High-Performance I/O Gets the Most from Flash Arrays

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Enabling the performance offered by flash based solutions

- All Flash Arrays
  - Putting the bottleneck back on the server
- Database and Business Analytics
  - 16Gb FC study
- Cloud Computing, Flash and FC
  - Rackspace case study with FC architecture

All Flash Arrays = Extremely Low Latency

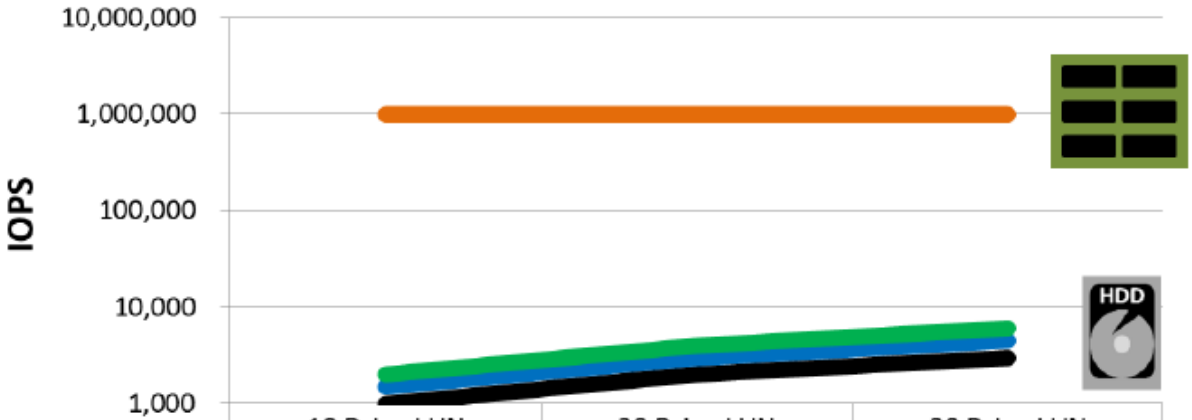
*"From the storage media perspective, flash storage provides **almost instantaneous response time** and is rapidly replacing hard disk storage in many performance-demanding environments."*

George Crump, Lead Analyst, Storage Switzerland, LLC

- Instantaneous Response Time from the Array means Ultra-Low Latency
- The Server and Network now become the Bottleneck
- Turning the Compute/Storage Performance Delta on its Head

16Gb FC needed to deliver full potential of All Flash Array

IOPS Performance— All Flash Array vs. All HDD Array



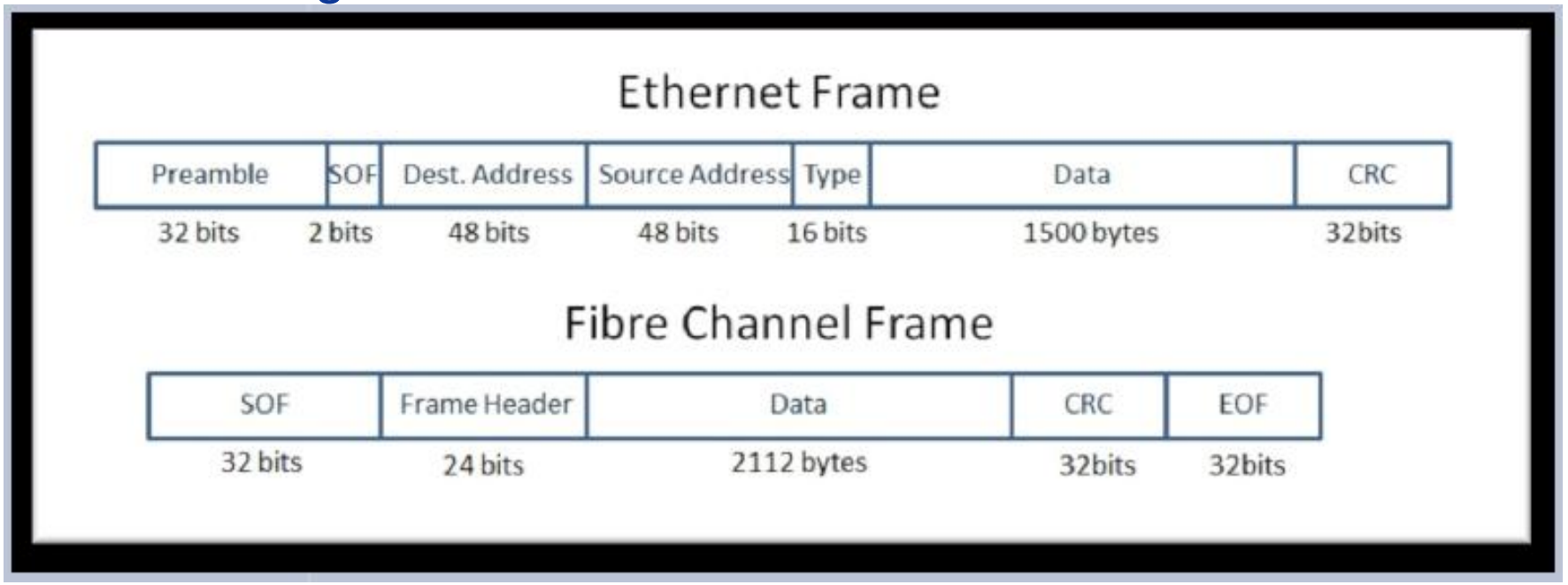
	10 Drive LUN	20 Drive LUN	30 Drive LUN
7,200 RPM HDD	1,000	2,000	3,000
10,000 RPM HDD	1,500	3,000	4,500
15,000 RPM HDD	2,000	4,000	6,000
2TB Flash Array - 1 LUN	1,000,000	1,000,000	1,000,000

4Gb Fibre Channel SANs have the capacity to support I/O to storage systems handling few thousand IOPS. 16Gb Fibre Channel is needed to exploit the full potential of all flash storage arrays that can handle a million IOPS each.

From IT Brand Pulse – Industy Brief – 16 Gb FC Eases Data Center Traffic James

All Flash Arrays – FC Networking Efficiency

- Very efficient frame design in FC leads to a 16Gb FC running 40% faster than 10GbE networks

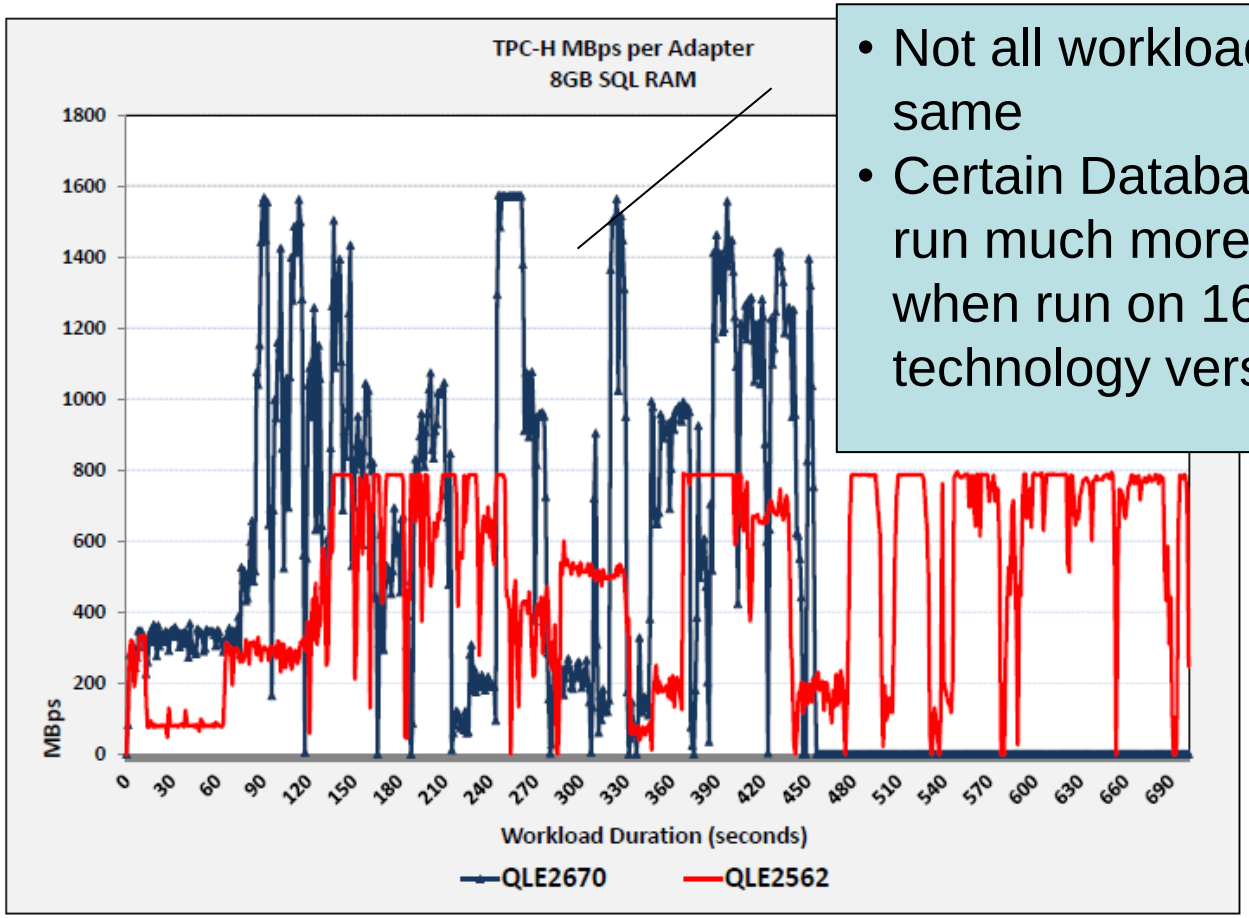


- *"My network can beat up your network"*

Database and Business Analytics

- We Explored the Benefits Achieved with 16Gb FC HBA for Accelerating Mixed Workloads
- 16Gb FC as Compared to Our Own 8Gb FC:
  - Showed up to 82% faster task completions
  - 35% faster total time to execute
- Extremely Low Latency HBA Technology

Database and Business Analytics – TPC-H MBps



- Not all workloads are the same
- Certain Database Queries run much more than 2x faster when run on 16Gb FC technology versus 8Gb FC

Figure 3. Throughput Performance Comparison

Cloud Computing, Flash and the Need for FC

- Rackspace is a World Leader in Dedicated Hosting and Cloud Computing
  - 200,000 customers
- Rackspace Relies on FC Infrastructure

"For Rackspace, density and the ability to use all of our capacity is critical to our financial performance,…Fibre Channel allows us higher densities, the ability to leverage the infrastructures across our customer base and more readily monetize our capital investments." – Sean Widige, CTO Rackspace

Cloud Computing, Flash and the Need for FC

- RackSpace Offers SSD based Cloud Block Storage (CBS) and Delivers it via FC
- SSD Benchmark data from RackSpace shows increased performance for many applications such as Database, Batch Updates, Large data ingest and Backup
- SSD Infrastructure Must be Delivered with the RackSpace “Fanatical Support” Model
  - In 2012 they outfitted data centers with 16Gb FC in eight of their nine data centers

16Gb FC Key to Delivering Flash Performance

- In Summary
  - All Flash Arrays are putting stress back on the servers
  - 16Gb FC has proven to accelerate the workloads now being deployed in all flash environments
  - Enterprise and Cloud infrastructures have been and continue to rely on FC to deliver application performance to their customers

References

Information World - FCIA Knowledge Vault

Fibre Forward - Why Storage Infrastructures Should Be Built With Fibre Channel

IT BrandPulse - 16 Gb FC Erases Traffic Jams

RackSpace - Benchmark Report

RackSpace FC Case Study

Why FC Fabrics to Support Flash Storage

QLogic 16Gb Gen 5 FC for Database & Business Analytics