SNIA PERSISTENT MEMORY + SUMMIT 2022 COMPUTATIONAL STORAGE

VIRTUAL EVENT • MAY 24-25, 2022

CS TWG Update

Another Great Year!

Presented by the Co-Chairs of the CS TWG

Jason Molgaard, Solutions Architect, ARM

Scott Shadley, VP Marketing, NGD Systems

Agenda

- Updates on the TWG Membership
- Updates on the TWG Work Efforts
- Status of the Architecture
- Status of the SW API
- What is Next?

The Continued Growth of Experience

- TWG Working group is continuing to see growth
  - 51 companies, 258 individual members
- Work within SNIA Efforts
  - CS SIG – Webinars, Blogs, Events
  - SDXI – New Sub-Group Collaboration
  - Security TWG – Ensuring Alignment
- Collaborating with other Groups
  - NVM Express – Computational Programs
  - xPU Engagements – Overlap/Complimentary

52 Participating Companies - 258 Member Representatives

The Efforts to Get Information Out is Continuing

DISCOVER / NEWS / 0321 COMPUTATIONAL STORAGE

Accelerated Box of Flash: Powerful computational storage for big data projects

Radically new approach to storage acceleration aids data manipulation for research and discovery

MARCH 21, 2022

2022 Strategic Roadmap for Storage

Published 16 March 2022 - ID G00760294 - 35 min read

By Jeff Vogel, Julia Palmer, **and 3 more**

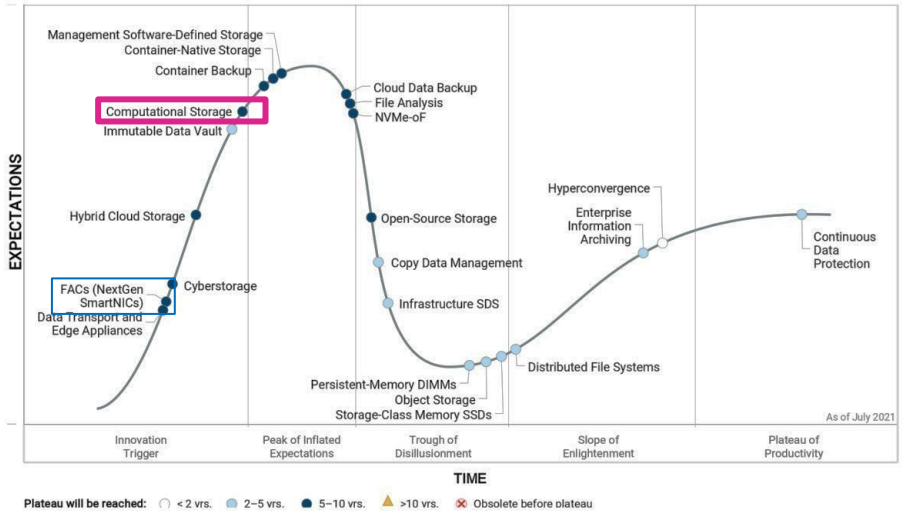
Computational Storage

Computational storage device (CSD) combines processing and storage to reduce performance inefficiencies in the movement of data between storage and compute resources to address latency-sensitive application issues. CS offloads host processing from the main memory of the CPU to the storage device.

Why Is Computational Storage Inevitable?

by Sarah Lee | Mar 7, 2022 | Technology, All

Hype Cycle for Storage and Data Protection Technologies, 2021



Source: Gartner (July 2021)

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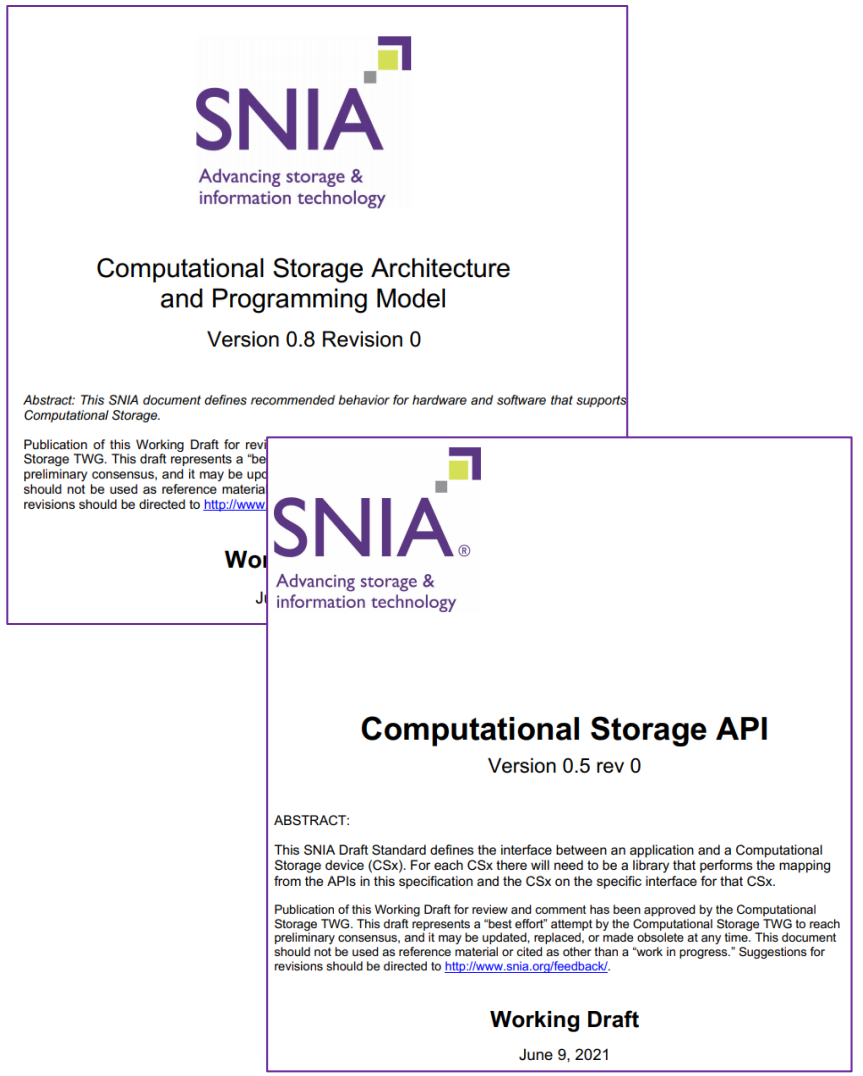
Current Progress of TWG Output

- Architectural Document has been Released
  - V0.8 is now in Public Review
  - V1.0 Release SOON!!
- Second release of API Document - Soon
  - First level support of customer interface
- Security now being incorporated
  - In Collaboration with Security TWG



A Brief Rundown of the Architecture

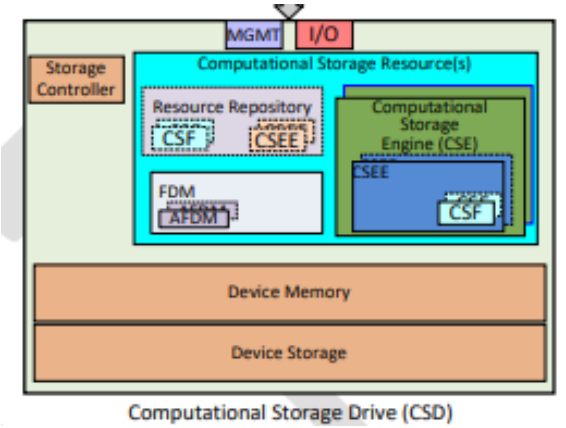
Computational Storage

Computational Storage Resource (CSR)

Computational Storage Engine (CSE) ⟷ Computational Storage Function (CSF)

Computational Storage Devices (CSx)

- Computational Storage Processor (CSP)
- Computational Storage Drive (CSD)
- Computational Storage Array (CSA)



Computational Storage Drive (CSD)

Security Recommendations/Considerations

EXAMPLE Considerations

- Mutual authentication of all entities that are interacting (in-band; out-of-band)
- Data-in-flight Security (integrity and confidentiality)
- Authorization and access controls (least privilege)
- API Security (CSF specific) privileged APIs.
- Trusted code (firmware/OS) updates
- Data-at-rest security implemented in the CSP
- Key management implemented in the CSP
- Root of Trust (RoT) (e.g., TPM); securing and storing keys
- CSF sanitization (app/function, FPGA, metadata, configuration)
- Data-at-rest security implemented in the CSD (FDE, KPIO, etc.,)
- Key management implemented in the CSD (for data-in-flight and data-at-rest security, key lifecycle)
- User Data/media sanitization

The API - What Has Been Going On?

1) Proposes an Application Programming Interface to Computational Storage devices

2) Allows a user application on a host to have a consistent interface to any vendor's CS device

3) Vendor defines a library for their device that implements the API
   a. Mapping to wire protocol for the device is done by this library
   b. Functions that are not available on a specific CS device may be implemented in software

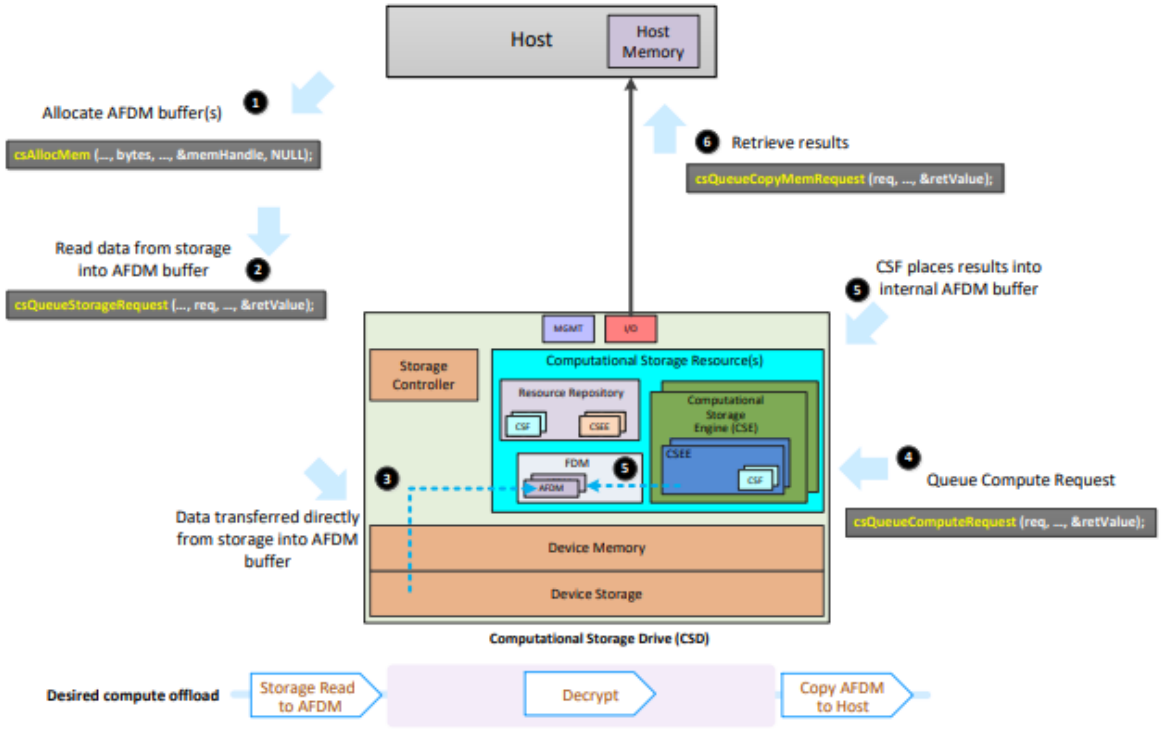


Figure 3: Example API flows

What Next?

Moving Beyond Architecture

- Security and Computational Storage
  - Moving beyond single host usage
- Illustrative Examples Growth
  - More and more ways to deploy
- CS and SDXI Collaboration
  - Ensuring proper cross-platform support
- xPU – The coordination of Compute
  - CSP or xPU and how they align

NVMe Computational Storage Task Group

The charter of Computational Storage Task Group is to develop features associated with the concept of Computational Storage on NVM Express devices. The scope of work encompasses how these features are discovered, configured and used inside an NVM Express framework. Examples of these features include general compute, compression, encryption, data filtering, image manipulation and database acceleration.

The target audience consists of the vendors and customers of NVMe Storage Devices that support computational features.

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Session at this Event on NVMe Work

Kim Malone, Stephen Bates – Co-Chairs

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