SNIA®

# 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


# The Importance of Standards and Industry Collaboration

# 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.

# Areas of Focus

## PERSISTENT MEMORY
- NVDIMMs
- Non-Volatile Memory Programming Model

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

## POWER EFFICIENCY MEASUREMENT
- SNIA Emerald™ Power Efficiency

## DATA MANAGEMENT
- Protection
- Integrity
- Retention

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

## DATA SECURITY
- Storage Security
- Privacy and Data Protection Regulations

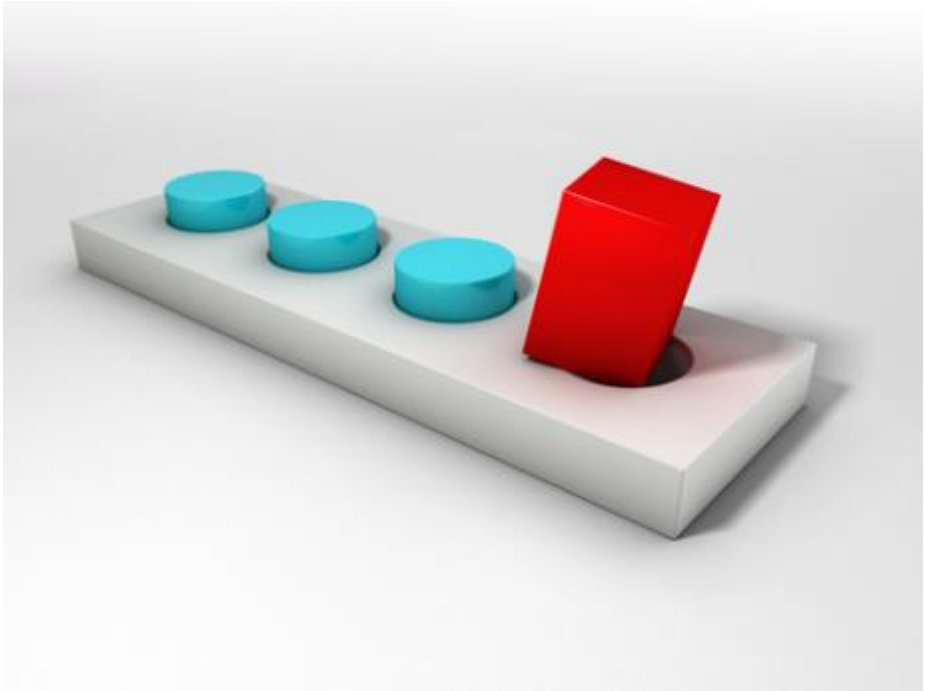
## NETWORKED STORAGE
- Data Access Protocols
- Networking Technologies for Storage

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

## STORAGE MANAGEMENT
- Device and System Management


# Why Standards Are Important

# Old Saying…



# Standards are the industry tools…

# You don’t want this…

# Or this…

# …but likely this starts to be OK


# 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!

# 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.


# Persistent Memory

# Fundamental Changes Require An Ecosystem


Microsoft Linux vmware ORACLE

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

JEDEC SNIA SNIA

- 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)

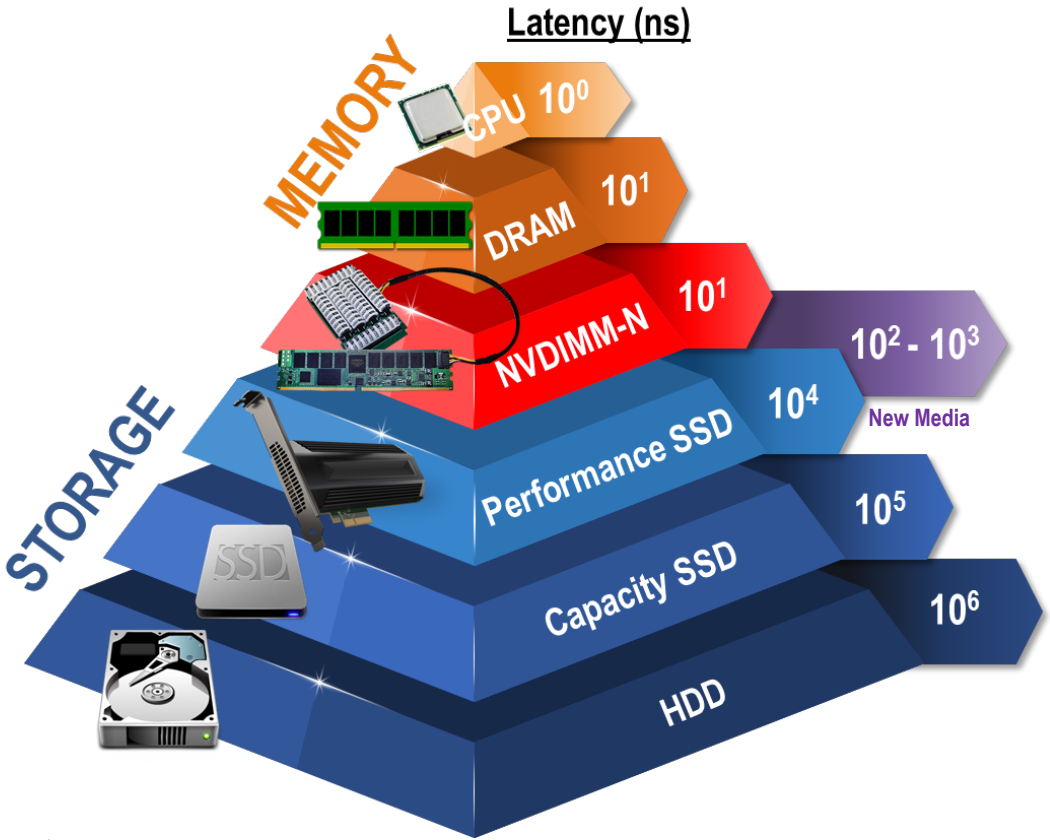
AGIGA TECH Micron SK hynix SMART Modular Technologies viking TECHNOLOGY NETLIST

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

intel AMD OTHERS Hewlett Packard Enterprise DELL SUPERMICRO

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

# Hierarchy of things

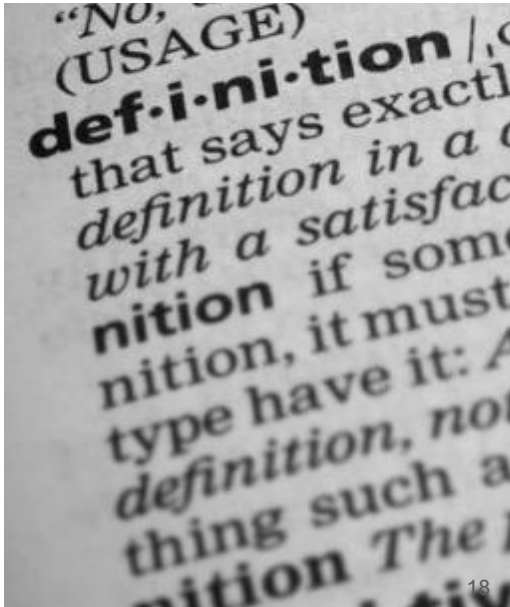



*NVDIMM Types Are Complementary, Not Competing*


# Computational Storage

# Speaking the Same Language

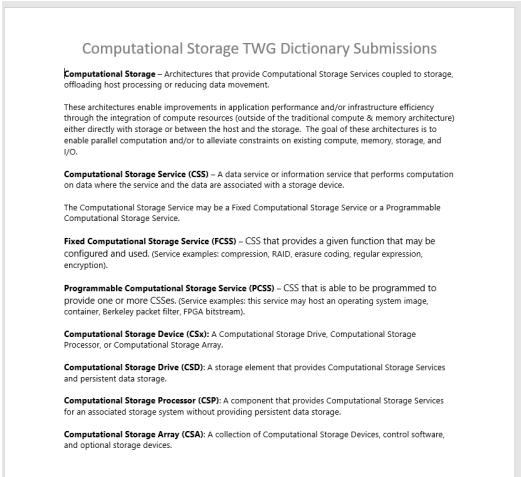
- Computational Storage (https://snia.org/dictionary ):
  - Architectures that provide Computational Storage Services coupled to storage offloading host processing and/or reducing data movement.
- Two Foundational Constructs
  - Computational Storage Devices (CSx)
  - Computational Storage Services (CSS)
- 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).*

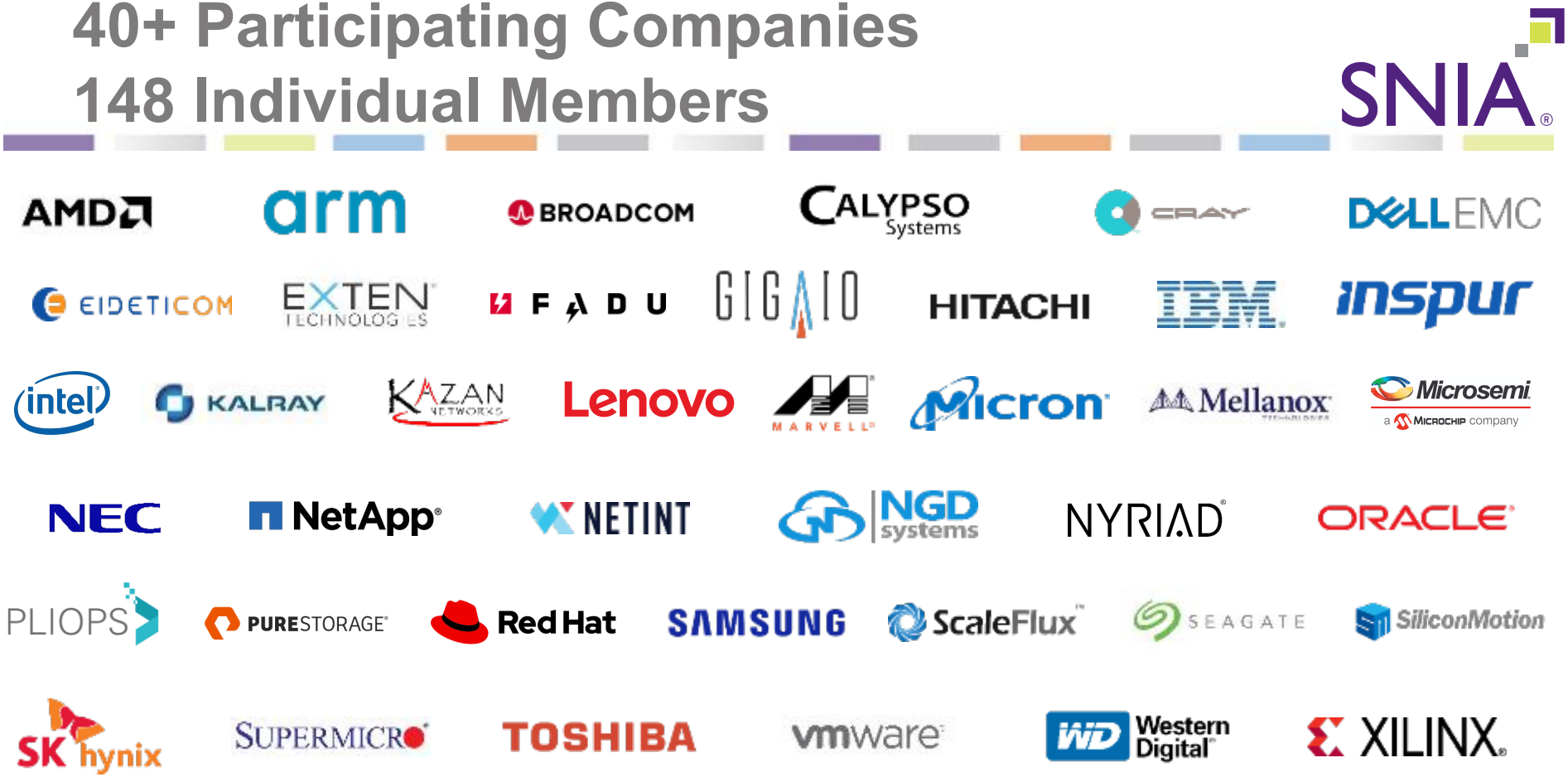
This Internal Use Draft is an internal document of the Computational Storage TWG that has not been approved for release outside of the membership of the Computational Storage TWG. This draft may not represent the position of the Computational Storage Technical Working Group.

***Internal Draft***

April 24th 2019

For SNIA Computational Storage TWG Internal Use Only

# 40+ Participating Companies
# 148 Individual Members




# Get Involved with SNIA and Participate in the Industry

Key Resources

# Newsletters, Education, Social Media


- SNIA Matters Newsletter – subscribe: https://www.snia.org/news_events/news/snia_matters
- SNIA Education - https://www.snia.org/educational-library (searchable)
- SNIA Dictionary - https://www.snia.org/dictionary searchable dictionary
- SNIA on YouTube - https://www.youtube.com/user/SNIAVideo
  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
- SNIA Podcasts - https://www.snia.org/events/storage-developer/podcasts
- SNIA Mailing Lists - https://www.snia.org/subscribe
- SNIA on Storage Blog - http://sniablog.org
- SNIA Standards: https://www.snia.org/standards

# Newsletters, Education, Social Media


- 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

SNIA

snia.org/join

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