STORAGE DEVELOPER CONFERENCE

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BY Developers FOR Developers



Computational Storage: How do NVMe and SNIA CS Work Together

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Agenda

- Overview of SNIA CS Model
- Overview of NVMe CP Model
- NVMe-SNIA mapping
- Summary



SNIA Computational Storage Architecture



Computational Storage Drive



Computational Storage Array Host 1 Host n CS Fabric (PCIe, Ethernet, etc) MGMT I/O Computational Storage Resource(s) Storage Controller **Resource Repository** Array CSF | CSEE Engine (CSE) Control Fransparer FDM CSF Storage AFDM Access Proxied **Device Memory** Storage Access Storage Device Storage Device or CSD or CSD

Computational Storage Array (CSA)



SNIA Architectural Elements for CS Drive



Computational Storage Drive (CSD)

- Computational Storage Engine
 - Computational Storage Engine Environment
 - Computational Storage Function
- Resource Repository
 - CSFs
 - CSEE
- Data may be transferred between Device Storage and AFDM
- CSFs operate on data in Function Data Memory or Device Storage
 - FDM Allocated as AFDM
 - Input Data and/or
 - Output Data
- Device Storage
 - Input Data and/or
 - Output Data



NVMe Computational Storage Architectural Components

	Host	
	NVMe Controller	
3 2 1 0 Programs Compute Namespace 1 3 2 1 0 Programs Compute Namespace 2 Compute Namespace 2	Memory Range Set Subsystem Local Memory	NVM Namespace 100 NVM Namespace 101 NVM Namespaces
Domain 1		
NVM Subsystem		

- Compute Namespaces
 - Compute Engines
 - Programs
- Programs operate on data in Subsystem Local Memory
 - Allocated as Memory Range Set
 - Includes program input, output
- NVM Namespaces
 - Persistent storage of data
 - NVM
 - ZNS
 - KV
- Data is transferred between NVM Namespaces and SLM

This presentation discusses NVMe work in progress, which is subject to change without notice.



Correlation of SNIA/NVMe terms

SNIA Terms

- Computational Storage Engine
- Computational Storage Engine Environment
- Resource Repository
 - Downloaded CSF and CSEE
 - Pre-loaded CSF and CSF
- Function Data Memory (FDM)
- Allocated FDM (AFDM)
- Device Storage

NVMe Terms

- Compute Engine/Compute Namespace
- Virtual (Not currently defined)
- Programs
 - Downloaded programs
 - Device-defined programs
- Subsystem Local Memory (SLM)
- Memory Range Set
- NVM Namespaces





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Memory

Host

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NVM Namespace 100

NVM Namespace 101

NVM Namespaces

Differences between SNIA and NVMe

SNIA

- Defines CSEE
- CSF can directly access
 AFDM or Storage
- Supports an indirect model

NVMe

- CSEE is logical no specific definition
- Program only accesses
 Memory Range Set
- Specific Execute command only
- Join SNIA and NVMe in the standardization effort





Summary

SNIA

- A general architectural model for computational Storage
- Flexibility for a variety of protocols
- API specifies a Application programming interface

NVMe

- A specific I/O Command Set for computational Programs
- Specific for the NVMe protocol
- Library maps API calls to specific NVMe protocols
- Join SNIA and NVMe in the standardization effort





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