Computational Storage BoF

What A Year It Was!

Hosted by the Co-Chairs of the CS TWG
  Jason Molgaard, Sr. Principal Solutions Architect, ARM
  Scott Shadley, VP Marketing, NGD Systems
& Chair, CS SIG
  Eli Tiomkin, VP Business Development, NGD Systems
The Growth and Evolution

TWG Membership and Efforts
The Continued Growth of Experience

- TWG Working group is continuing to see growth
  - Member count is up, Users ‘following’ and ‘participating’
  - 51 companies, 261 individual members

- Work in the Special Interest Group
  - CS SIG – Webinars, Blogs, Events

- Collaborating with other Groups
  - NVM Express – Computational Programs
  - Be sure to check out the session presented by the Co-Chairs of that work
Computational Storage SIG Mission and Objectives

**Mission**: Accelerate the awareness of computational storage concepts and influence industry adoption and implementation of the technical specifications and programming models when available

**Objectives**: The Computational Storage SIG will:
- Communicate the CS taxonomy and technical specification
- Communicate the CS programming model and why there’s a standard model
- Educate on benefits, use models, and implementation of Computational Storage
- Evangelize CS TWG work and recruit members to contribute to spec
- Influence the industry to adopt programming model and uses when available
- Coordinate marketing across industry standards groups in conjunction with SNIA Strategic Alliance Committee
Current Progress of TWG Output

- Architectural Document has been Released
  - V0.8 is now in Public Review
  - Many updates from 0.5

- Initial release of API Document
  - First level support of customer interface

- Security now being reviewed
  - In Collaboration with Security TWG
A Brief Rundown of the Modified CS Direction

REMOVAL OF - CSS, FCSS, PCSS to better align the Architectural use case of the Computational Storage Devices (CSx) - Addition of replacement terms below
Different Implementations – Differences?
What About the API?

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
eBPF Discussion – NVM Express and CS TWG

eBPF for Downloadable Programs

- **Why downloadable programs?**
  - Flexibility
  - Process complex formats
  - Emerging applications
  - Portability from existing applications

- **Why eBPF?**
  - Vendor Agnostic
  - Well understood
  - Existing ecosystems
  - LLVM
  - Toolchains
  - Sits under Linux Foundation

This presentation discusses NVMe work in progress, which is subject to change without notice.
So… What about Security?

- Threat Model Analysis?
- Trying to identify security issues/threats that are “new”
- Using Security TWG and Standards as Baseline
Hypothetical Implementation Configuration
Moving Beyond Architecture

- Security and Computational Storage
  - Security TWG collaboration

- Illustrative Examples Growth
  - More and more ways to deploy

- Deployment Models and Feedback
  - Customer use cases, market growth
SDC 2021 Recap of Sessions

**COMPUTATIONAL STORAGE**

**Computational Storage Architecture Simplification and Evolution**

Jason Molgaard, Sr. Principal Storage Solutions Architect, Arm Inc.

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**Scientific Data Powered by User-Defined Functions**

Lucas Villa Real, Research Software Engineer, IBM Research

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**SkyhookDM: An Arrow-Native Storage System**

Jayce Chakraborty, IRIS-HEP Fellow, IRIS-HEP and ORROSS, UC Santa Cruz

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**Computational Storage Deployment with Kubernetes and Containerized Applications**

Scott Shadley, Co-Chair, Computational Storage TGW - VP Marketing, NGD Systems

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**Accelerating File Systems and Data Services with Computational Storage**

Brad Settlemeyer, Storage Researcher, Los Alamos National Laboratory

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**Stop Wasting 80% of Your Infrastructure Investment!**

Tony Afshary, Sr. Director, Product Line Management, Pliops

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**Computational Storage**

Jai Menon, Chief Scientist, Fungible

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**The Building Blocks to Design a Computational Storage Device**

Jerome Gaysses, Senior Technology and Market Analyst, Silinov Consulting