Using “Open” Building Blocks to Enable Emerging SSD Form Factors

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Data Centers are Increasingly Virtualized & Multi-Tenant
Data Center Users Seeking Bare Metal Performance & QoS

Virtualized Server Storage
Amount of DC Applications & Workloads Increasing

Workloads are continuously evolving & tomorrow’s are unknown
Each Workload has “Optimal” Storage Requirements

- Capacity
- Performance
- Latency
- Endurance / Life / Redundancy
- Host / Application Acceleration
- Power / Thermals
- Security
- Unit of Scale
- $ per GB

Guaranteeing Quality of Service Critical for Majority
Current Storage Solutions **Not** Addressing All Optimally

Multiple industry initiatives have started to address starting with OCP
Emerging Industry Standard SSD Form Factors

- EDSFF
- NGSFF
- Current & Future OCP Designs

New Innovation Sandboxes for Open Compute Community
Potential New Innovations for Emerging Form Factors

**Workload Accelerators**
- Key-Value
- In-Compute
- Programmable Logic
- Machine Learning

**Emerging Memories**
- ReRAM
- MRAM
- Hybrid memory architectures

**Protocols & Interfaces**
- NVMe 1.3 -> NVMe X.Y
- NVMe-oF
- Gen-Z
- OpenCAPI
Intro to Marvell’s Enabling Data Center NVMe SSD Chipsets

Industry’s 1st NVMe SSD Switch
- Aggregates & virtualizes up to 4 NVMe SSD controllers
- Offloads host CPU for optimal QoS performance
- Up to 1.6M IOPS & 6.4 GB/s throughput

Single & Dual-Ported x4 NVMe SSD Controllers
- 4th Gen of NANDEdge™ ECC IP enabling QLC NAND
- Supports SR-IOV with up to 64 virtual functions
- Up to 800k IOPS & 3.6GB/s throughput
Using Common Building Blocks for Standard FF SSDs

M.2280 SSD

M.22110 SSD

U.2 SSD

U.2 SSD built with NVMe Switch & M.2280s

Modular, simple & open!

Dual Ported

MARVELL NVMe SSD Switch NVMs SSD Controllers
Reusing Same Common Building Blocks to Develop Emerging EDSFF & NGSFF Form Factor Solutions

- Up to 800k IOPs
  - Up to 32 NAND pkgs
  - Up to 16GB DRAM

- Up to 1.5M IOPs
  - Up to 32 NAND pkgs
  - Up to 16GB DRAM

- Up to 1.6M IOPs
  - Up to 40 NAND pkgs
  - Up to 32GB DRAM

MARVELL NVMe SSD Switch NVMs SSD Controllers
Leveraging Common Building Blocks to Deliver New Storage with Emerging Memories & Offloads
Summary

• Virtualized data centers’ users seeking bare metal performance
• Number of data center workloads increasing with differing storage needs
• Current storage solutions not optimally addressing new requirements
• Emerging SSD form factors offer “innovation sandbox” opportunity
• Marvell’s NVMe SSD chipsets offer common high-volume building blocks

Looking forward to innovating with OCP community members
Project Denali is one of the 1st opportunities!
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