



OPEN

Compute Engineering Workshop

March 9, 2015

San Jose



Evolving from Appliance Switched Fabrics to Device Switched Fabrics

Dimitar Boyn

I/O Switch Technologies, Inc.

CTO



If IT Architects Designed Cars



1966 Two Engine Toronado

- Unique single oversized cooling system to support both engines. Coolant lines route through frame rails to support rear engine with modified rear engine water pump to allow rear seat/firewall clearance
- Single Tachometer and Throttle pedal to run both engines
- Oil pressure gauge light split to show both engines separately
- Oldsmobile rocker switch starts rear engine
- Two engines feed off of the one original gas tank
- Oldsmobile switch located on dash modified to override the transmission and shift from 3rd to 2nd using the horn button.
- Two extra fans in front, and two in trunk to remove engine heat
- Functional trunk w/o view of rear engine
- Has a functional trunk and a functional rear seat to completely conceal the rear engine.



What is the Connection ?

EMC Corporation

4,015 followers on Google+

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EMC Corporation is an American multinational corporation headquartered in Hopkinton, Massachusetts, United States. [Wikipedia](#)

Stock price: EMC (NYSE) \$25.28 -0.29 (-1.13%)

May 7, 4:00 PM EDT - Disclaimer

CEO: Joseph M. Tucci

Headquarters: Hopkinton, MA

Founded: 1979, Newton, MA

Customer service: 1 (800) 782-4362 (Consumer), 1 (508) 497-7901 (Consumer)

Founders: Richard Egan, Roger Marino



NetApp

2,488 followers on Google+

Follow

NetApp, Inc., formerly Network Appliance, Inc., is a computer storage and data management company headquartered in Sunnyvale, California. It is a member of the NASDAQ-100. It was ranked on the Fortune 500 for the first time in 2012.

[Wikipedia](#)

Stock price: NTAP (NASDAQ) \$33.70 -1.28 (-3.66%)

May 7, 3:59 PM EDT - Disclaimer

CEO: Tom Georgens

Headquarters: Sunnyvale, CA

Founded: 1992

Founders: Michael Malcolm, James Lau, David Hitz



Piggly Wiggly

Supermarket company

Piggly Wiggly is a supermarket chain operating in the Midwestern and Southern regions of the United States, run by Piggly Wiggly, LLC, an affiliate of C&S Wholesale Grocers. The current company headquarters is in Keene, New Hampshire. [Wikipedia](#)

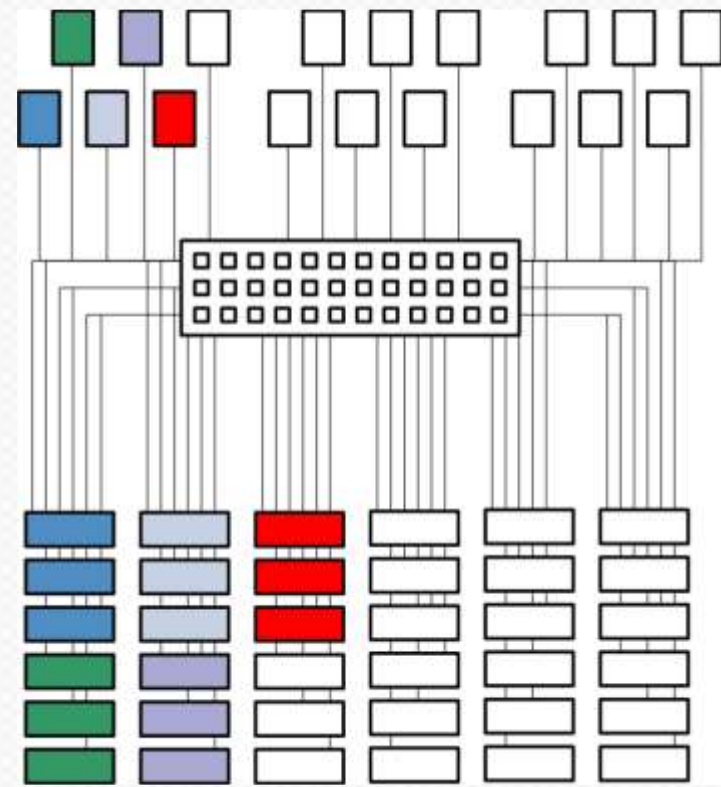
Founder: Clarence Saunders

Founded: Memphis, TN

CEO: David R. Schools

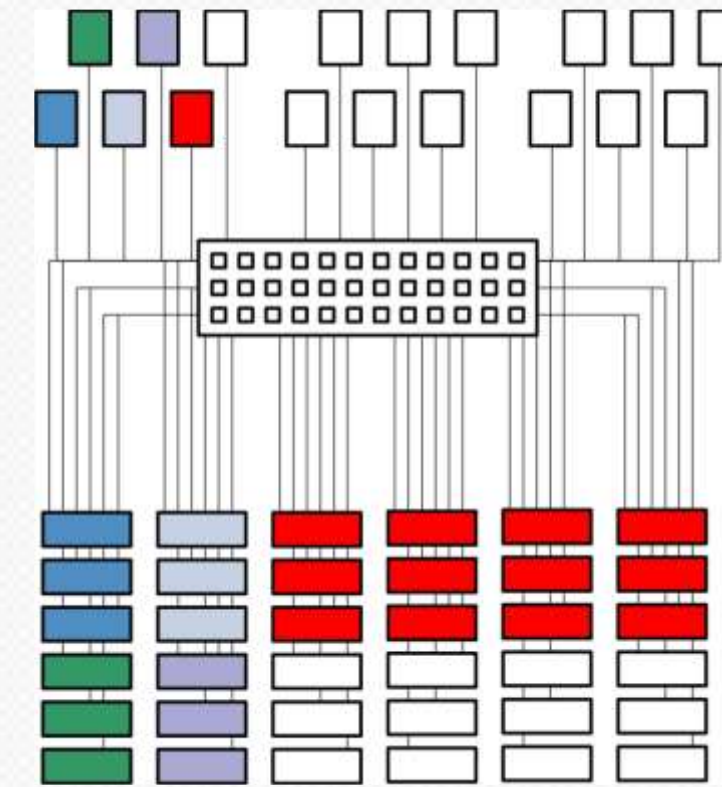
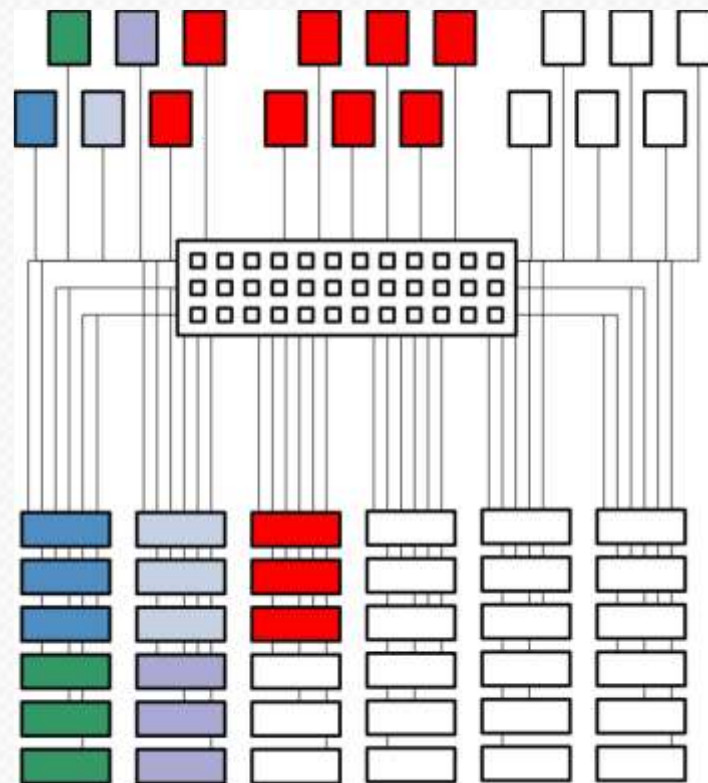


General Purpose Stores



Switched Fabric

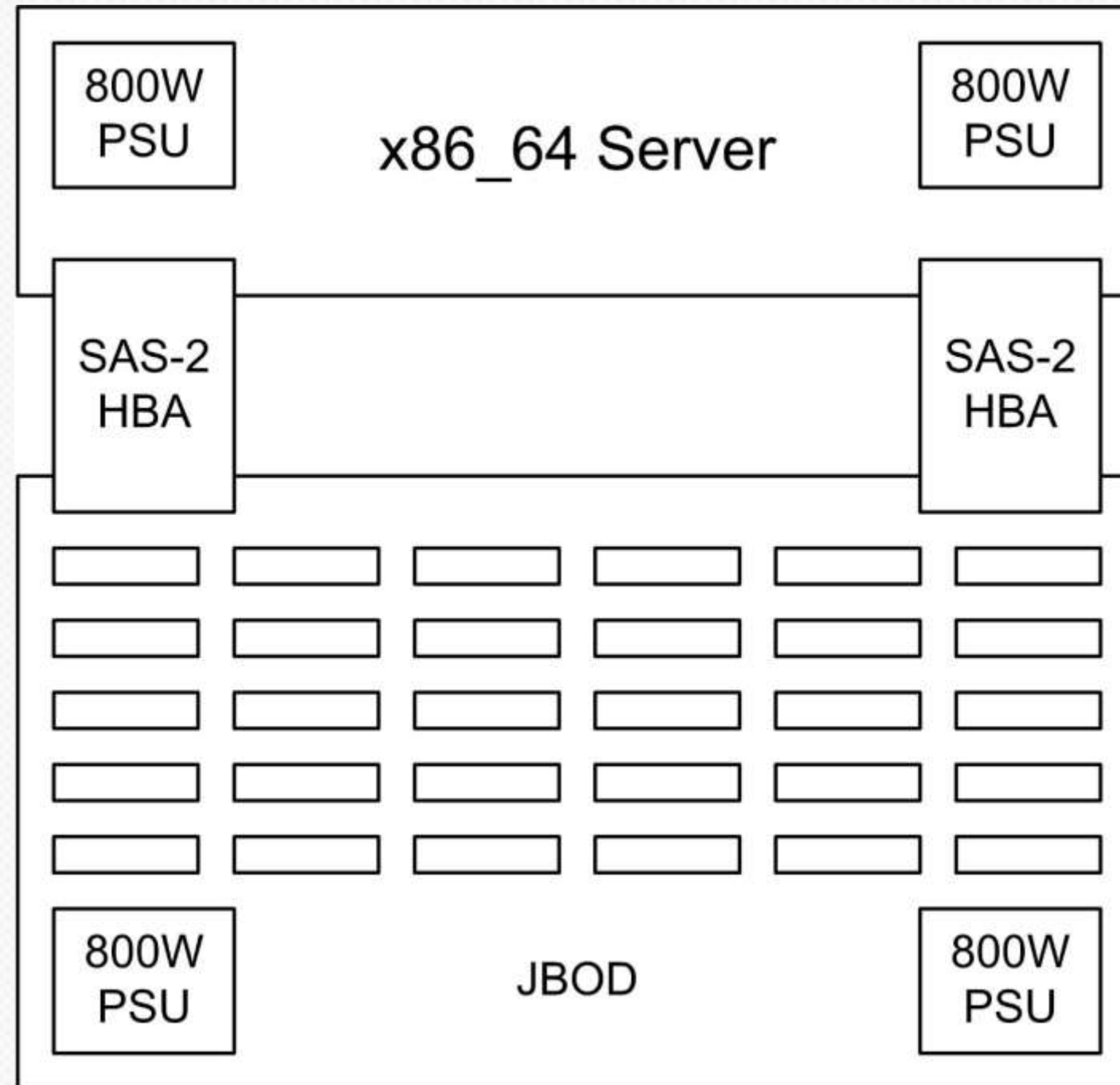
Dynamic Recombination



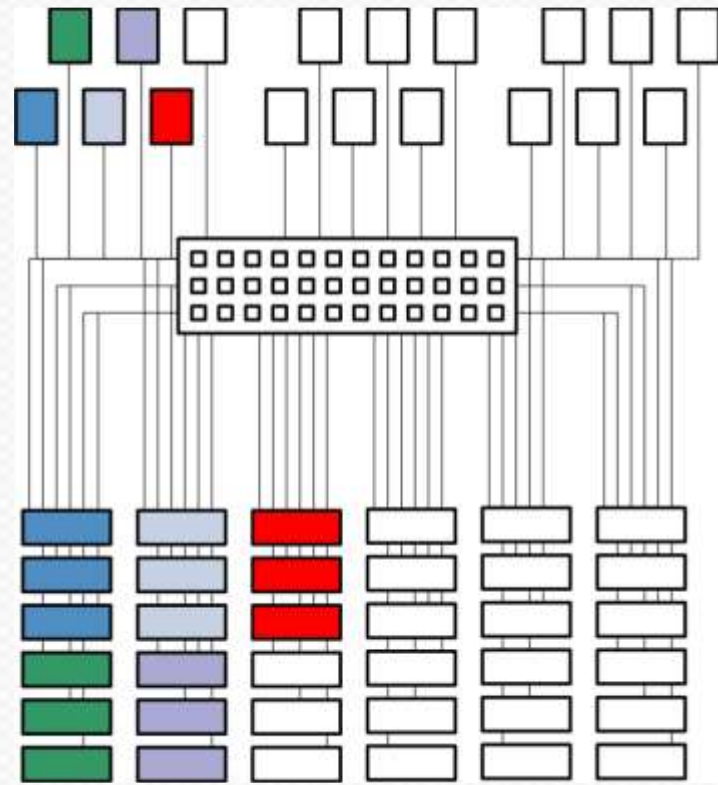
Storage Resource Elasticity



What isn't wrong with this picture?

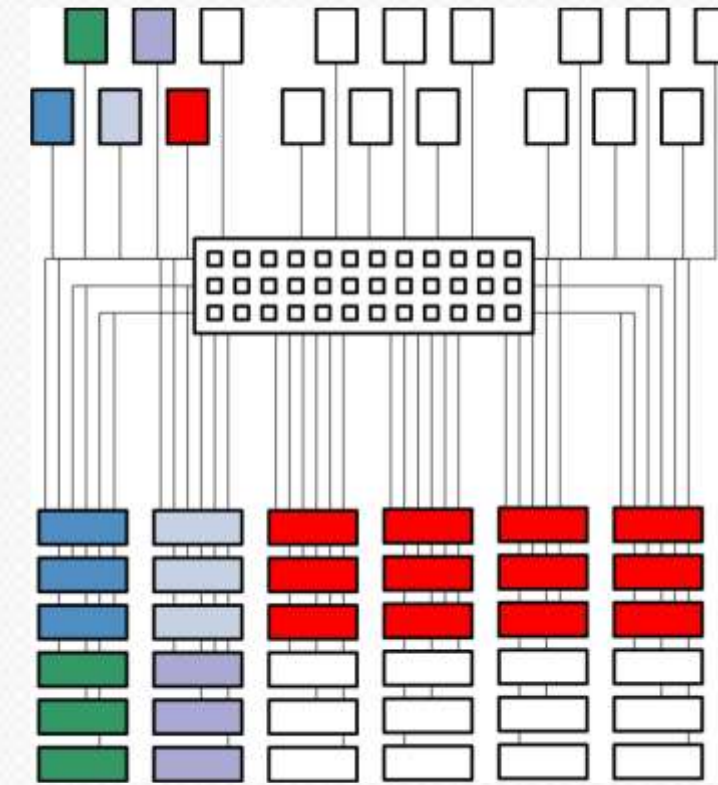
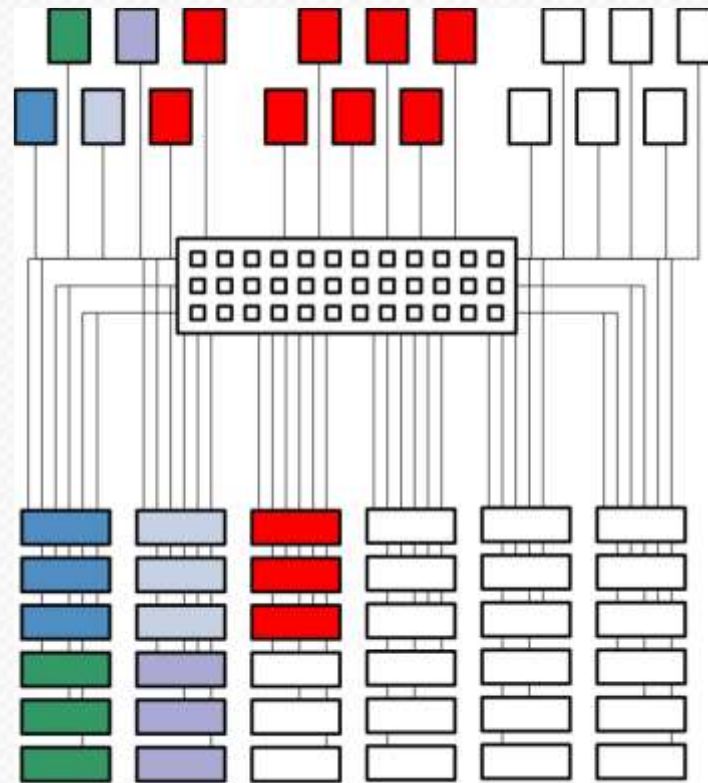


Adaptive Storage ?



Switched Fabric

**Dynamic Recombination
for Compute**



Storage Resource Elasticity

Open I/O



Open I/O Concept

When we implement a switched fabric between devices and replace hardware RAID with in silicon cloud age data protection algorithms

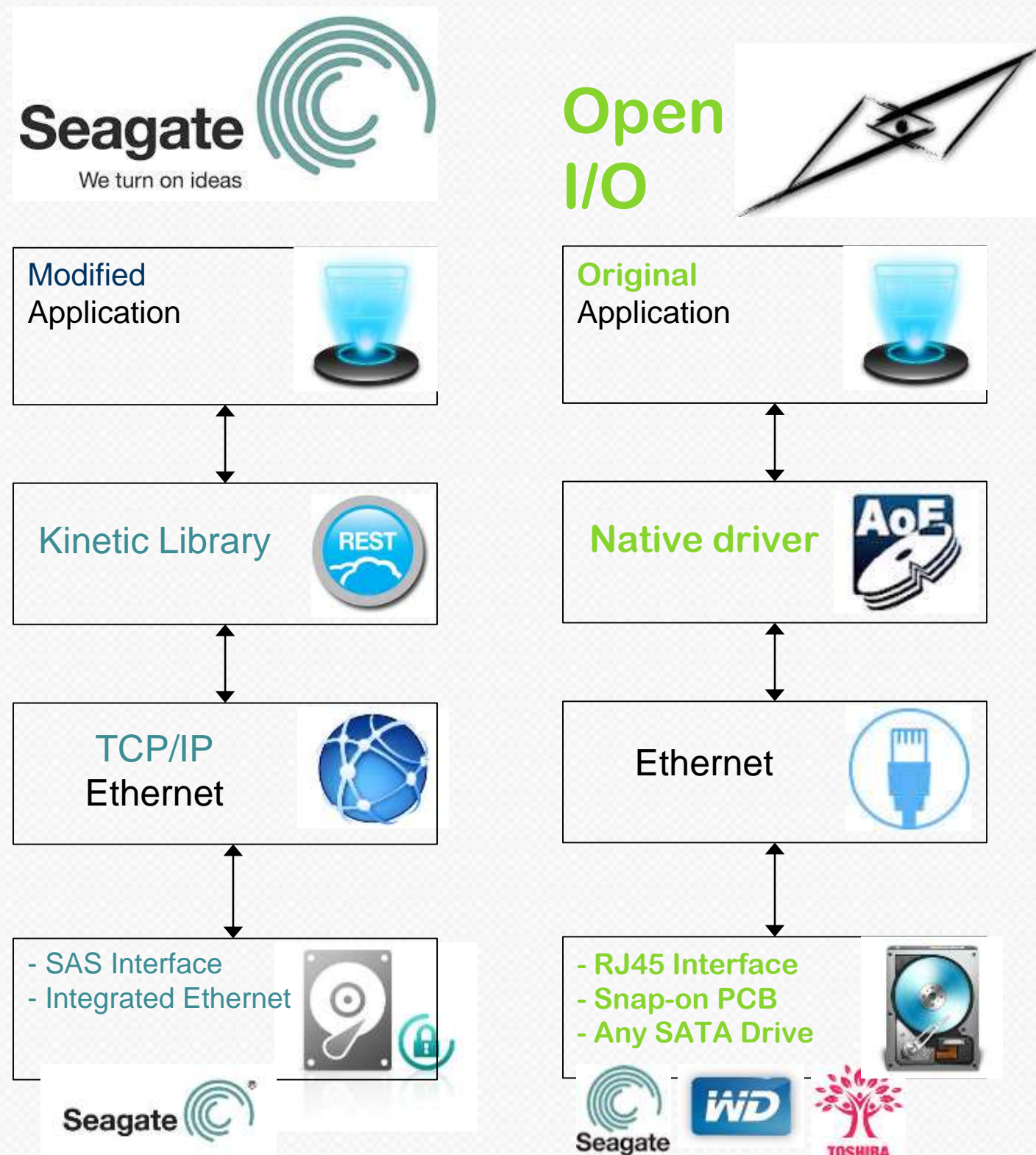
We gain what we lose:

- + No disk controller bottleneck
- + No common failure domains

Linear aggregation of
{ IOPS, bandwidth & capacity }



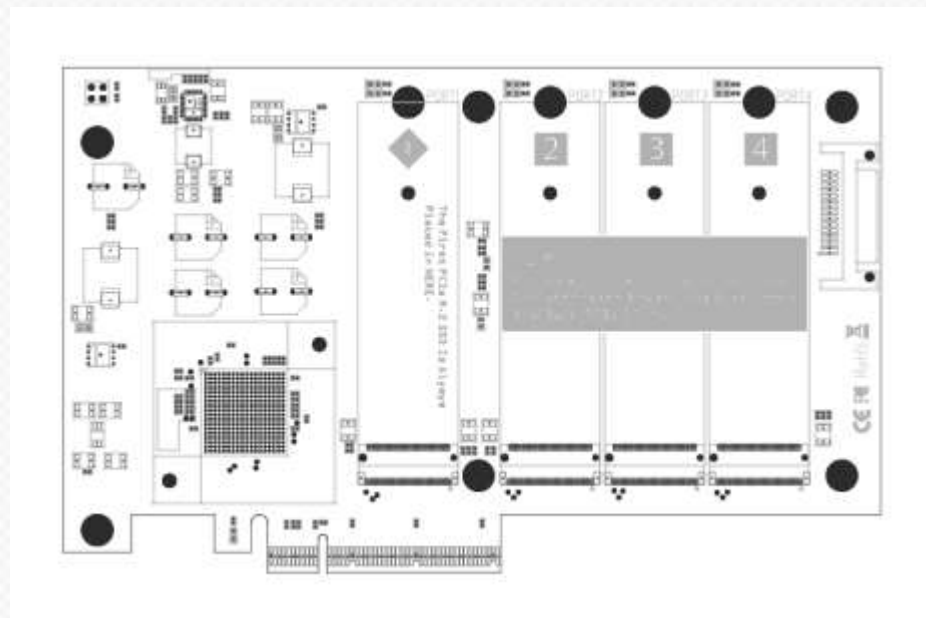
Network ATA Standardization



Up to 8TB per Slot



Thunderstorm Expansion Module



Open I/O

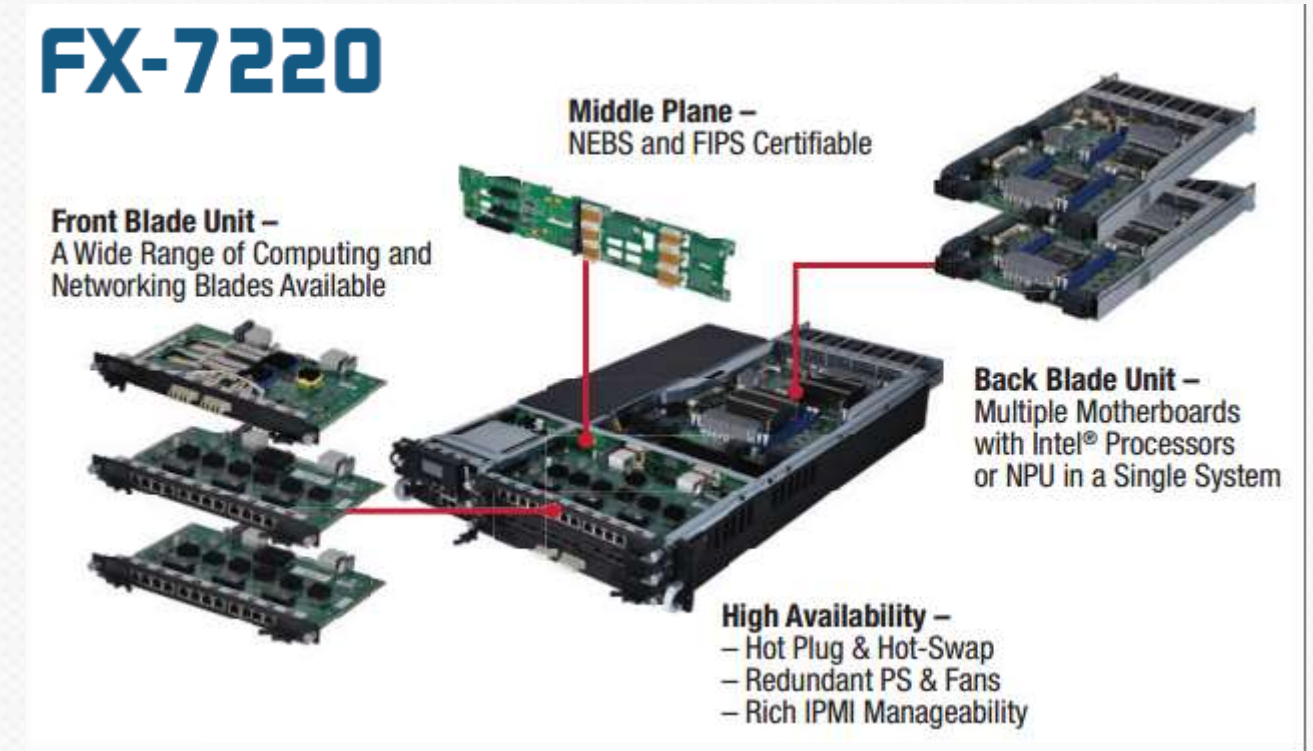
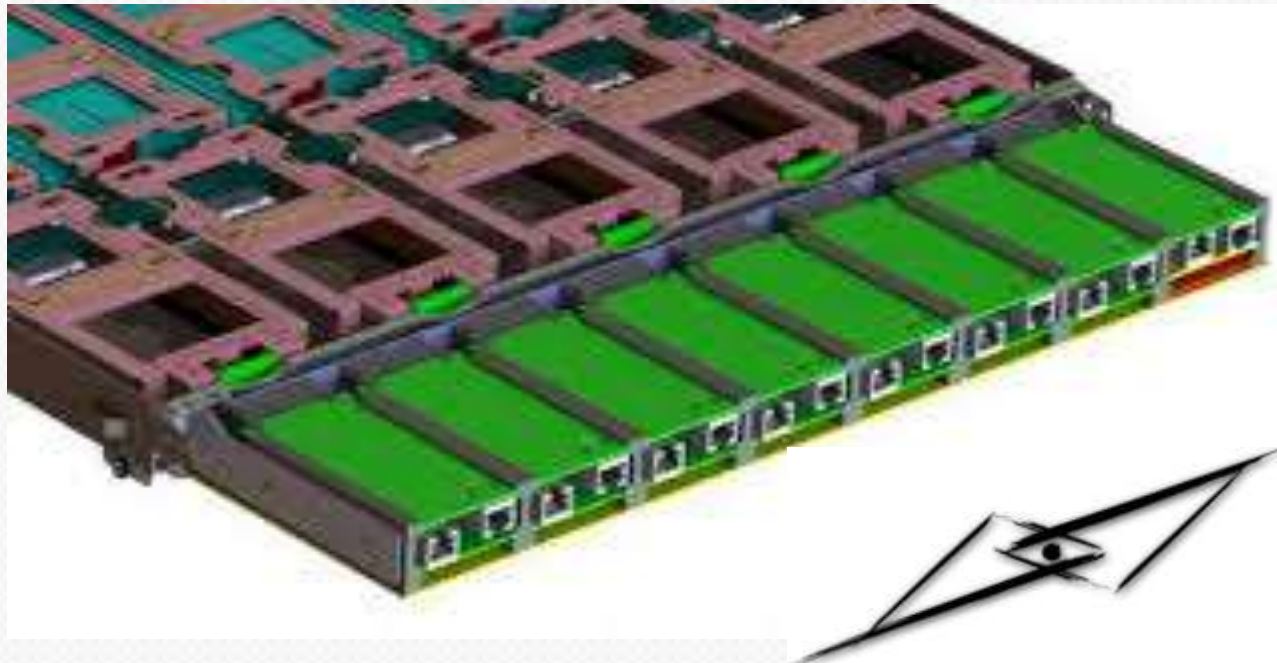
System

- Rate up to 15GB/s
- 0.052ms latency
- 1,000,000 IOpS
- SSF PCIe switching
- Platform compatible with VMware, Linux, HyperV
- Interface PCI Express 3.0 x8
- Gold finger connector + NGFF
- RDMA M.2 PCIe SSD



Cloud **Scaling** **Open I/O**

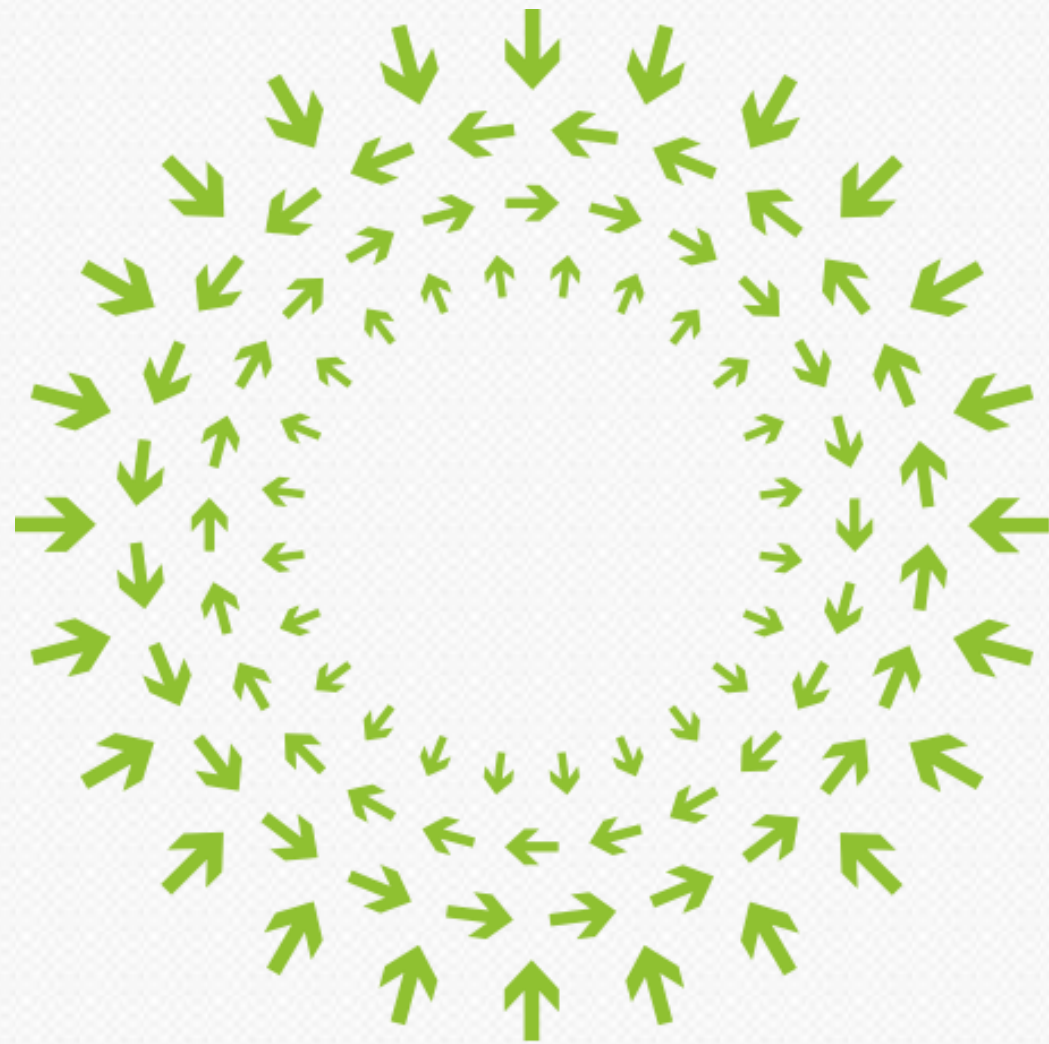
Converged Network, Storage & Compute



Lanner

Right!
Memo





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