STORAGE DEVELOPER CONFERENCE
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BY Developers FOR Developers

A SNIA Event

Computational Storage:
How do NVMe and SNIA CS Work Together

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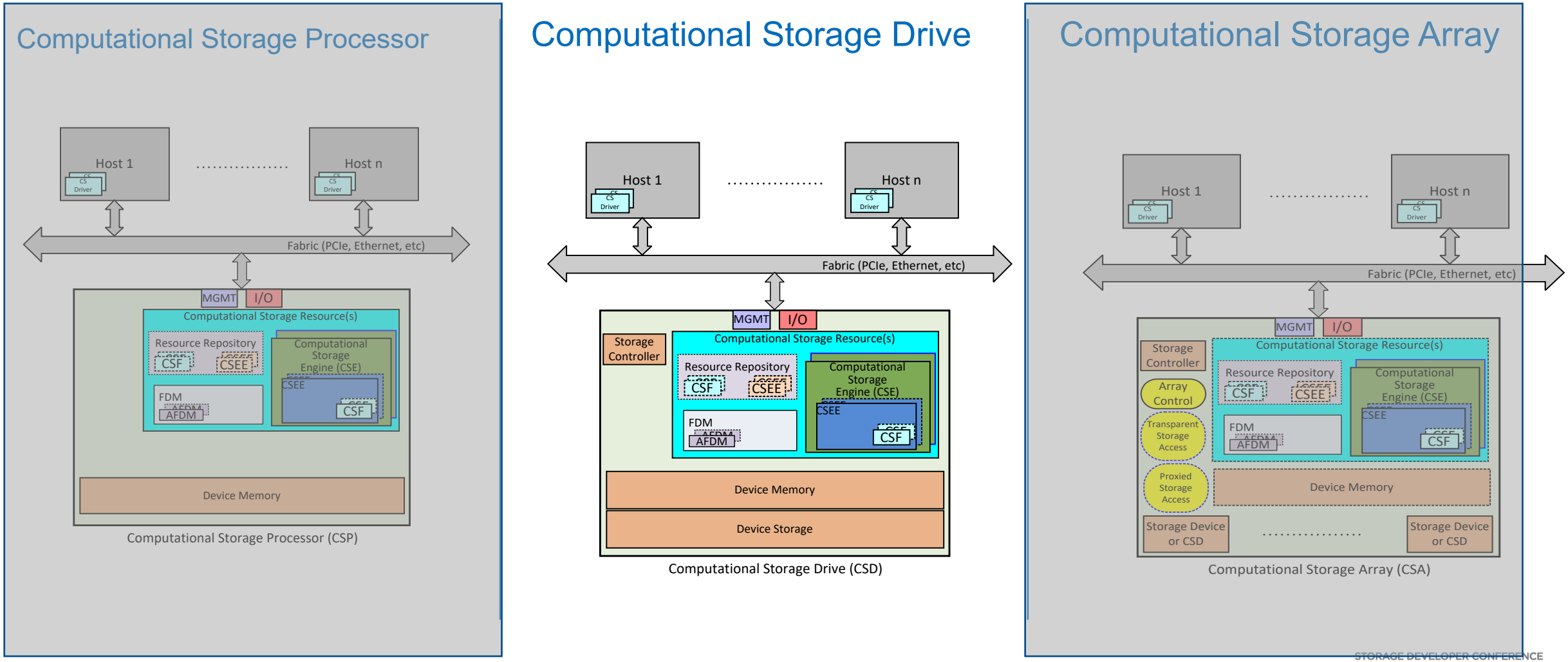
SNIA: TC Co-Chair, Computational Storage Editor
NVMe: Board member, Computational Programs Co-Chair
Samsung Semiconductor Inc. SSD IO Standards

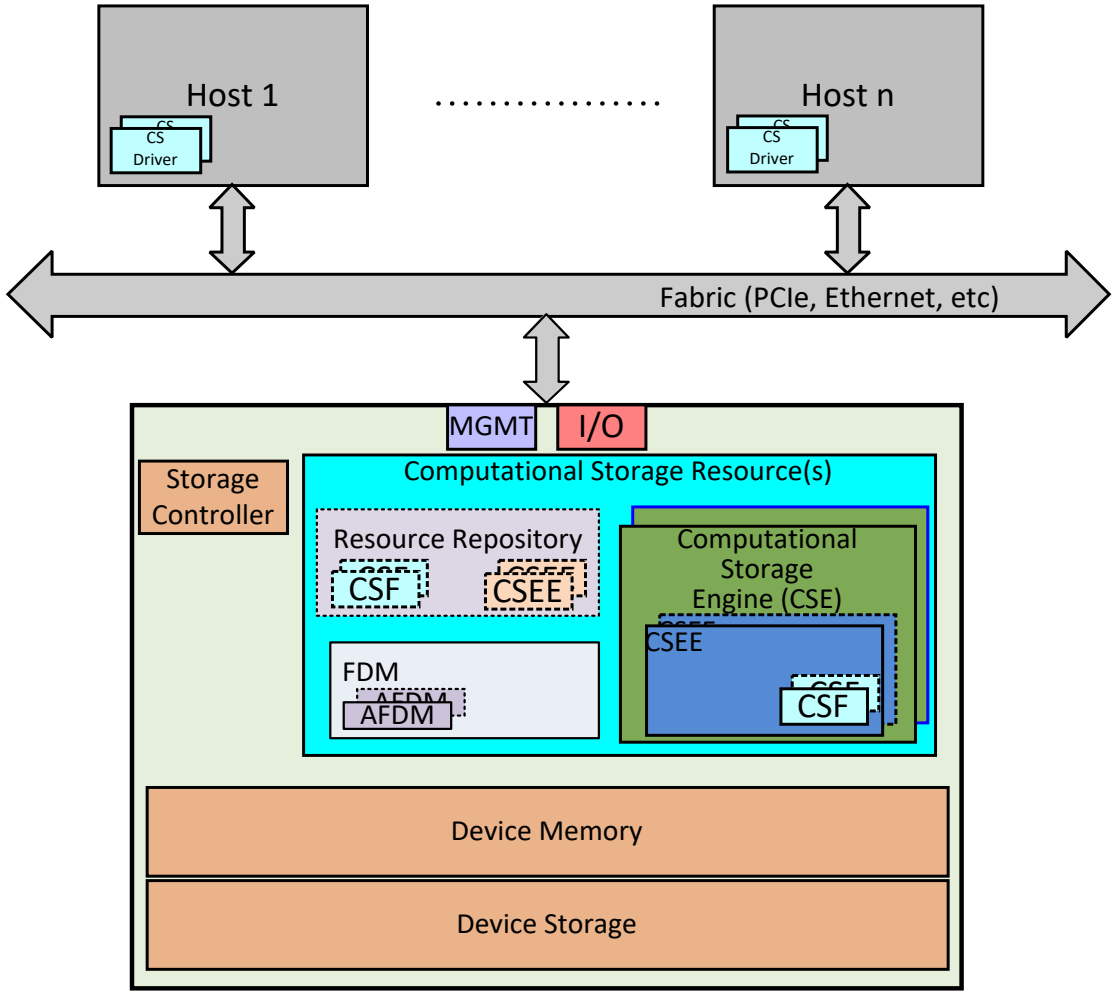
Agenda

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

SNIA Computational Storage Architecture



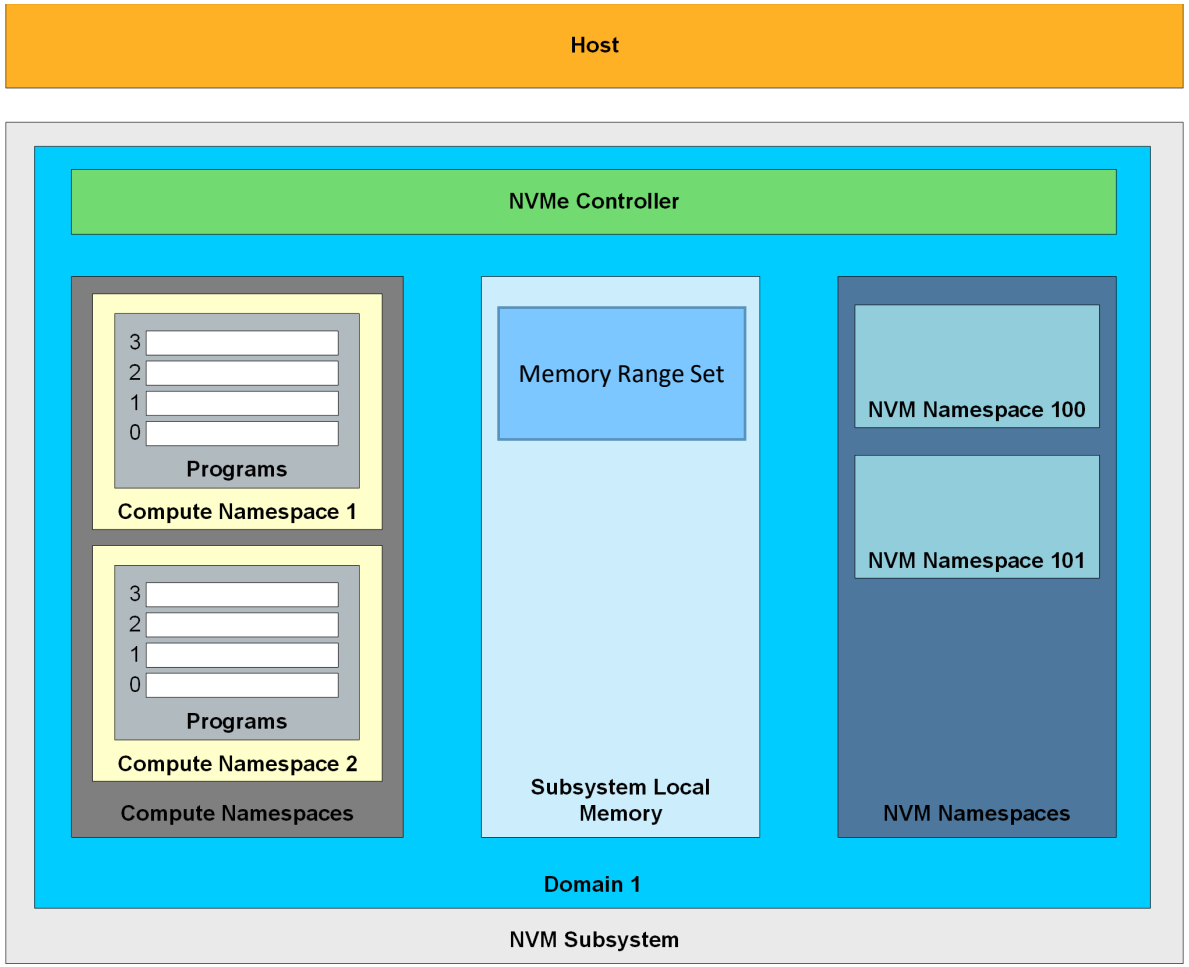
SNIA Architectural Elements for CS Drive



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



- 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

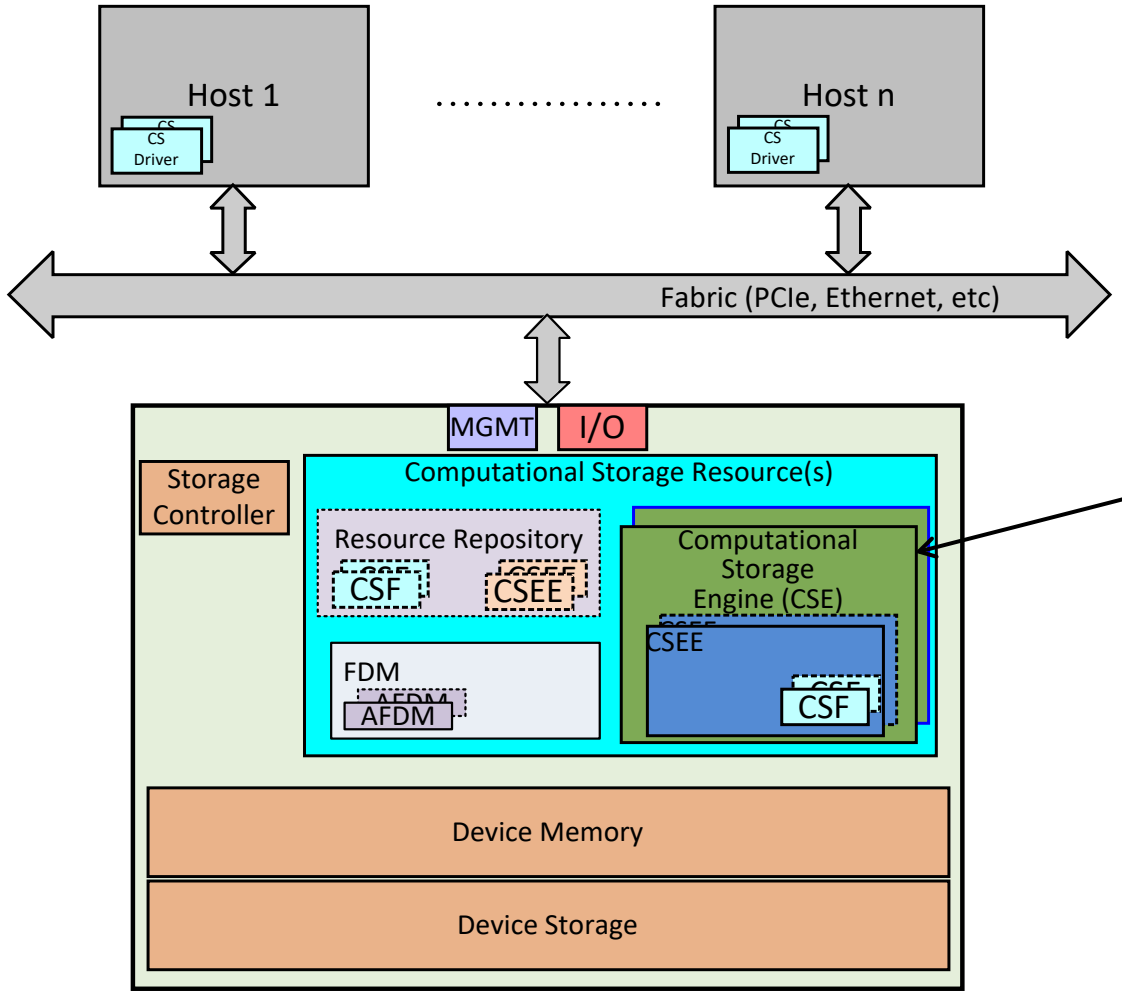
SNIA Terms

- 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

Mapping to NVMe for Computational Storage



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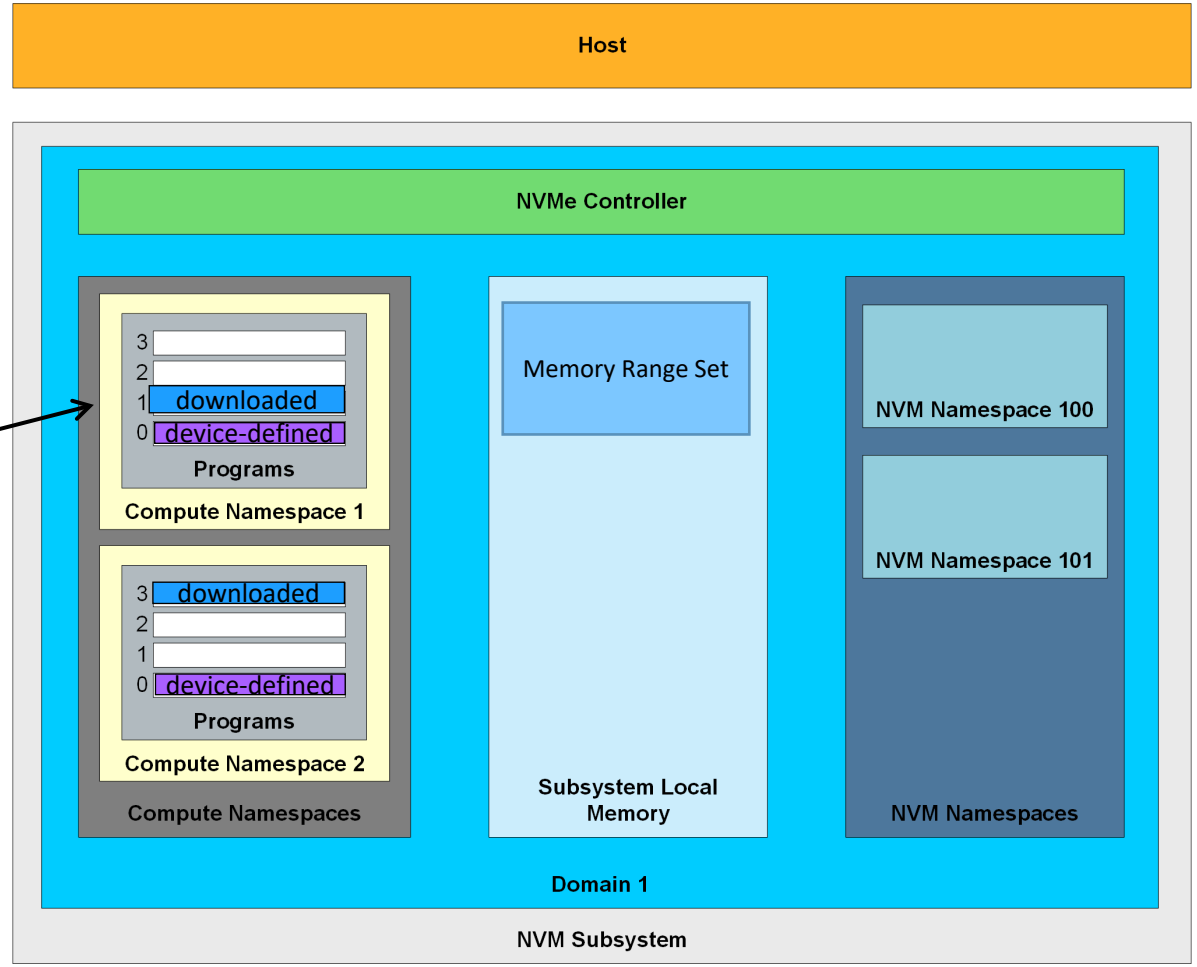

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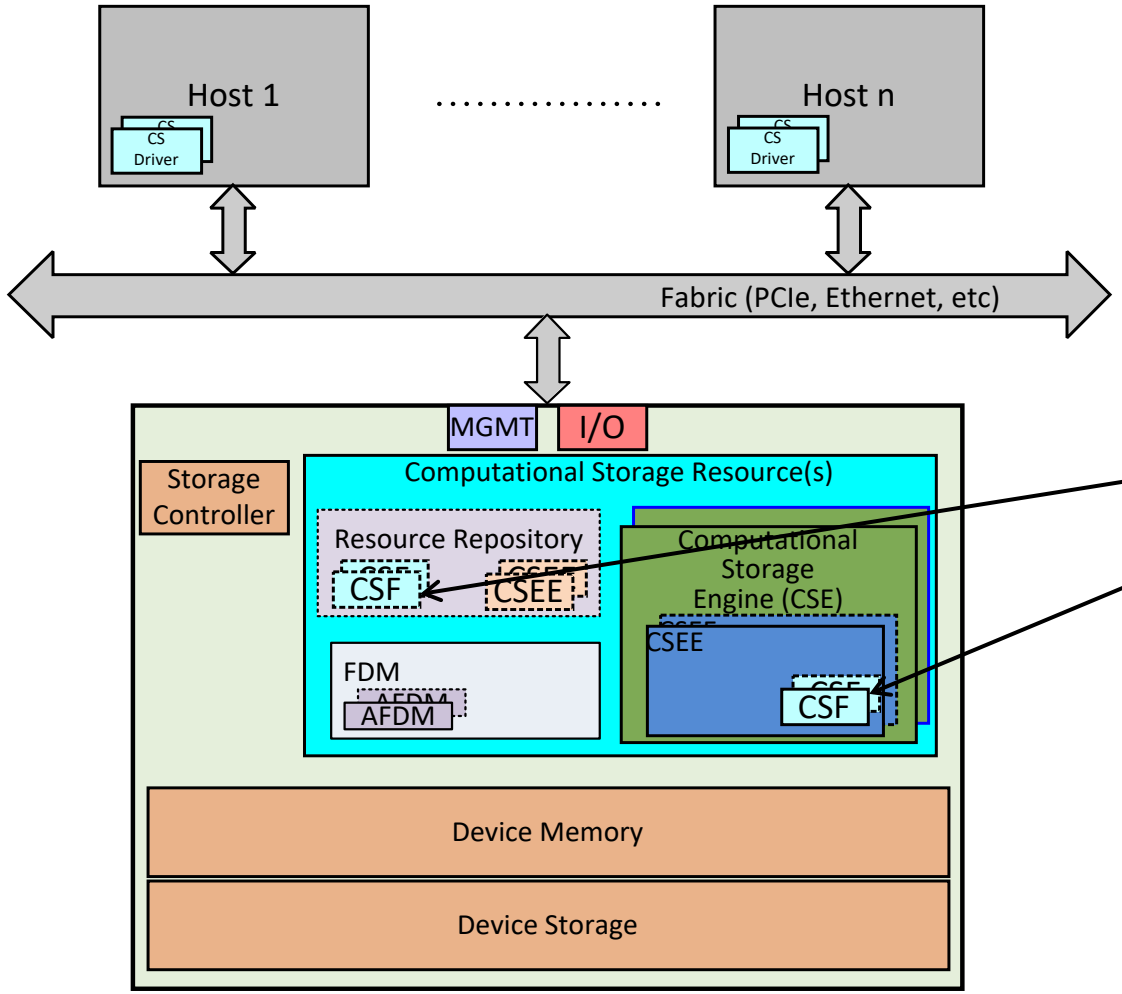

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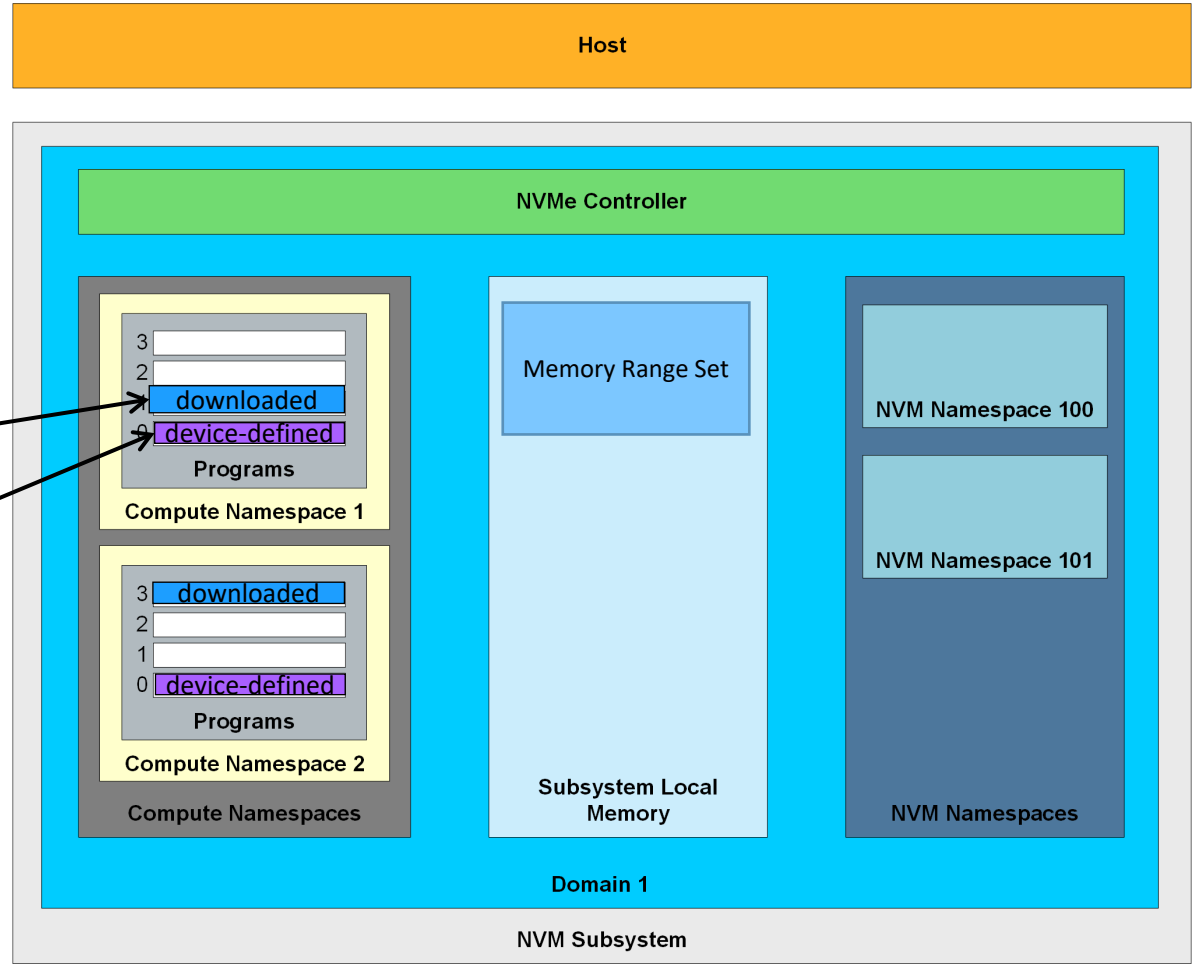

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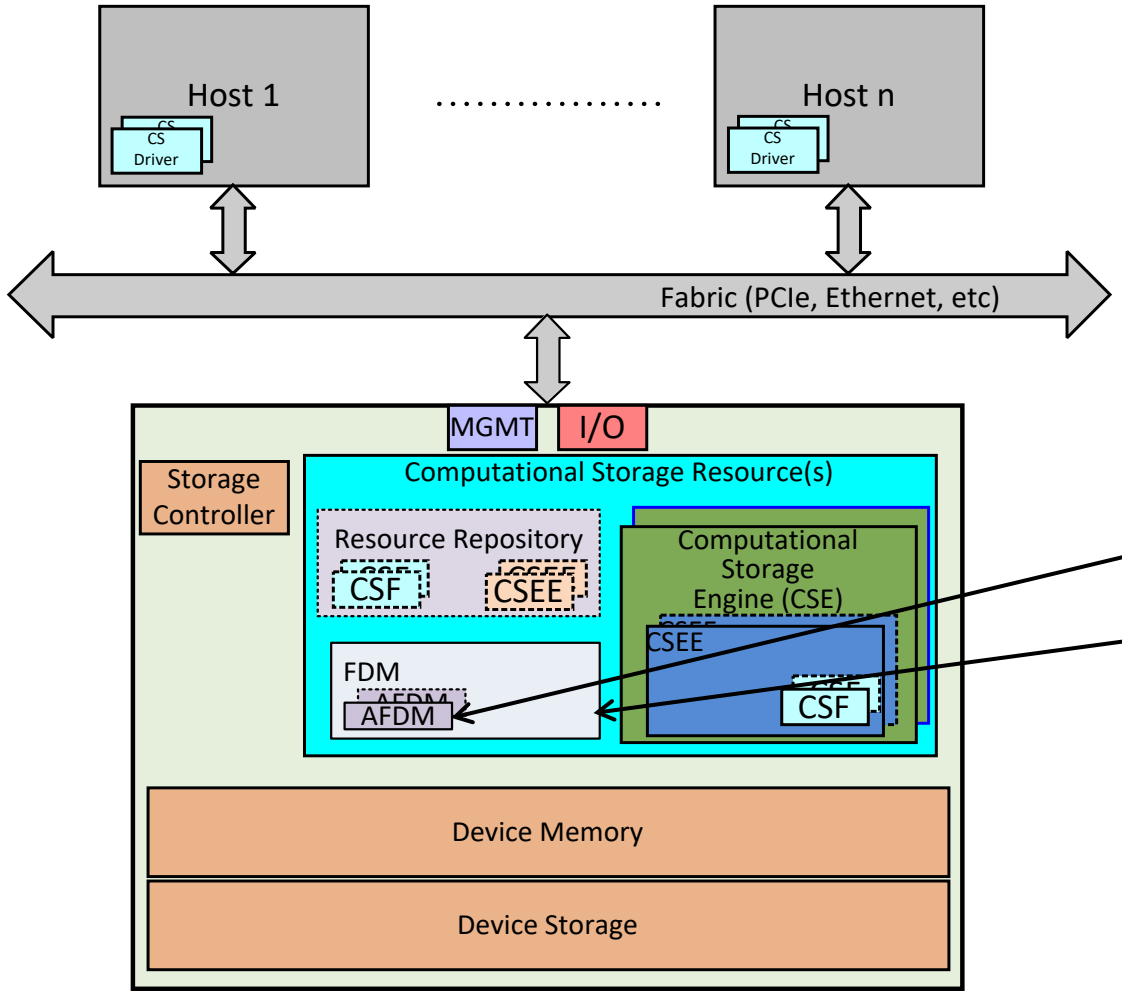

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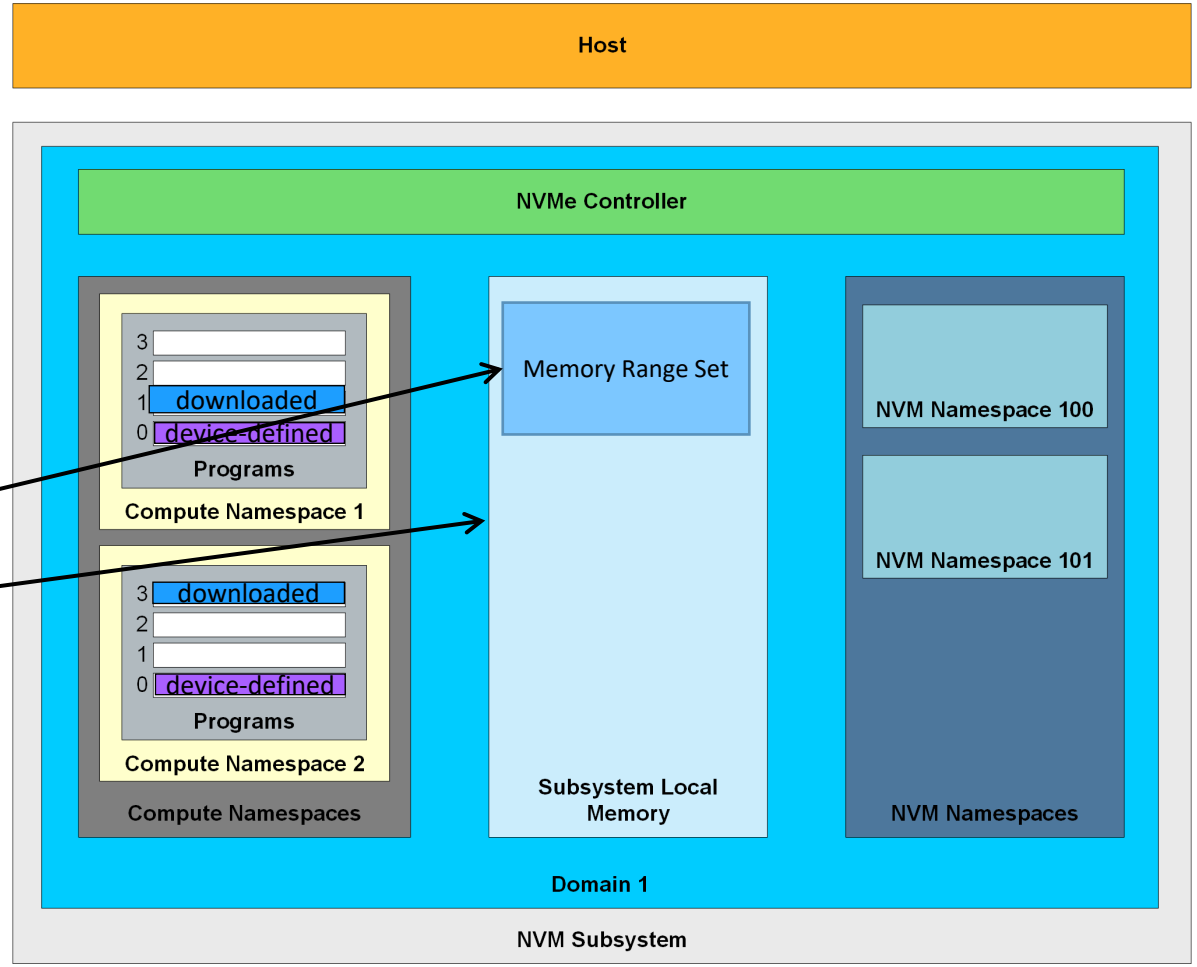

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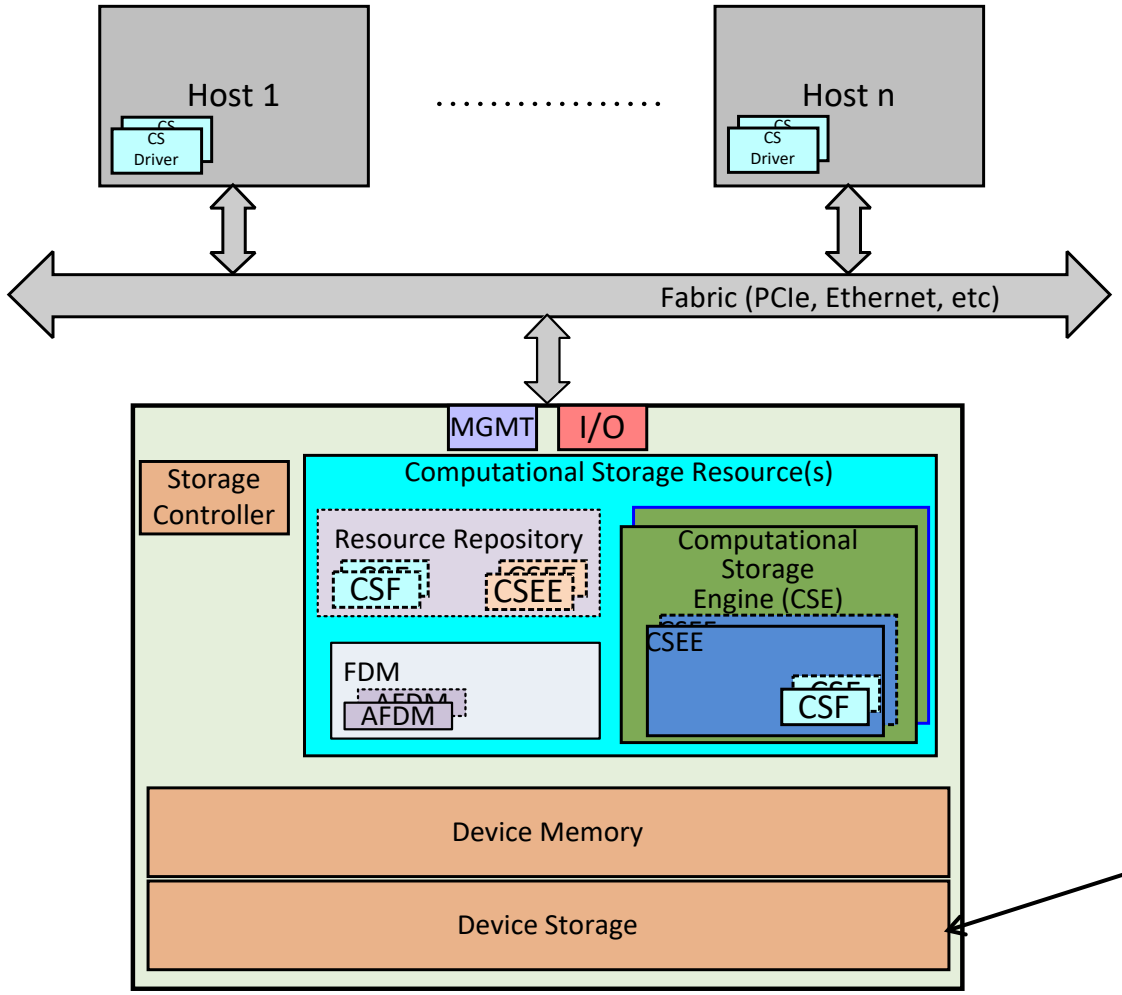

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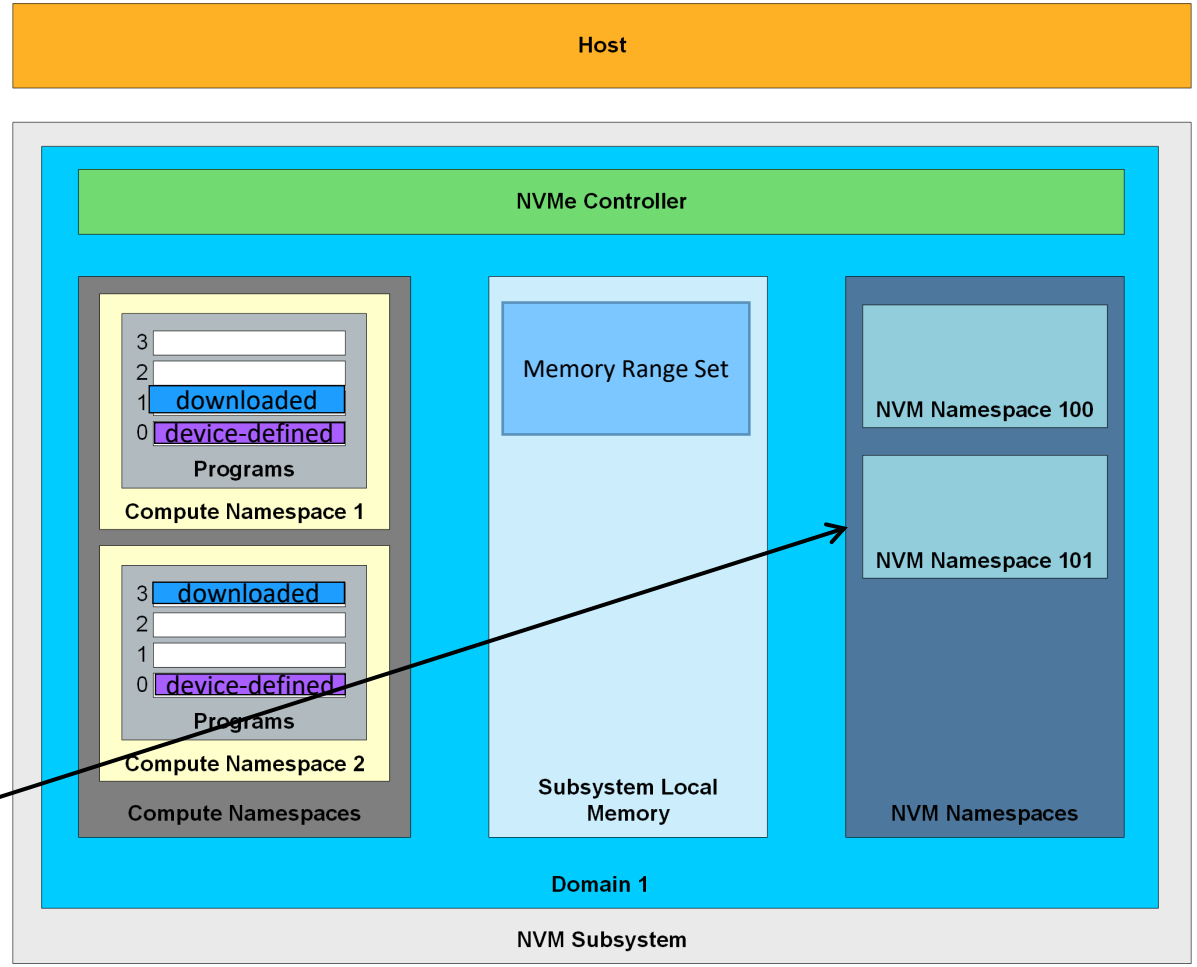

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Differences between SNIA and NVMe

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

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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