

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

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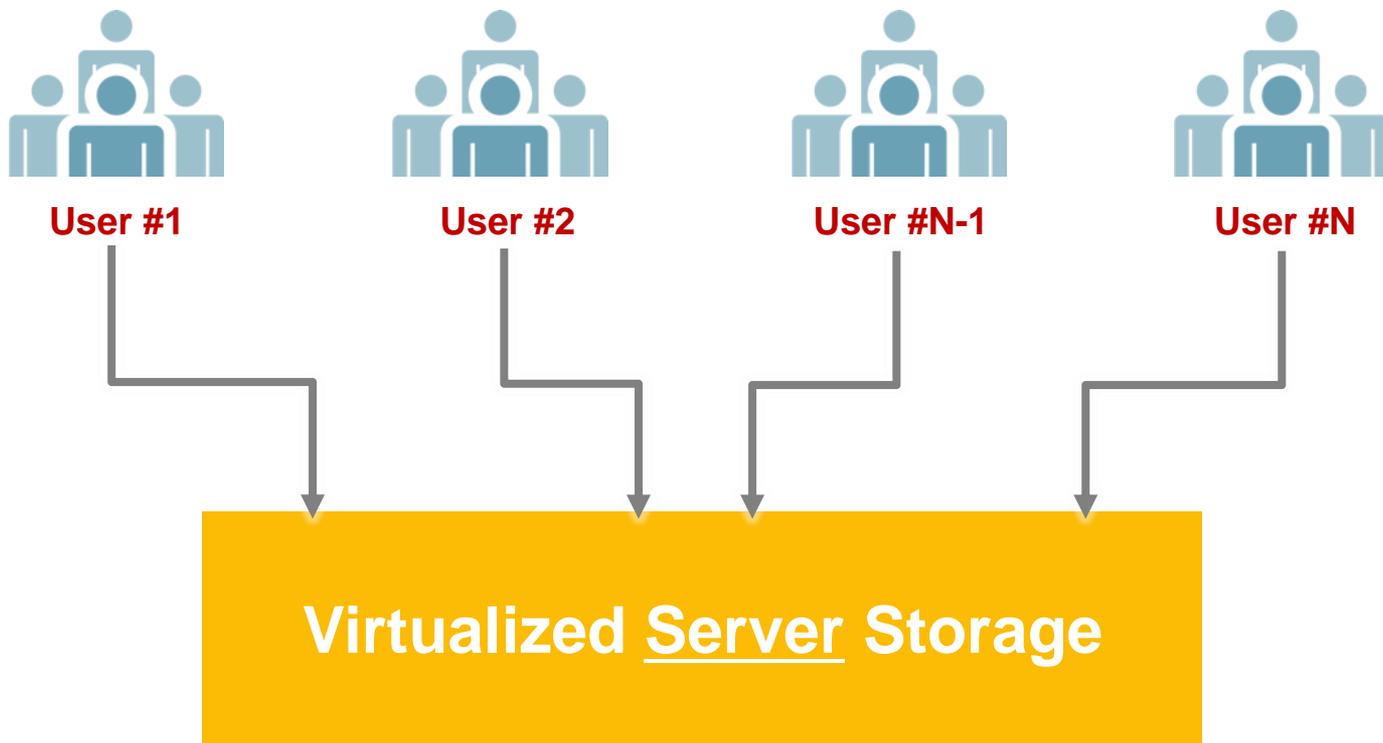
OPEN. FOR BUSINESS.



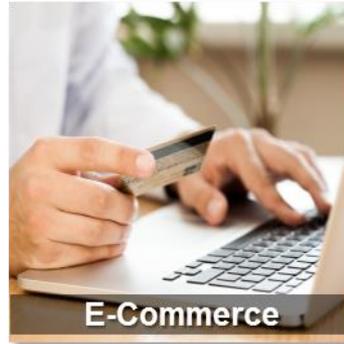
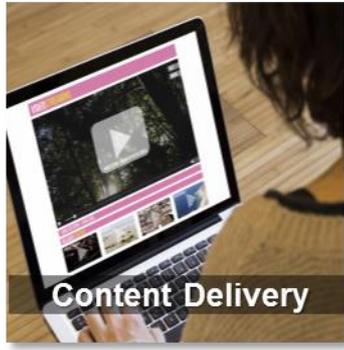
Data Centers are Increasingly Virtualized & Multi-Tenant



Data Center Users Seeking Bare Metal Performance & QoS



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

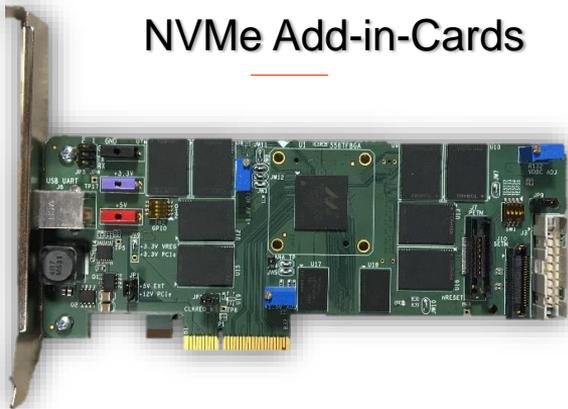
Unit of Scale

\$ per GB

Guaranteeing Quality of Service Critical for Majority

Current Storage Solutions Not Addressing All Optimally

NVMe Add-in-Cards



M.2 SSDs



U.2 SSDs

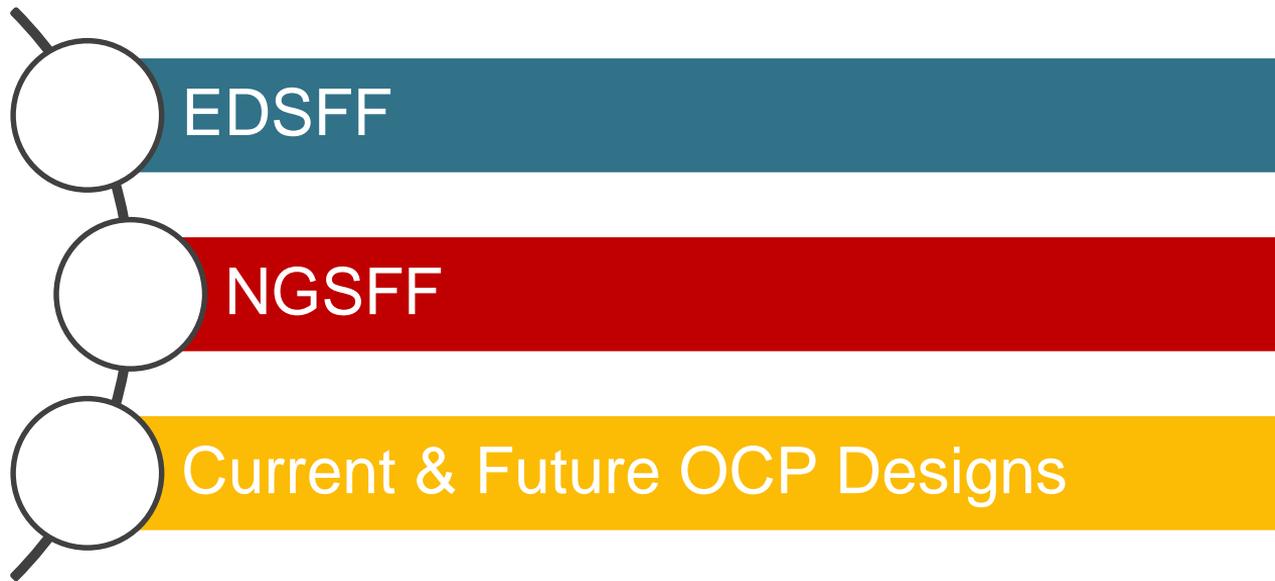


3.5" HDDs



Multiple industry initiatives have started to address starting with OCP

Emerging Industry Standard SSD Form Factors



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



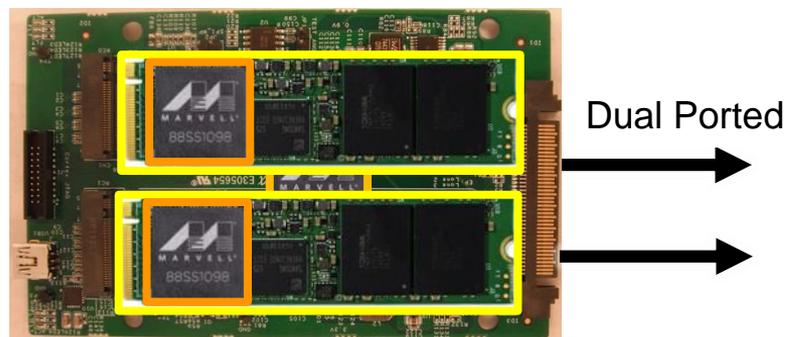
M.22110 SSD



U.2 SSD

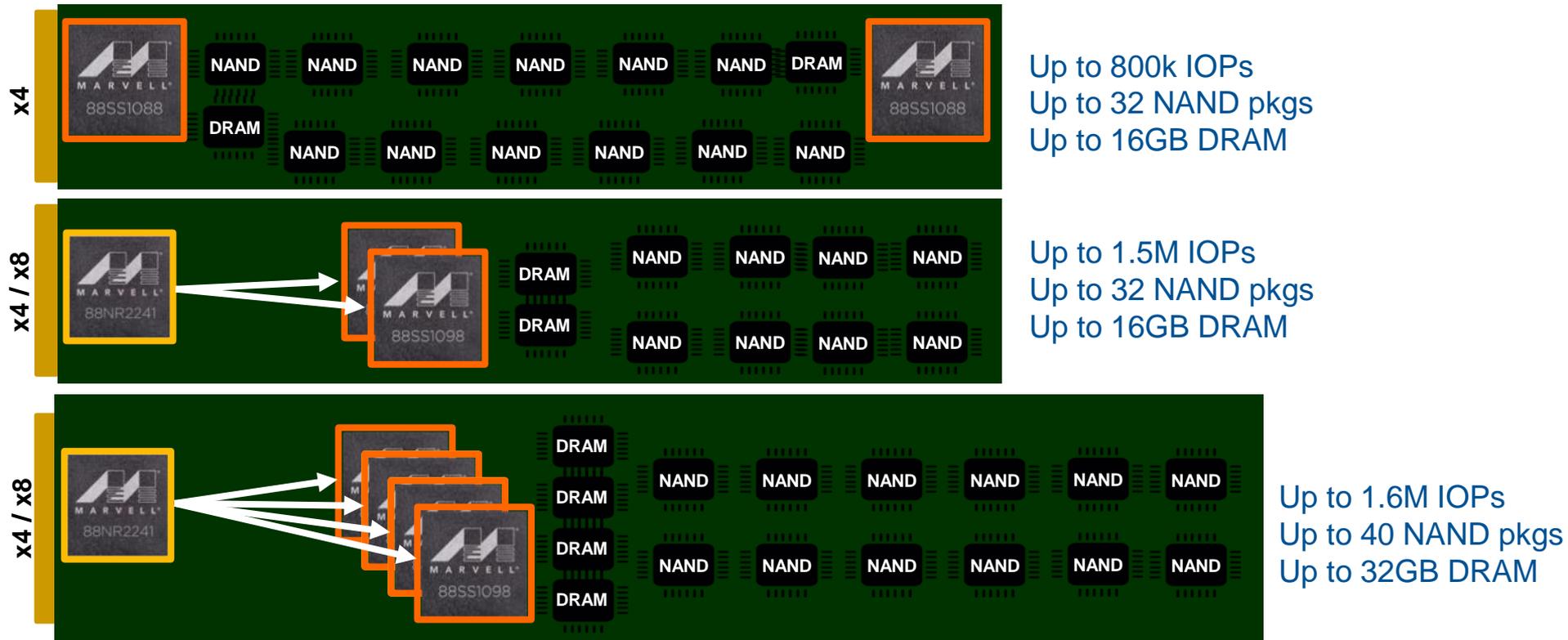


U.2 SSD built with NVMe Switch & M.2280s



Modular, simple & open!

Reusing Same Common Building Blocks to Develop Emerging EDSFF & NGSFF Form Factor Solutions

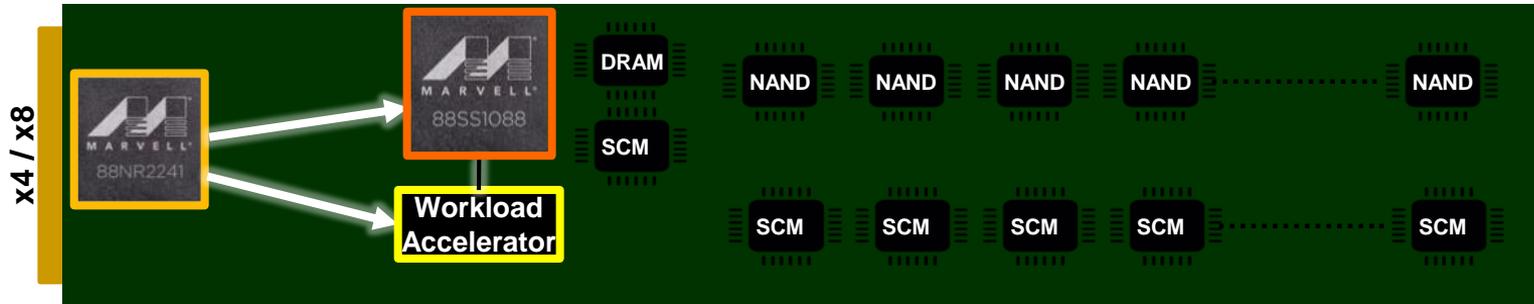
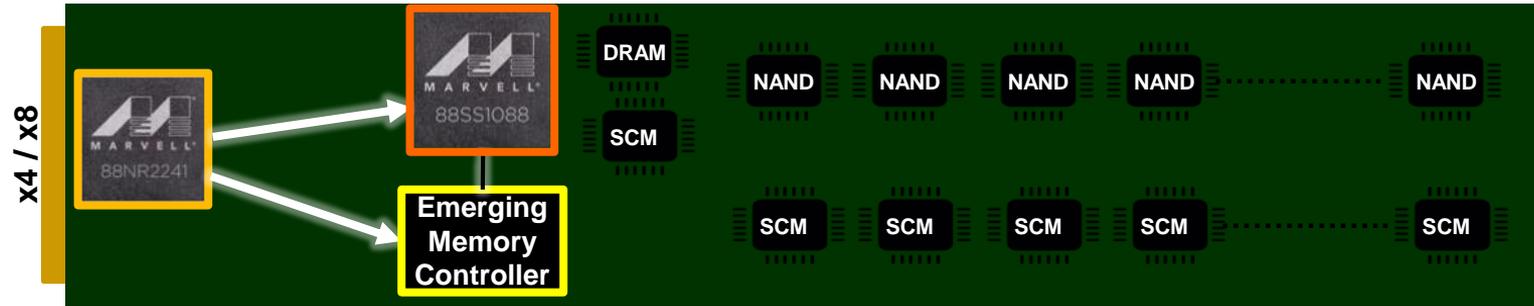


M A R V E L L

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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