Defining requirements for a successful all-flash data center

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Outcomes Driving the Move to an All-Flash Data Center

CapEx and OpEx Savings	Organizational Productivity	Business Transformation

< 10%
raw capacity needed vs HDD

50%
License reduction for databases, virtualization and middleware

IT & dev ops see
2x productivity

3x code quality improvement

Reduce operational staff workload by
50%

Quadruple **(4x)** the number of new projects supported by IT

Access and process
thousands
of times more data vs HDD

Real-time analytics applied to real-time automated decision-making

Source: Top Ten Reasons why CIOs Should Migrate to All-flash Datacenters by 2016. David Floyer - 26 May 2015 - Wikibon.com

Storage infrastructure requirements for the all-flash data center

1	Consistent, predictable performance
2	Affordable
3	Dense, power efficient
4	Enterprise class resiliency
5	Future-proof

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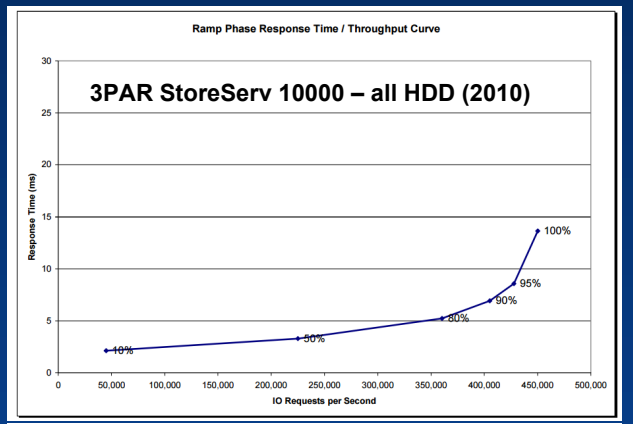
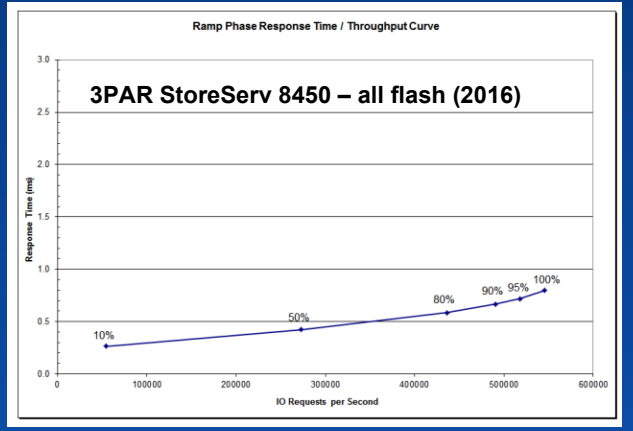
Power to the masses…

- Compare the SPC-1 results of two of our systems:
  - The StoreServ 10000 all HDD result (from 2010) came in at 450,212 IOPS at $6.59/IOP
  - The StoreServ 8450 all flash result (from 2016) came in at 545,164 IOPS at $0.23/IOP
  - The real story is in the latency response – the all flash system does half a million IOPS at 800us





Source: SPC web page: http://www.storageperformance.org/results/benchmark_results_spc1_active/

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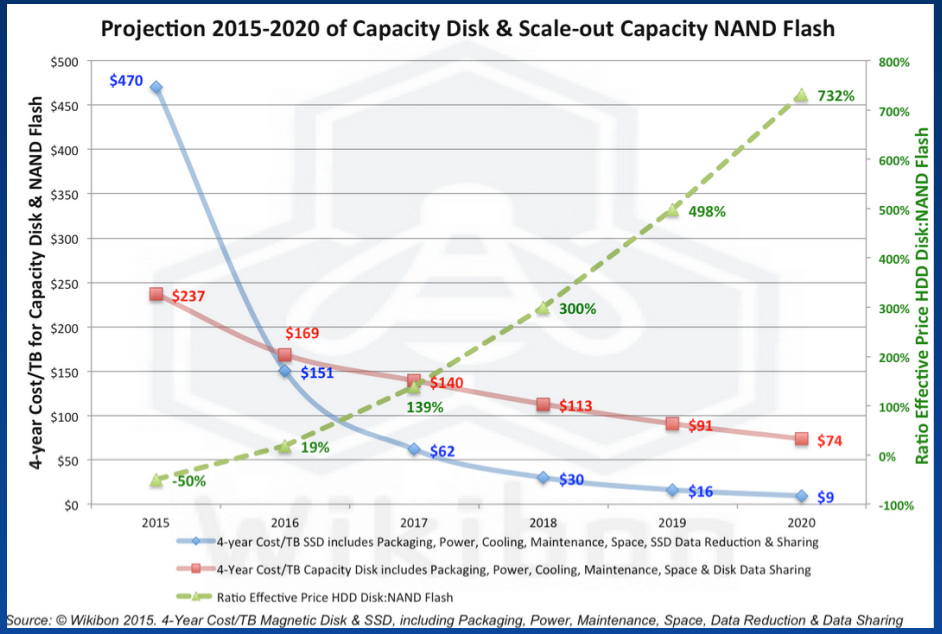
NAND flash costs continue declining

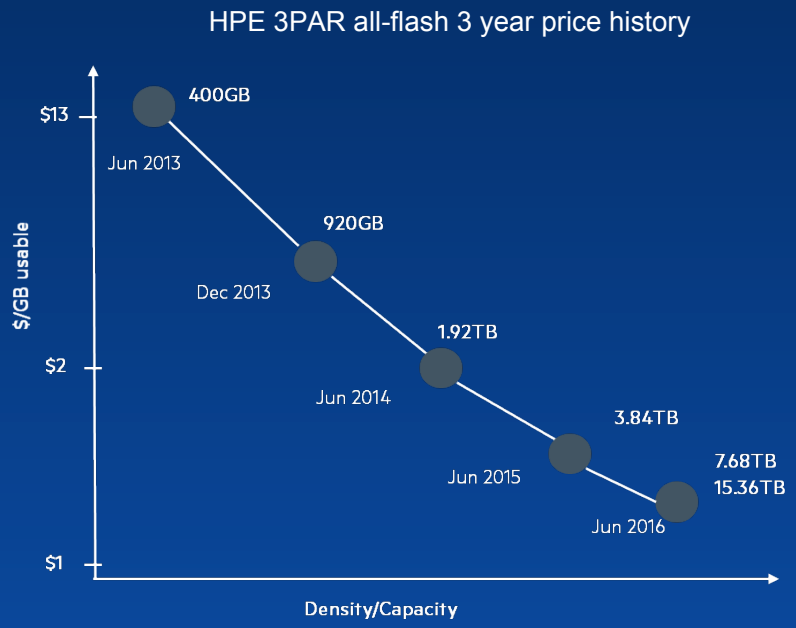
- Cost remains the single biggest reason for not adopting flash
- NAND flash costs will continue declining although the rate of decline will be lower
- 3D-NAND has made a significant difference – QLC will be the next inflection point



Source: http://wikibon.org/wiki/v/Evolution_of_All-Flash_Array_Architectures

The right architecture matters

- Storage architectures need to meet two key requirements to drive adoption:
  - Adopt the latest, most cost effective media quickly
  - An efficient architecture that includes compaction



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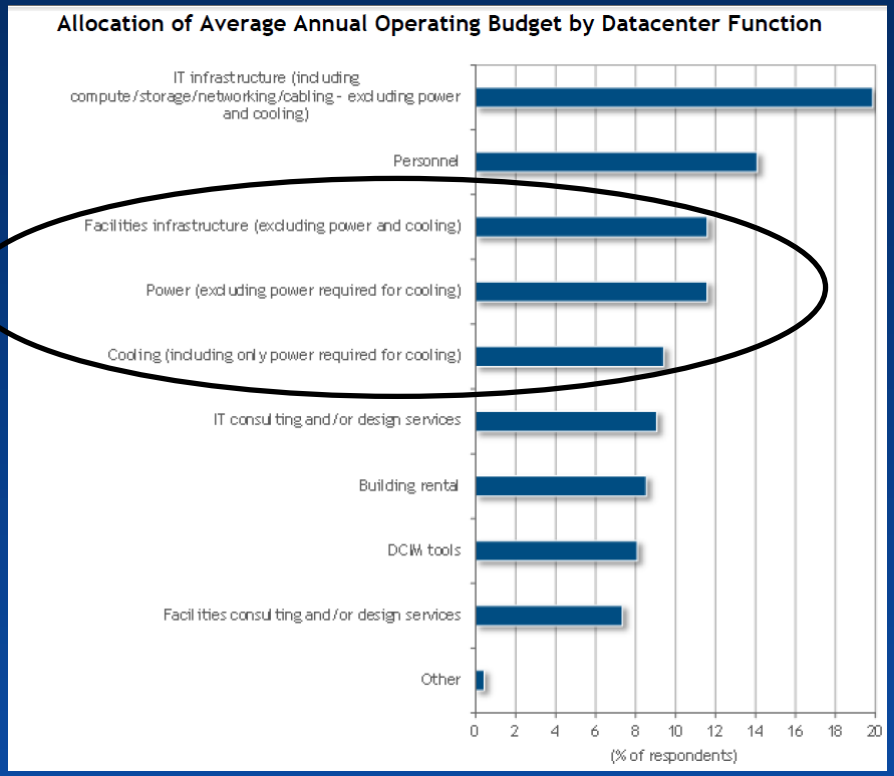
Top datacenter concerns

- Power and cooling is top of mind for data center operators
- Accounts for a significant chunk of budgets after IT gear and personnel
- Enterprises adoption of colocation datacenters brings more focus on space savings



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Source: IDC's Enterprise Datacenter Survey, 2015

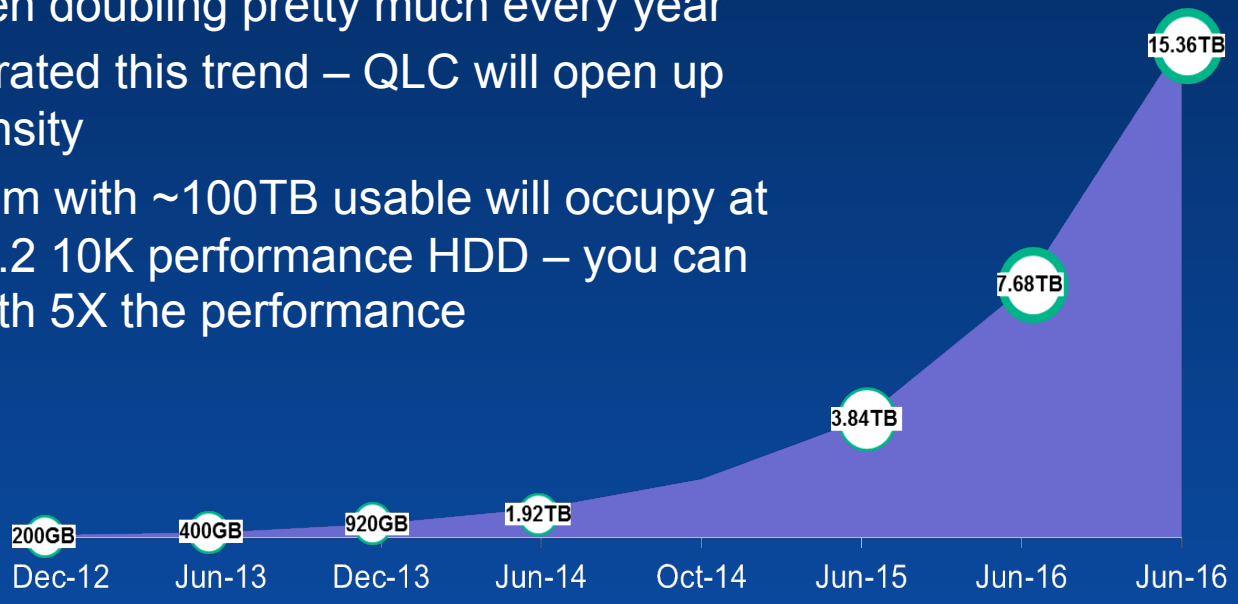
Flash is a YUUUGE power saver

- The contrast is stark…
  - Fewer number of media devices consuming less power compared to spinning media means dramatically lower power figures at significantly higher performance

	8400 Hybrid	8450 All Flash	Saving
Power Consumption	5,964 Watts	1,352 Watts	**>77%**
Thermal Output	20,334 BTU/hr	4,670 BTU/hr	**>77%**
Rack Height	40U	8U	**>80%**
Weight	426Kg	103Kg	**>75%**

Honey I shrunk the datacenter

- SSD capacity has been doubling pretty much every year
- 3D-NAND has accelerated this trend – QLC will open up the next frontier in density
- Consider this: A system with ~100TB usable will occupy at least 10U if you use 1.2 10K performance HDD – you can get the same in 2U with 5X the performance



SSD adoption in 3PAR systems

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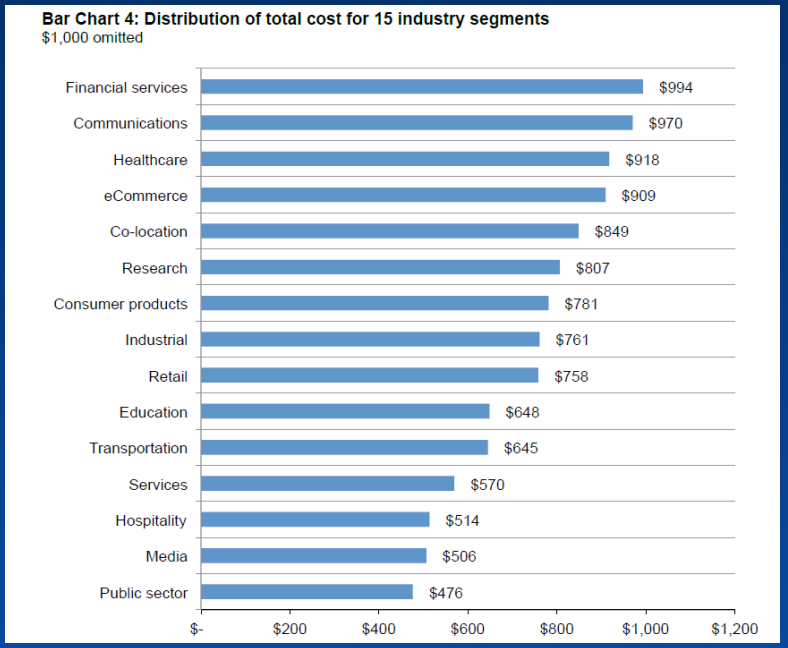
The cost of downtime is time high

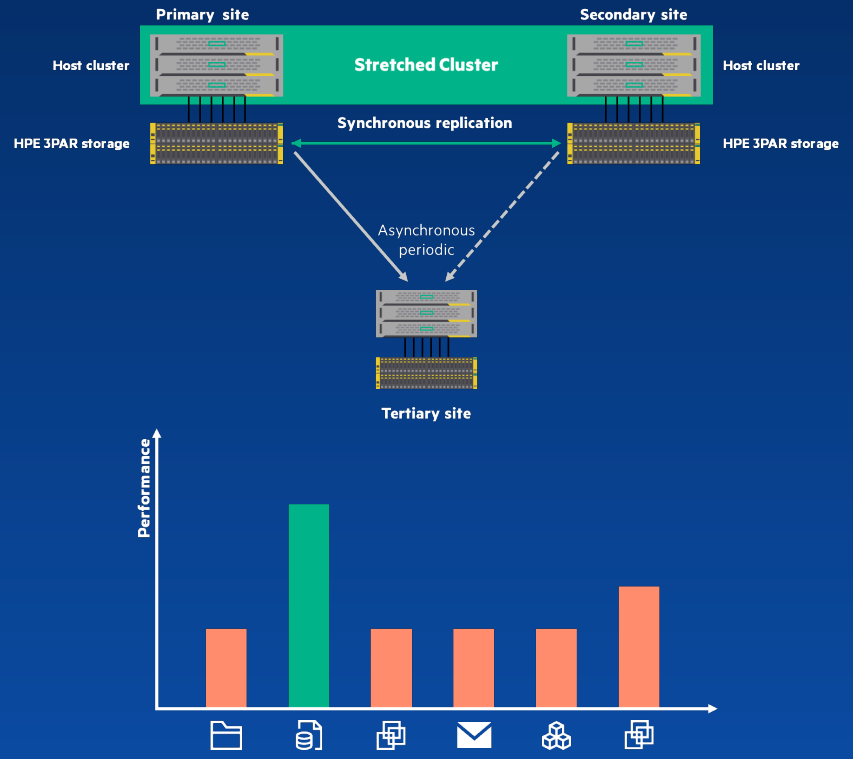
- Loss of data or access to data can be catastrophic for business
  - On average unplanned data center downtime costs US companies $740,357 per outage*
  - Plus the intangible cost of, brand damage and loss of customer goodwill
- With increasing system interconnectedness the risk of cross system data corruption has grown



*Based on the Ponemon Institute Cost of Data Center Outages Study (Jan 2016)

Flash drives consolidation

- Robust replication capabilities are as important as ever
  - All-flash or not, mission critical deployments will need full fledged replication capabilities
- Storage quality of service is important
  - Consolidation brings the noisy neighbor problem to the fore – runaway apps can cause downtime
- End to end data integrity is another factor
  - Higher performance and density means more data on storage systems and on the network



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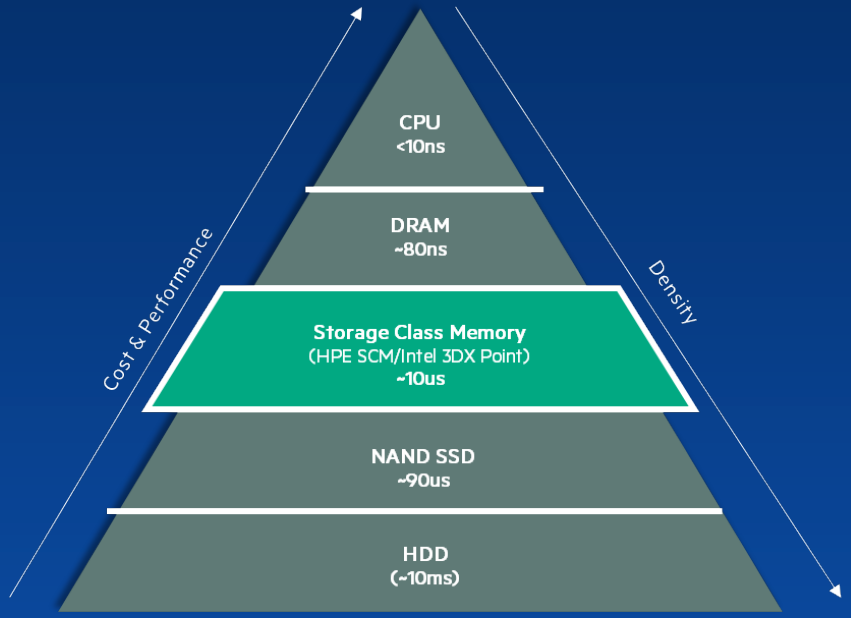
Are you ready for SCM?

- The next step in performance calls for solid state media with access times closer to DRAM and costs closer to RAM - Storage Class Memory
  - Intel 3DXPoint and other types of SCM (PCM/ReRAM) are emerging
- The key question is whether a storage architecture is ready to make this transition?



The All Flash data center calls for...

- Storage infrastructure that can:
  - Deliver predictable performance
  - Is affordable
  - Reduce datacenter footprint, help save power
  - Has enterprise class resiliency features
  - And is built to take advantage of next gen media and protocol advances

Thank you!