Optimizing Storage Solutions for Data Center Applications

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Marvell Semiconductor
Addressing the Next Waves of Innovation & Productivity Growth

1st Wave
1983
Personal computing

2nd Wave
1995
Internet era

3rd Wave
2007
Mobile era

4th Wave
2011
Cloud era

5th Wave
2018
Data era

Megascale SW-Defined Infrastructure
Increasing Data Generated Driving Multiple Data Center Workloads

Continuously evolving with tomorrow’s being unknown
Data Center Clients Seek “Optimal” Resources for their Application

Most data center operators utilizing software-defined converged servers
Innovators have moved to disaggregated infrastructure starting with storage
Today’s Converged Server Infrastructure Architecture

Common building block designed to balance efficiency vs growth
Challenged to address evolving data center application requirements
Today’s Disaggregated Storage Solutions Improve Efficiencies

Compute Server #1 to N

Disaggregated HDD Storage (JBOD)

Disaggregated SSD Storage (JBOF)

TOR
Today’s Disaggregated Storage Solutions Improve Efficiencies but...

- Compute Server #1 to N
- Disaggregated HDD Storage (JBOD)
- Disaggregated SSD Storage (JBOF)

**Latency**
**Power**
Oversubscribing $$$Ds
Significant Bottleneck

TOR
How Significant is Bottleneck?

Disaggregated SSD Storage (JBOF)

SSD SSD SSD SSD SSD SSD SSD SSD SSD

PCIe Gen3x4
32Gbps

PCIe Gen4x4
64Gbps

PCIe Gen5x4
128Gbps

Huge bandwidth pipe bottleneck combined with CPU+DRAM+NIC+PCIe switch power, cost & latency increase TCO

New high-performance, low-latency scalable architecture needed
Introducing Revolutionary Disaggregation Building Block

MARVELL

Industry’s 1st NVMe-oF SSD Converter Controller

Turns any x4 NVMe SSD into a 25G NVMe-oF SSD
<750ns latency
upto 700kIOPS
<1.5W operating power
13x13mm package

https://www.marvell.com/storage/system-solutions/nvme-controllers/
NVMe-oF Converter Controller Enables NVMe-oF SSD & SCM

NVMe SSD = NVMe-oF SSD
  upto 700k IOPs
  <700ns added latency

NVMe SCM = NVMe-oF SCM
  upto 700k IOPs
  <700ns added latency

https://www.marvell.com/storage/system-solutions/nvme-controllers/
Tomorrow’s SW-Defined Data Center with TOR NVMe-oF SSDs & SCM

Shared high performance low-latency 700k IOPS SSD

Shared high performance low-latency 700k IOPS SCM
  Lower than NVMe-oF SSD latency

Top-of-rack low-latency, linear scalable NVMe-oF SSDs & SCM
Tomorrow’s SW-Defined Data Center with End-to-End NVMe-oF EBOF

End-to-End NVMe-oF EBOF: simple, scalable linear native performance! Optimizes $ per IOPS & IOPs per GB

24 NVMe-oF SSDs = upto 16M IOPs
Comparing Traditional NVMe-oF JBOF vs End-to-End EBOF

Disaggregated SSD Storage (JBOF)

Limited performance, high CPU power & high BOM

End-to-End NVMe-oF Ethernet Bunch of Flash (EBOF)

Simple native scalable performance with extremely lower power consumption

>65%* TCO Savings excluding SSDs

*Toshiba & Marvell TCO analysis
Live FMS Demo in Toshiba Booth

2RU 24 x NVMe-oF SSD High-Availability Ethernet BOF
Dual 6x100GE

>14M IOPs!!!
Future Enterprise Storage Array

2.5” U.2 Dual-ported
Native NVMe-oF SSD

TOSHIBA
Aupera
Making Video Alive

MARVELL®
Summary

- Cloud & data generation eras driving need for new software-defined infrastructure
- Current converged server & disaggregated architectures challenged to scale
- Marvell NVMe-oF SSD converter controller revolutionizes DC storage units of scale
- End-to-end NVMe-oF Ethernet BOF offers data centers highest storage performance
Thank you