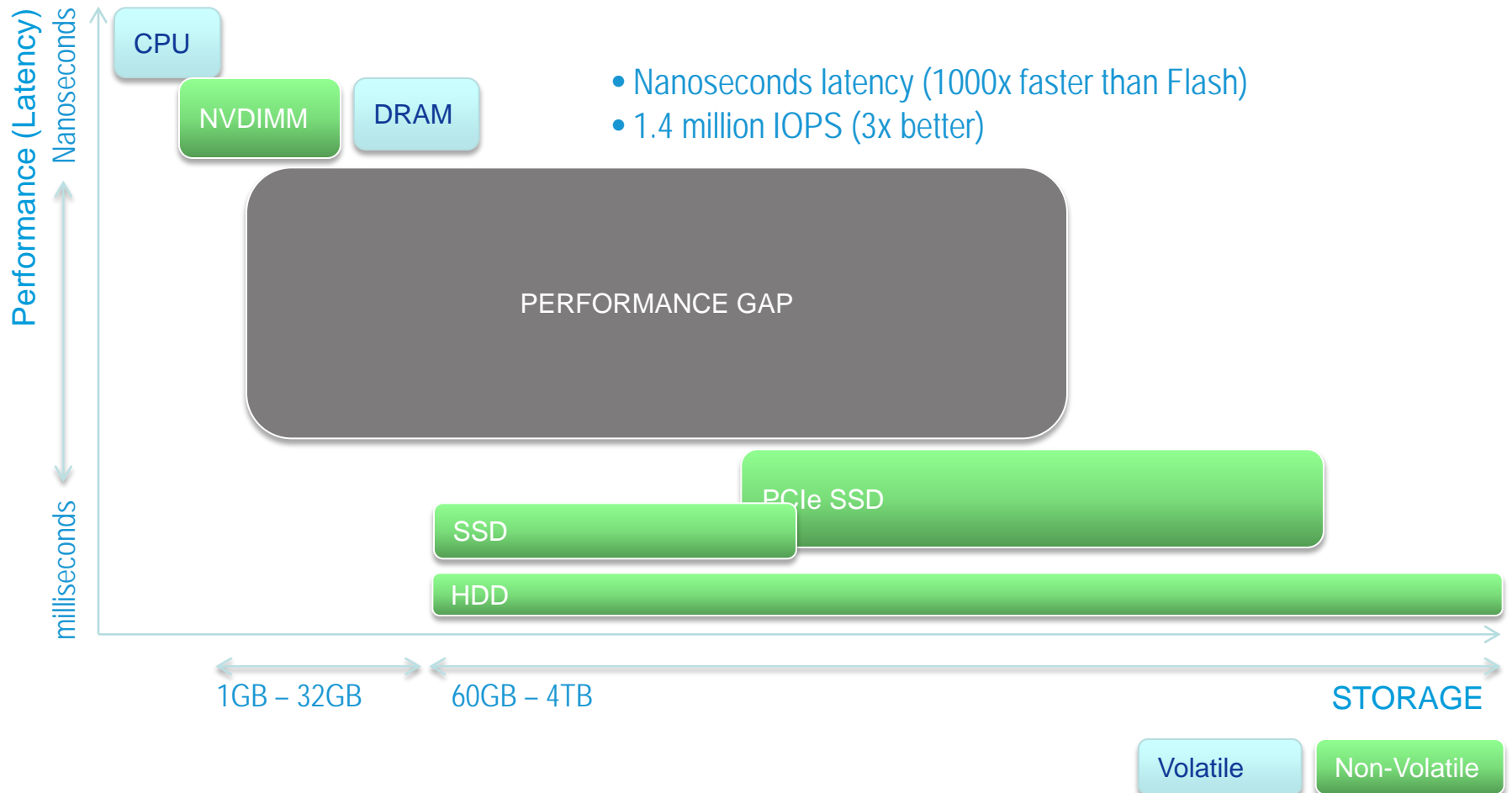
NVDIMM'S – WHAT & WHY



- Resides on the Memory Channel (DDR3/DDR4)
- Retains data in the event of an unexpected power loss
- Combines memory technologies (DRAM & Flash)
- Requires unique power source for main memory persistence
- Delivers high levels of storage throughput performance
- Databases can run faster & recover quicker
- Can enhance both SSD endurance and reliability

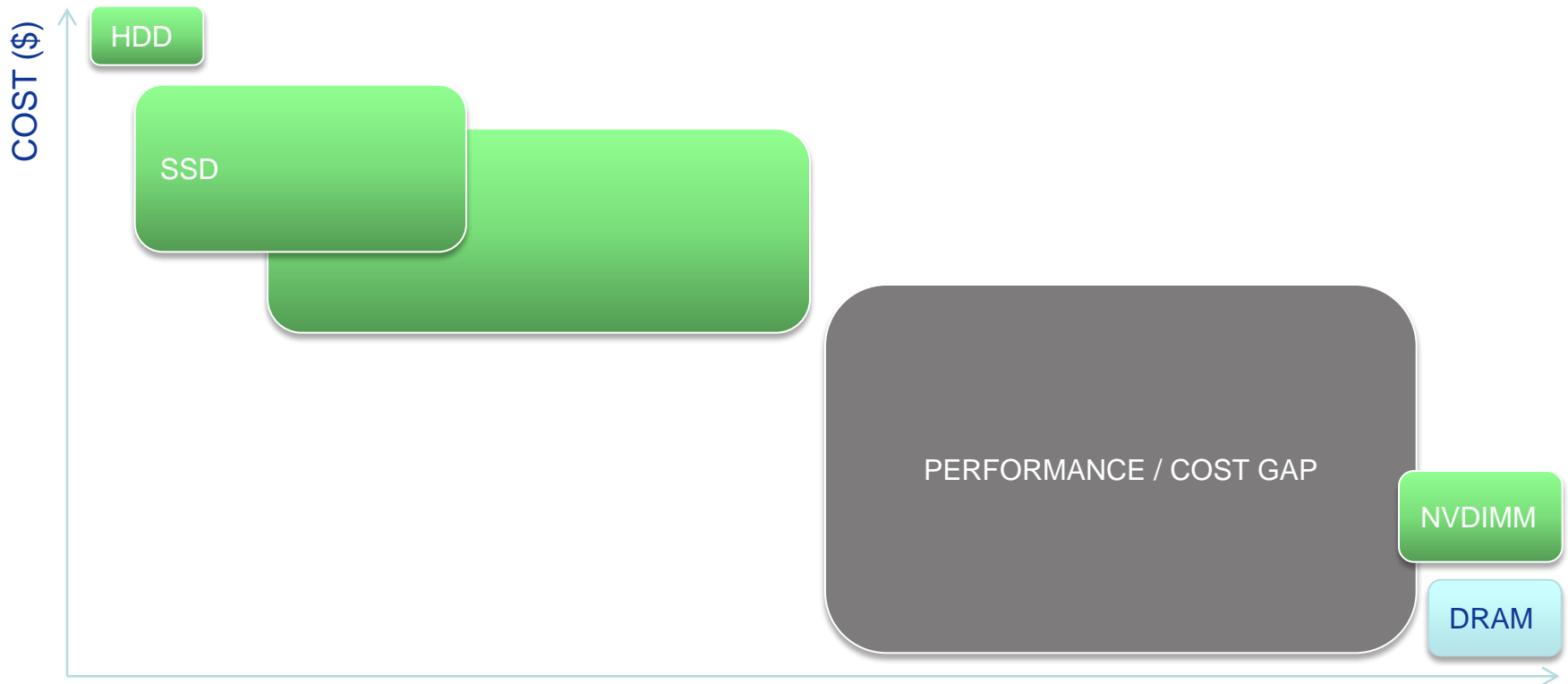
LATENCY & CAPACITY

Ecosystem performance gap between compute & storage



\$ PER I/O : NEW STORAGE METRIC ?

Performance vs. Cost (\$ per I/O) trade-off



Best in Class SSD: \$100.00 / PB versus. NVDIMM: \$0.40 (250x cost savings)

Reference: http://www.vikingtechnology.com/uploads/NVDIMM_Technical_Comparison.pdf

PERFORMANCE

Volatile

Non-Volatile

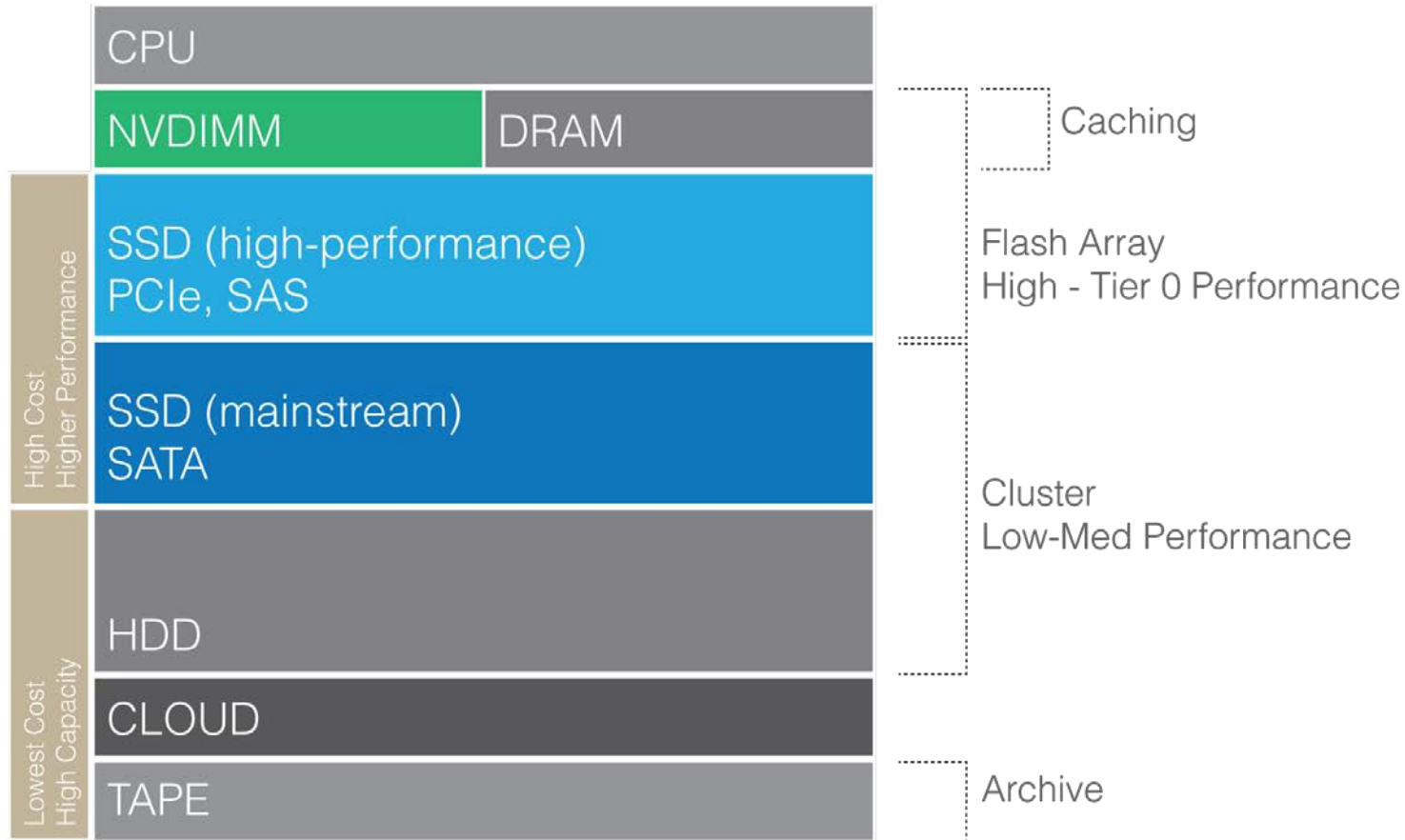
SOLUTION DIFFERENTIATORS

Several alternatives solutions in the market, all for different usage and applications. Each solution has its purpose, the questions is “finding the right tool for the job”.

ATTRIBUTE	HDD	NVDIMM	Std. SSD	PCIe SSD
Transaction (IOPS)	350	1.4 Million	60K – 250K	70K – 300K
Capacity	Up to 4TB	2GB – 16GB	60GB - 4TB	400GB – 8TB
Latency	10,000,000 ns	10 ns	100,000 ns	10,000 ns
Ease of Integration	Plug n’ Play (Low)	DDR4 availability & NVDIMM enabled Server (High)	Plug n’ Play (Low)	Drivers (Medium)
Availability	Now	DDR3 Now DDR4 Q4-2014	Now	Now
Scalability	Easy (24 per 2U)	DDR3/4 Socket (Medium)	Drive bays not always available (low – med)	PCIe Sockets (Very Low)
Market/Audience	All	OEMs	All	VARs / Integrators OEMs / Client

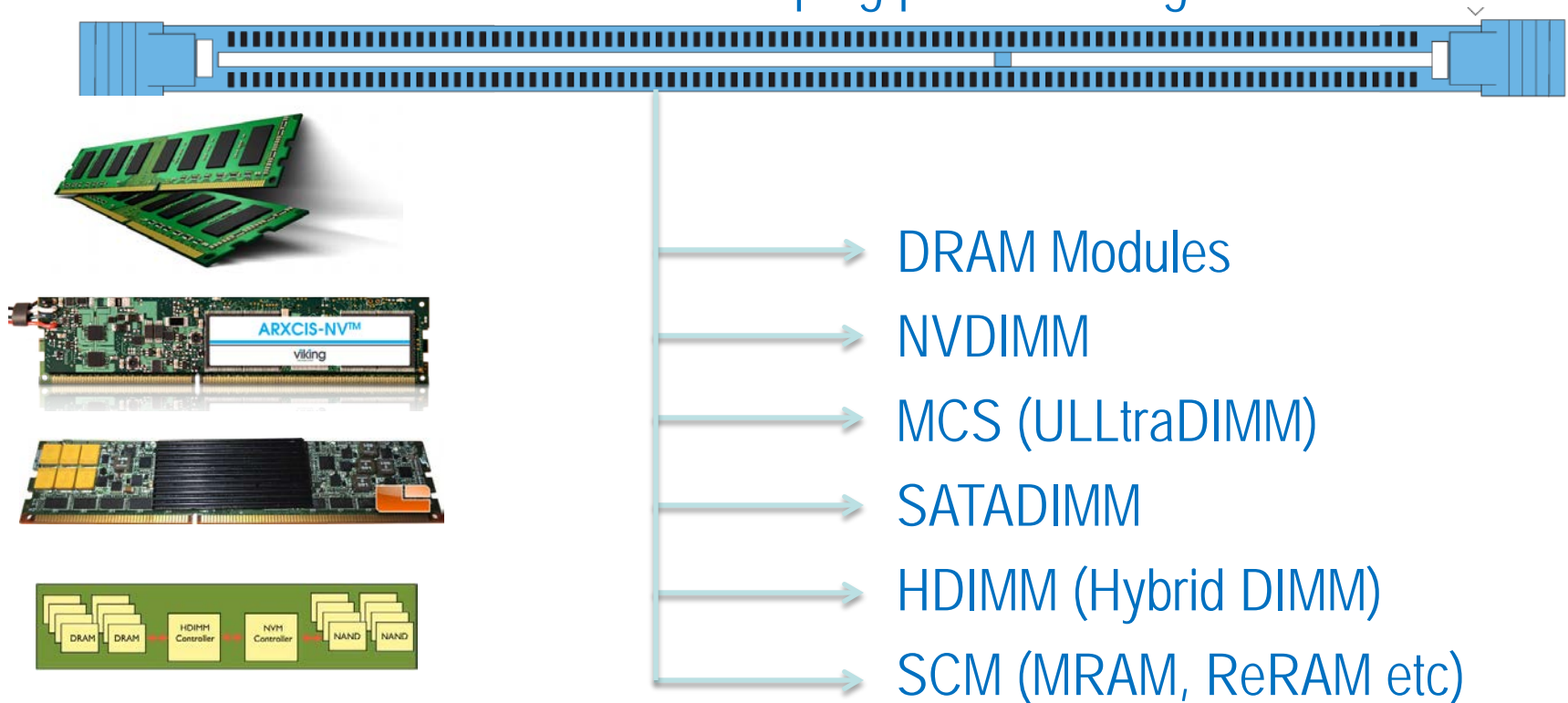
NEW STORAGE ECOSYSTEM

Storage hierarchy and synergistic ecosystem



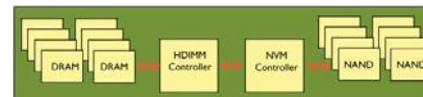
MEMORY BUS DEVICE OPTIONS....

The SNIA NVDIMM-SIG is developing product categories



OPTIONS – FLEXIBILITY – PRO’S & CON’S

- Flash is cheaper than DRAM \$/GB
- NVDIMM has 1000x lower latency than Flash
- DRAM has practically infinite endurance
- Hyperscale want “Dense & Cheap” (WORM)
- Financial want low & predictable latency
- Storage wants higher I/O performance & increased data security
- No individual “BEST” choice – There are OPTIONS....





THANK YOU

www.vikingtechnology.com