Storage Networking Industry Association

Michael Oros
Executive Director

185 industry leading organizations

2,000 active contributing members

50,000 IT end users & storage pros worldwide

What We Do

- **Standards Development and Adoption**
  - Spec development; submissions for International Standard ratification (ISO/IEC)
  - Open source software to accelerate adoption
- **Interoperability Assurance**
  - Plugfests & conformance testing
- **Technology Acceleration and Promotion**
  - Special Interest Groups to promote technologies
  - Vendor collaboration to accelerate adoption
- **Global Vendor-Neutral Education**
  - Peer-reviewed webcasts and tutorials
  - Conferences and presentations
  - White papers, articles, blogs, etc.
  - IT training and certification courses

Areas of Focus

PHYSICAL STORAGE
- Connectors, Form Factors & Transceivers
- Solid State Storage
- Hyperscaler Storage
- Object Drives
- Computational Storage

DATA MANAGEMENT
- Protection
- Integrity
- Retention

DATA SECURITY
- Storage Security
- Privacy and Data Protection Regulations

CLOUD STORAGE TECHNOLOGIES
- Data Orchestration
- Data into and out of the Cloud

PERSISTENT MEMORY
- NVDIMMs
- Non-Volatile Memory Programming Model

POWER EFFICIENCY MEASUREMENT
- SNIA Emerald™ Power Efficiency

NEXT GENERATION DATA CENTER
- Software Defined Storage
- Composable Infrastructure
- Next Generation Storage Management API

NETWORKED STORAGE
- Data Access Protocols
- Networking Technologies for Storage

STORAGE MANAGEMENT
- Device and System Management

Persistent Memory

Fundamental Changes Require An Ecosystem

- Windows Server 2016
- Windows 10 Pro for Workstations
- Linux Kernel 4.2 and later
- VMware, Oracle, SAP HANA early enablement programs

- Multiple vendors shipping NVDIMMs
- SNIA NVDIMM Special Interest Group (formed Jan'14)
- Successful demonstrations of interoperability among vendors

- JEDEC JESD245B.01: Byte Addressable Energy Backed Interface (released Jul'17)
- JEDEC JESD248A: NVDIMM-N Design Standard (released Mar'18)
- SNIA NVM Programming Model (v1.2 released Jun'17)
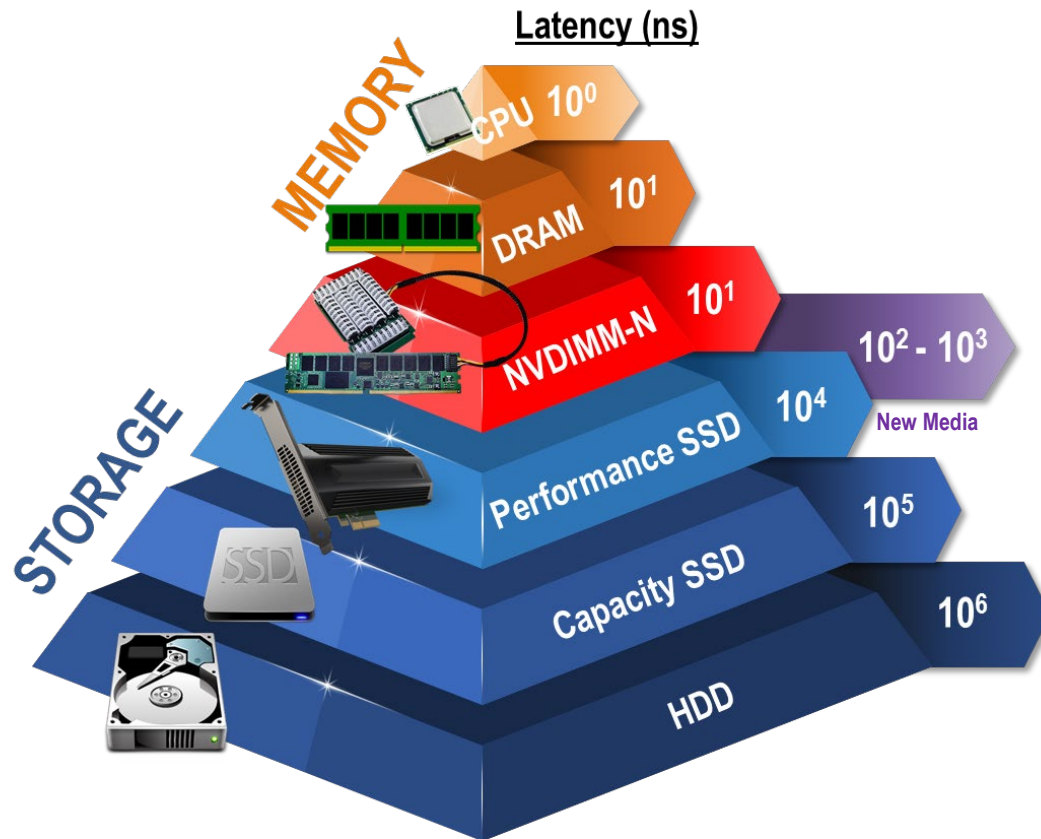- unfit ACPI NVDIMM Firmware Interface Table (v6.2 released May'17)

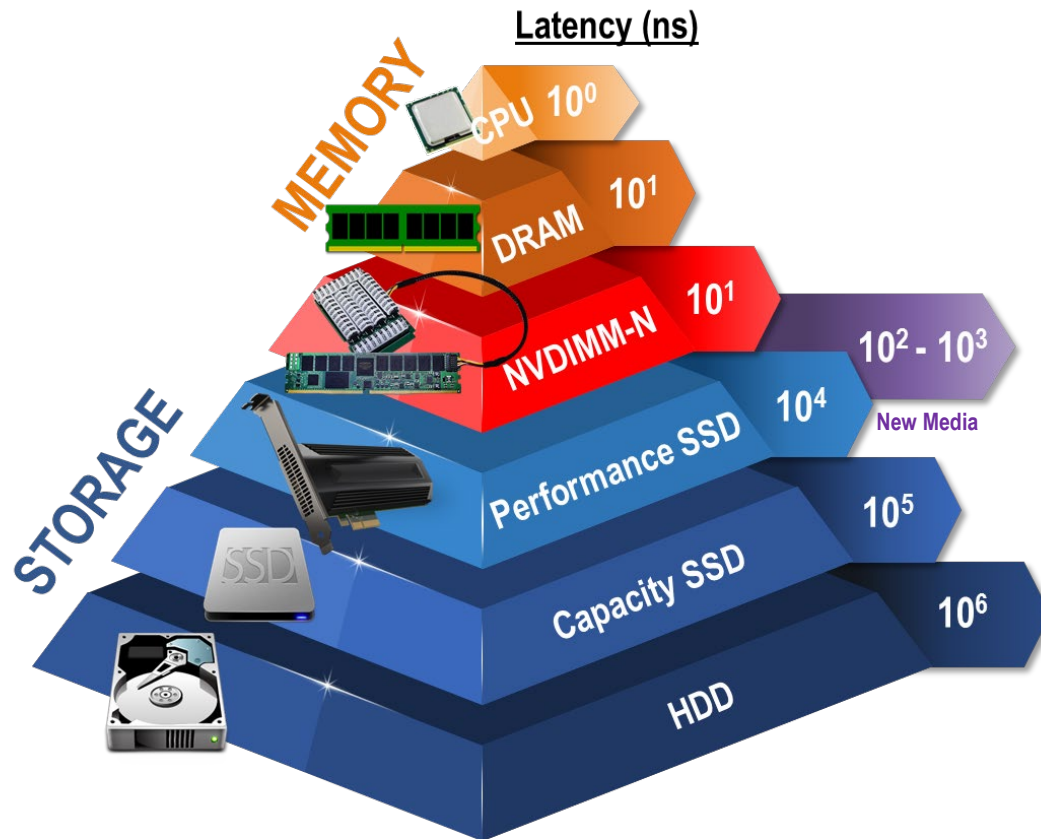- All major OEMs shipping platforms with NVDIMM support
- Requires hardware and BIOS mods

Hierarchy of things

Latency (ns)

MEMORY

CPU 10^0

DRAM 10^1

NVDIMM-N 10^1

10^2 - 10^3
New Media

STORAGE

Performance SSD 10^4

Capacity SSD 10^5

HDD 10^6

Hierarchy of things

Latency (ns)

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CPU 10^0

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New Media

NVDIMM Types Are Complementary, Not Competing

STORAGE

Performance SSD 10^4

Capacity SSD 10^5

HDD 10^6

Computational Storage

Speaking the Same Language

◆ Computational Storage (https://snia.org/dictionary):
  › Architectures that provide Computational Storage Services coupled to storage offloading host processing and/or reducing data movement.

◆ Two Foundational Constructs
  ◆ Computational Storage Devices (CSx)
  ◆ Computational Storage Services (CSS)

◆ Scope and path to universal usage model
  ◆ Today: custom solutions…Tomorrow: Standard

Starting the Standards Work

◆ **Multiple F2F sessions have been focused on what we can accomplish and what we will leave for later**

◆ **Management**

◆ **Security**

◆ **Operation**

Computational Storage TWG Dictionary Submissions

Computational Storage – Architectures that provide Computational Storage Services coupled to storage, offloading host processing or reducing data movement.

These architectures enable improvements in application performance and/or infrastructure efficiency through the integration of compute resources (outside of the traditional compute & memory architecture) either directly with storage or between the host and the storage. The goal of these architectures is to enable parallel computation and/or to alleviate constraints on existing compute, memory, storage, and I/O.

Computational Storage Service (CSS) – A data service or information service that performs computation on data where the service and the data are associated with a storage device.

The Computational Storage Service may be a Fixed Computational Storage Service or a Programmable Computational Storage Service.

Fixed Computational Storage Service (FCSS) – CSS that provides a given function that may be configured and used. (Service examples: compression, RAID, erasure coding, regular expression, encryption).

Programmable Computational Storage Service (PCSS) – CSS that is able to be programmed to provide one or more CSSes. (Service examples: this service may host an operating system image, container, Berkeley packet filter, FPGA bitstream).

Computational Storage Device (CSx): A Computational Storage Drive, Computational Storage Processor, or Computational Storage Array.

Computational Storage Drive (CSD): A storage element that provides Computational Storage Services and persistent data storage.

Computational Storage Processor (CSP): A component that provides Computational Storage Services for an associated storage system without providing persistent data storage.

Computational Storage Array (CSA): A collection of Computational Storage Devices, control software, and optional storage devices.

SNIA
Advancing storage &
information technology

**Computational Storage
Architecture and Programming
Model**

Version 0.1 Revision 5

Abstract: This SNIA document defines recommended behavior for software supporting Non-Volatile Memory (NVM).

This Internal Use Draft is an internal document of the Computational Storage TWG that has not been approved for release outside of the membership of the Computational Storage TWG. This draft may not represent the position of the Computational Storage Technical Working Group.

Internal Draft

April 24th 2019
For SNIA Computational Storage TWG Internal Use Only

40+ Participating Companies
148 Individual Members

SNIA

AMD | arm | BROADCOM | CALYPSO Systems | CRAY | DELLEMC

EIDETICOM | EXTEN TECHNOLOGIES | FADU | GIGAIO | HITACHI | IBM | inspur

intel | KALRAY | KAZAN NETWORKS | Lenovo | MARVELL | Micron | Mellanox | Microsemi a Microchip company

NEC | NetApp | NETINT | NGD systems | NYRIAD | ORACLE

PLIOPS | PURESTORAGE | Red Hat | SAMSUNG | ScaleFlux | SEAGATE | SiliconMotion

SK hynix | SUPERMICRO | TOSHIBA | vmware | Western Digital | XILINX

Storage Management

Meet the Storage Management Initiative

The Storage Management Initiative (SMI) unifies the storage industry to develop and standardize interoperable storage management technologies

SMI programs and efforts include:
- Storage Management Lab Program
- Conformance Testing Program
- SNIA Technical Work Group Support
- Education

Ask about joining the SMI today!

SMI Member Companies

BFC DATA SYSTEMS INC   BROADCOM.   CISCO

Cumulus Systems   DELL   EXTEN TECHNOLOGIES

FUJITSU   Hewlett Packard Enterprise   HITACHI Hitachi Data Systems

HUAWEI   IBM   intel

Macrosan   ManageEngine   Microsoft

NetApp   PURE STORAGE   Quest

ScienceLogic   solarwinds   turbonomic

SNIA Swordfish™

SNIA Swordfish™ adds enterprise class storage management capabilities to the DMTF Redfish® standard.

Together, Redfish and Swordfish support a unified management approach for servers, fabrics and storage in today's large scale data centers.

Top 3 Reasons to Join SNIA

INFLUENCE

- ✓ Influence storage technologies important to the marketplace
- ✓ Amplify your vendor storage expertise and reputation
- ✓ Participate in the development of international standards

COLLABORATE

- ✓ Participate in multi-vendor interoperability activities
- ✓ Gain insight into disruptive industry trends
- ✓ Form strategic alliance partnerships
- ✓ Develop relationships throughout the industry

LEAD THE INDUSTRY

- ✓ Educate on all things storage
- ✓ Drive standards development and adoption
- ✓ Align strategic business objectives with worldwide standards

Events and Certification

- SNIA's Storage Developer Conference (snia.org/sdc)
  September 23-26, 2019 Hyatt Regency, Santa Clara, CA
    - FMS attendees receive a **$200 discount!** Register at
      https://www.regonline.com/?eventID=2555972&rTypeID=871308
      and use Registration code SDC19FMS200

- SNIA's Persistent Memory Summit (snia.org/pm-summit)
  January 23rd 2020 at the Hyatt Regency, Santa Clara, CA
    - Registration is free!

- Get SNIA Certified! More information can be found at
  https://www.snia.org/education/certification

Events and Certification

◆ SNIA's [Storage Developer Conference](#) ([snia.org/sdc](#))
September 23-26, 2019 Hyatt Regency, Santa Clara, CA

   ◆ FMS keynote attendees receive a **$250 discount!** Register at
   https://www.regonline.com/?eventID=2555972&rTypeID=871308
   and use Registration code SDC19FMS250 (expires Midnight on Friday, August 9th)

◆ SNIA's [Persistent Memory Summit](#) ([snia.org/pm-summit](#))
January 23rd 2020 at the Hyatt Regency, Santa Clara, CA

   ◆ Registration is free!

◆ Get SNIA Certified! More information can be found at
https://www.snia.org/education/certification

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  Hundreds of Technology-focused presentations are available for free
- SNIA Webcasts on BrightTalk – view upcoming and on-demand webcasts at https://www.brighttalk.com/channel/663/snia-webcasts
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- SNIA on Twitter - https://twitter.com/SNIA
- SNIA on LinkedIn - https://www.linkedin.com/company/snia/
- SNIA on Facebook - https://www.facebook.com/SNIA.ORG

Join SNIA at FMS 2019

Persistent Memory Track SNIA.
Sponsored by SNIA, JEDEC, & OFA
Tuesday & Wednesday
8:30 am - 10:50 am & 3:40 pm – 6:00 pm

Computational Storage Track
Sponsored by SNIA
Thursday
8:30 am – 10:50 am & 2:10 pm – 5:00 pm

Network with SNIA

Exhibit Hall Booth 820
Tuesday 4:00 pm – 7:00 pm
Wednesday 12:00 pm – 7:00 pm
Thursday 10:00 am – 2:30 pm
Meet SNIA Persistent Memory, Computational Storage, and Swordfish™ experts and see PM Demos

Beer & Pizza/Meet With the Experts
Tuesday 7:30 pm – 9:00 pm
Ballrooms A-C

SNIA. 2019 PERSISTENT MEMORY
HACKATHON
Tuesday and Wednesday
8:30 am to 7:00 pm
Great America Ballroom Lobby

SNIA | PERSISTENT MEMORY
Persistent Memory Meetup
Hosted by SNIA
Wednesday, 7:00 pm
Great America Ballroom K

SNIA. **Standards**
Key Value Storage
NVME-201A-1 Wednesday 8:30 am GAMR 2

SNIA Swordfish™
SOFT-201A-1 Wednesday 8:30 am Ballroom F

Form Factors
SSDS-201B-1 Wednesday 9:45 am GAB J

SNIA

snia.org/join

Join SNIA and the Global Storage Community!

185
industry leading
organizations

2,000
active contributing
members

50,000
IT end users & storage
pros worldwide