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Compute Everywhere: *How Storage and Networking Expand the Compute Continuum*

A SNIA Webcast Discussion Panel LIVE: November 17, 2020 – 10:00 am PST On Demand – snia.org/educational-library

Today's Speakers









Moderator: Jim Fister Director, CMSI Applications Enabling Principal, The Decision Place Presenter: Eli Tiomkin NGD Systems Chair, CMSI Computational Storage Special Interest Group Presenter: Steve Adams Intel Presenter: Chipalo Street Principal Program Manager Lead Microsoft, Azure IoT Edge



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SNIA-at-a-Glance









50,000 IT end users & storage pros worldwide





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Forward-Looking Enterprise Data States



- Compute everywhere to maximize data value
- Requires meaningful access to both data and data flow



Compute pendulum is swinging towards the middle



Latency, Cost, Sovereignty, Resilience, Capacity



"Edge Compute" is the next sharing economy battleground



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The rise of the EDN* ... the next big platform





The rise of the EDN* ... the next big platform



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The next decade: Composable E2E Platforms





Phase

3

The next decade: Composable E2E Platforms



Phase

3

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The next decade: Composable E2E Platforms



Phase

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- Scripts: invoke systems
- Queries: invoke insights
- Resources compose and data converges whenever, wherever, and for as long as needed









Azure





Azure Stack HCI Azure Stack Hub Azure Azure Stack Edge





Azure IoT Edge Azure Stack HCI Azure Stack Hub Azure Azure Stack Edge





Azure SphereAzure IoTAzure IoT EdgeAzure Stack HCIAzure Stack HubAzureAzure RTOSDevice SDKAzure Stack Edge



Need A New Way to Look at Storage

Pain PointsPhysical SpaceAvailable PowerScaling MismatchBottleneck Shuffle

Scaling requirements are not met with existing solutions One CPU to many storage devices creates bottlenecks These bottlenecks exist, we currently just shift where they reside



Technologies that 'compose' these elements just exacerbate the bottleneck

A way to augment and support without wholesale change is needed



Computational Storage View

Computational Storage Function (CSF)

- Send compute request to the drive
- Allow drive to reduce data
- Only return the results
- Can be local or fabric attached
- Reduces fabric and DDR BW consumption
- Costs Saving
 - Reduced transfers
 - Reduced power
 - Free up host cycles
 - Potential for server removal
- Potential for massively parallel compute





Fabric/Network Transfers



Computational Storage Devices

Computational Storage Drive (CSD):

A storage element that provides Computational Storage Function and persistent data storage.

Computational Storage Processor (CSP):

A component that provides Computational Storage Functions 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. (Many options here)







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Using Computational Storage

Benefits

Distributed Processing

Faster Results

Lower Power

Smaller Footprint **Reduced** data transfers

Reduced fabric provisioning

Scaling compute resources with storage provides access to results faster

Computational Storage resources 'offload' work from the overtasked CPU

Seamless architectures create new 'servers' with each storage device added



Additional CPU resources without added rack space

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Finding the Needles in Haystacks with AI and CSDs

Problem Statement

Databases growing at exponential rates

10 M	1 Billion	1 Trillion
2007	2017	2021

Load and Search time key blocks in getting results

Computational Storage Solution

- Determine best way to increase performance
- Load Time Reductions due to CSD Offload of AI code

Results are Proven:

- Load Time Reduced > 95%
- Search Time Reduced > 60%
- Power Savings of > 60%



Technical paper to be published in the ACM journal on Computational Storage







Computational Storage at the Edge





Thanks for Watching Our Webcast

- Please rate this webcast and provide us with feedback
- A link to this webcast and the PDF of the slides are posted to the SNIA Compute Memory and Storage Initiative website at <u>https://www.snia.org/forums/cmsi/knowledge/articles</u> <u>-presentations</u>
- You can also find this <u>webcast</u> and many other videos and presentations on today's topics in the <u>SNIA Educational Library</u>
- A Q&A from this webcast will be posted to the SNIA Compute, Memory, and Storage Blog





Take 10 – Watch a Computational Storage Trilogy

🛗 July 31, 2020 💄 Marty Foltyn 🔍 Leave a comment

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Aren't we all near the the edge? Take 5 minutes

& find out the future of edge compute



Where To Find Out More About Compute Everywhere and **Computational Storage**

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The ndustry leading companies of the SNIA Compute, Memory, and Storage Initiative (CMSI) support the industry drive to combine processing with memory and storage, and to create new compute architectures and software to analyze and exploit the explosion of data creation over the next decade.



- **CMSI Engages and Educates**
- Computational Storage
 - Solid State Drives Solid State Systems
- Persistent Memory
- PM and SSD Performance SSD Form Factors

CMSI Accelerates Standards



- Persistent Memory Programming Model
- PM Hardware Threat Model
- Solid State Storage Performance Test Specifications
- SSD Form Factor Specifications

CMSI Propels Technology Adoption

- Persistent Memory Programming Bootcamps
- PM Remote Access for High Availability White Paper
- ✓ SSD Form Factors Explained
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