SOFTWARE-ENABLED FLASH™

Technical Steering Committee Meeting

September 21, 2023

Linux Foundation Code of Conduct

- LF Projects is committed to maintain a positive, professional work environment. This commitment calls for workplaces where participants at all levels behave according to the rules of the following code. A foundational concept of this code is that we all share responsibility for our work environment.

- Full code text
  - https://lfprojects.org/policies/code-of-conduct/

Agenda

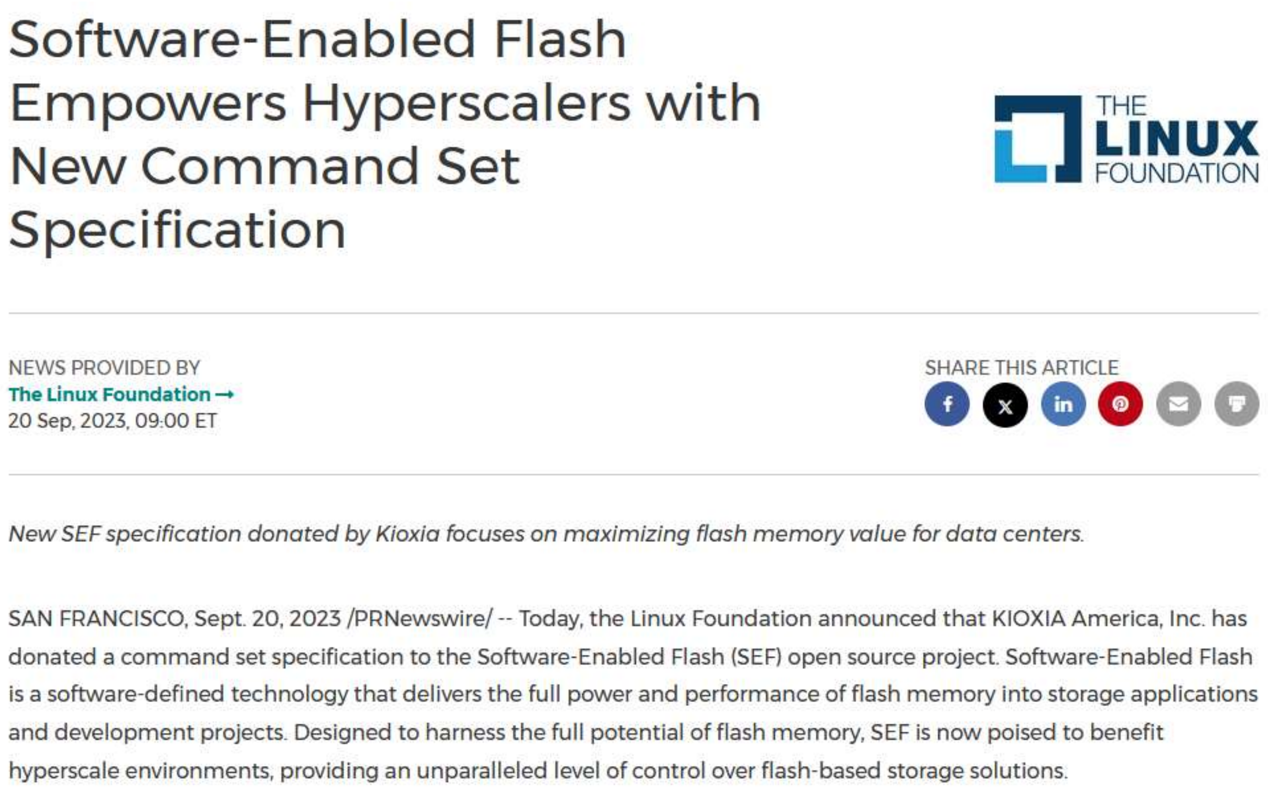
- Welcome and quick review of the previous TSC meeting
- ~~Exciting project milestones~~
- Sponsorship of SNIA SDC 2023
- Command Set Specification donation
- Demos of SEF on first member hardware
- Project and SDK updates
- Discussion topics for the OSS project
- Q & A discussions

SNIA Storage Developers Conference 2023 - Sponsorship

HIGHLIGHTS

- Platinum Sponsorship
- Keynote and Technical Presentation
- Great Birds of a Feather
- **Recordings coming soon**

SEF Command Set Specification Donation!



Software-Enabled Flash Empowers Hyperscalers with New Command Set Specification

THE LINUX FOUNDATION

NEWS PROVIDED BY
The Linux Foundation →
20 Sep, 2023, 09:00 ET

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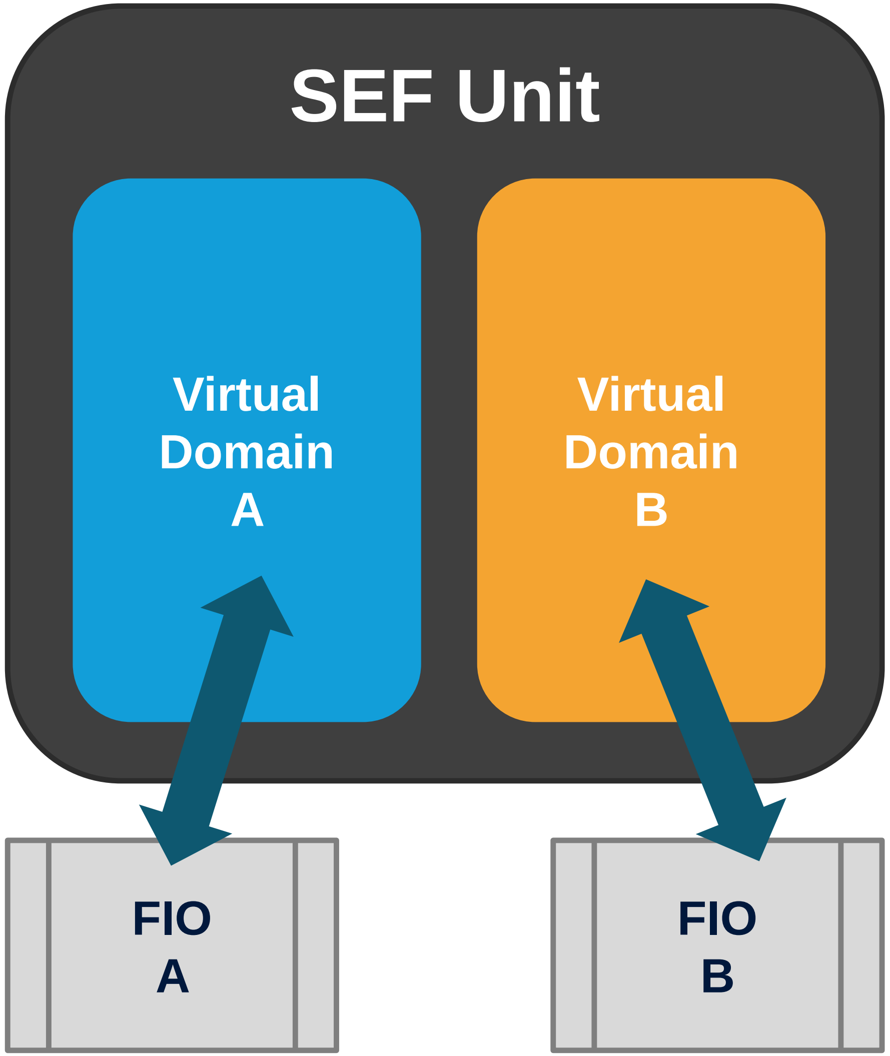
New SEF specification donated by Kioxia focuses on maximizing flash memory value for data centers.

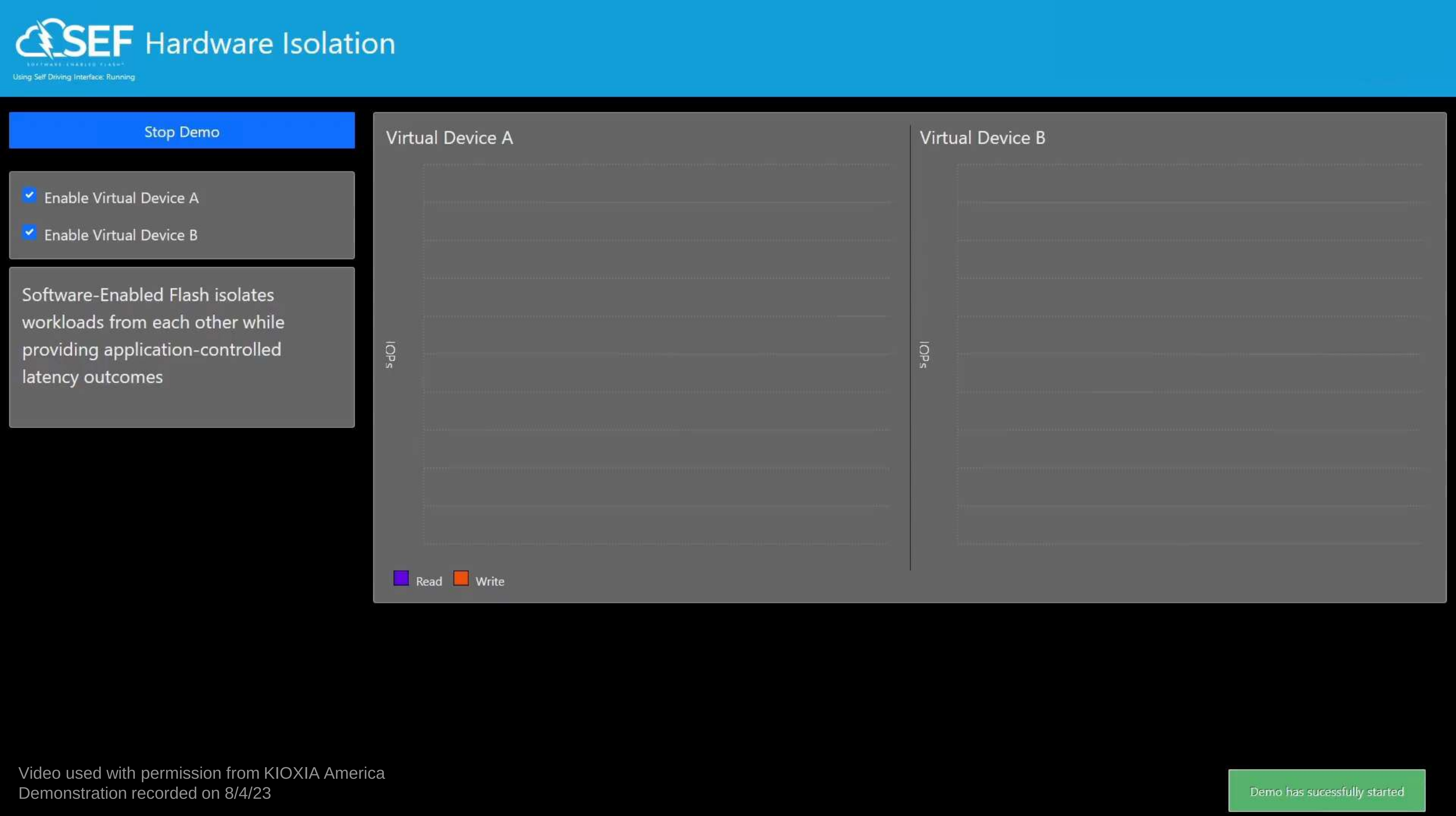
SAN FRANCISCO, Sept. 20, 2023 /PRNewswire/ -- Today, the Linux Foundation announced that KIOXIA America, Inc. has donated a command set specification to the Software-Enabled Flash (SEF) open source project. Software-Enabled Flash is a software-defined technology that delivers the full power and performance of flash memory into storage applications and development projects. Designed to harness the full potential of flash memory, SEF is now poised to benefit hyperscale environments, providing an unparalleled level of control over flash-based storage solutions.

https://github.com/SoftwareEnabledFlash/SEF-Command-Set

Demonstrating SEF Isolation Capabilities

- One physical SEF Unit
- Split into 2 separate Virtual Domains (physical isolation)
- Identical FIO workloads on each Domain
- Jobs started and stopped without interference





Hardware Isolation

Using Self Driving Interface: Running

☑ Enable Virtual Device A

☑ Enable Virtual Device B

Software-Enabled Flash isolates workloads from each other while providing application-controlled latency outcomes

Demo has sucessfully started

Video used with permission from KIOXIA America
Demonstration recorded on 8/4/23

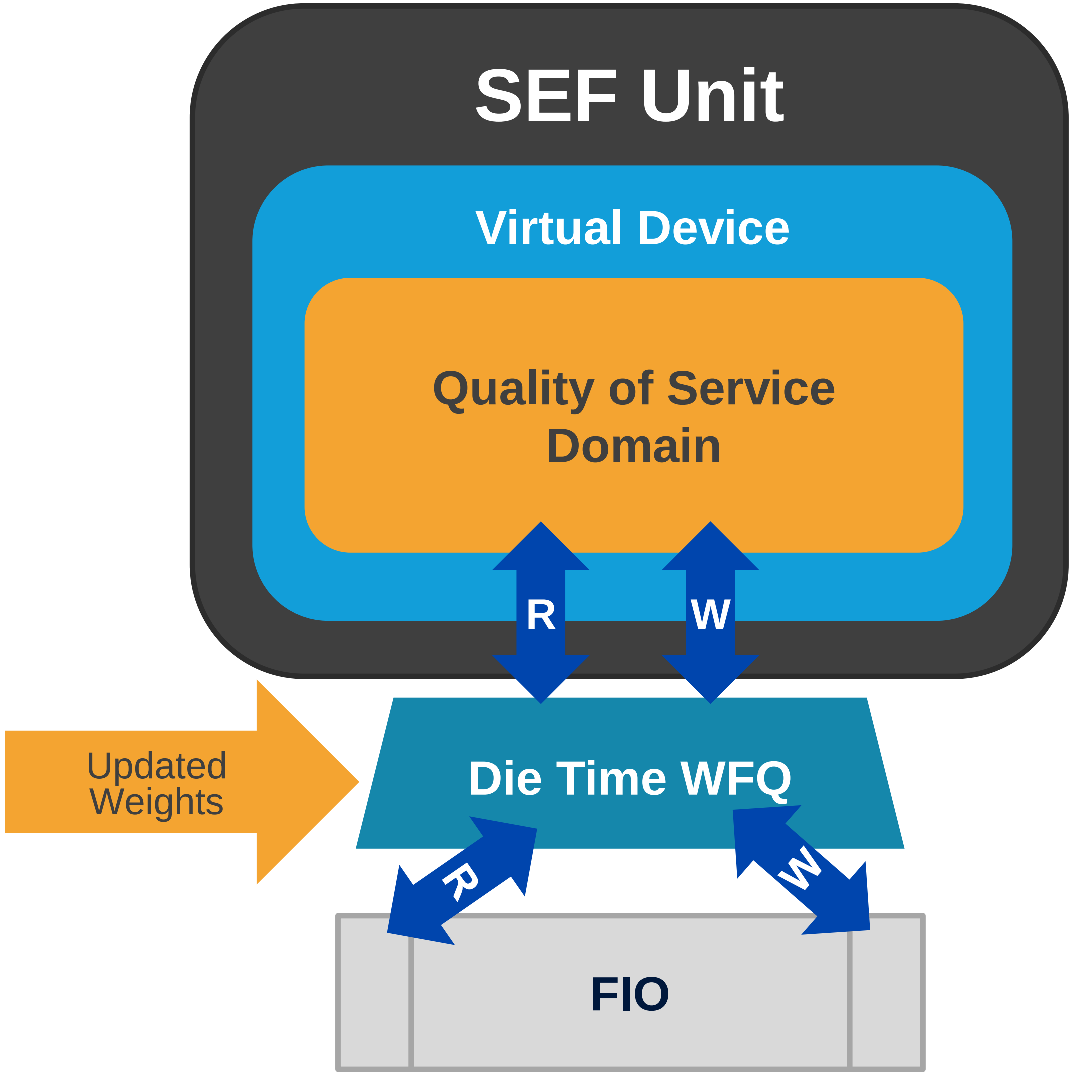
Show-and-Tell

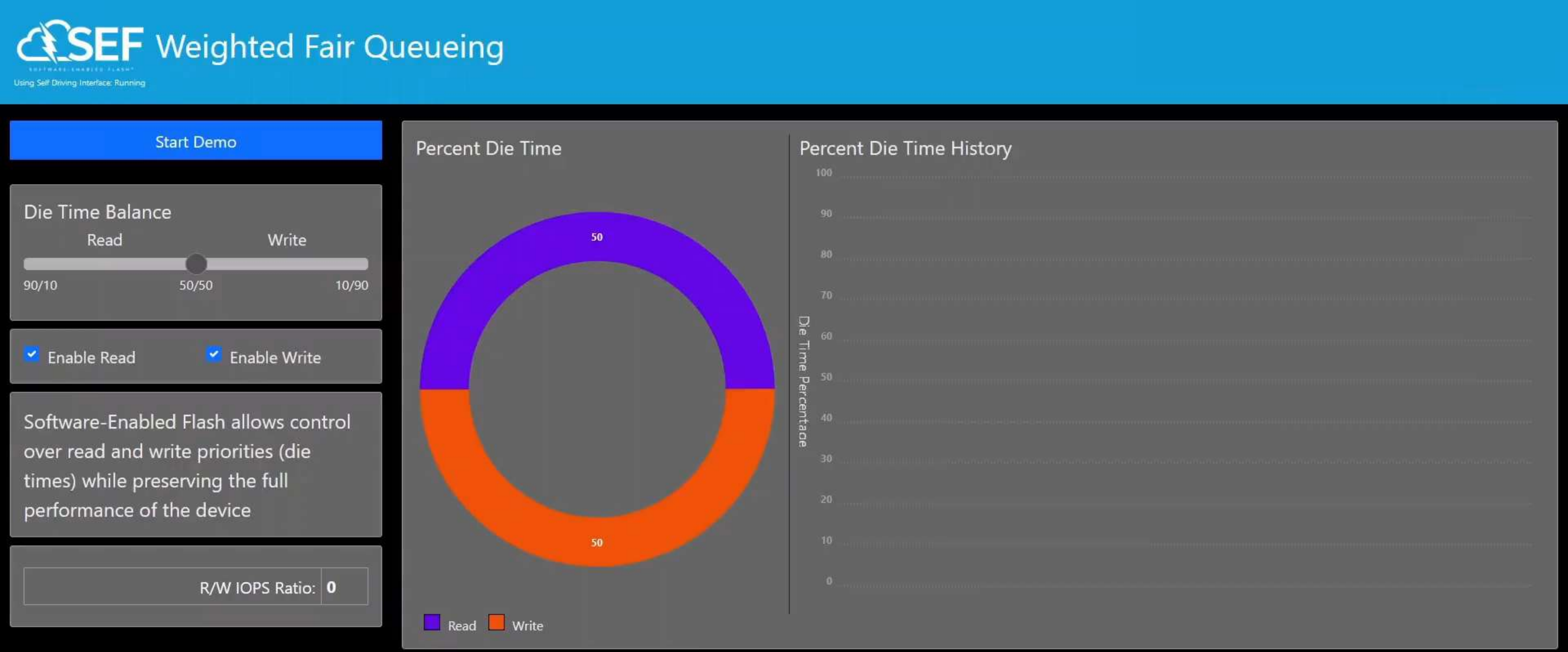
Real-time, application controlled queueing

Demonstrating SEF Queueing Capabilities

- Single SEF Unit
- Single Virtual Device
- Single Quality of Service Domain
- One FIO job (Read and Write)

- Die-Time Weighted Fair Queueing
  - Adjust read and write weights, in real time, while job is running





Weighted Fair Queueing

Using Self Driving Interface: Running

Die Time Balance

Read Write

90/10 50/50 10/90

☑ Enable Read ☑ Enable Write

Software-Enabled Flash allows control over read and write priorities (die times) while preserving the full performance of the device

R/W IOPS Ratio: 0

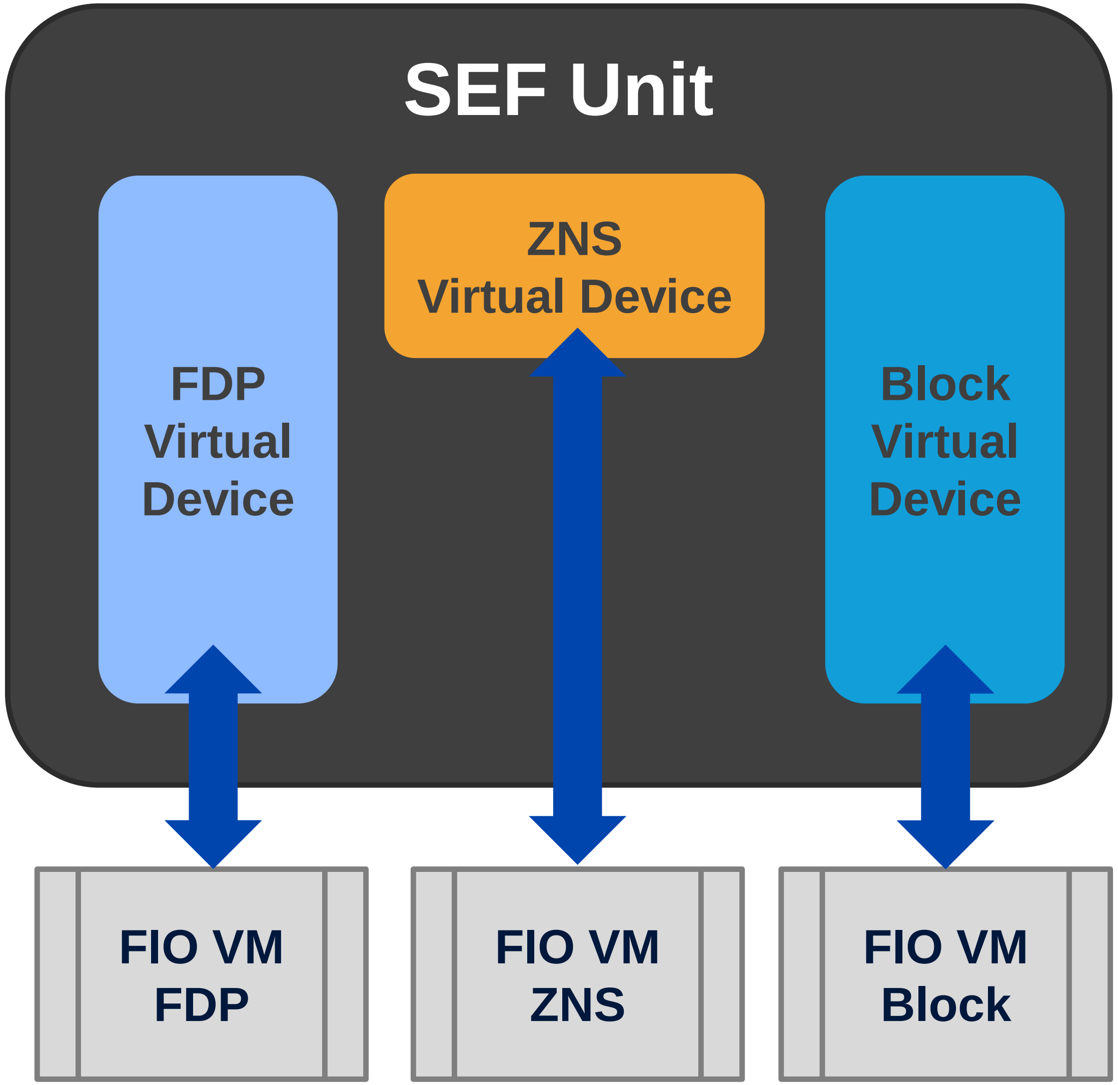
Video used with permission from KIOXIA America
Demonstration recorded on 8/4/23

Show-and-Tell

Application controlled, software-defined protocols

Demonstrating SEF Multi-Protocol Capabilities

- Single SEF Unit
- Three Virtual Devices (separate flash die isolation)
  - Unused die visible in this example
- Three VMs with different protocols
  - FDP
  - ZNS
  - Block
- FIO job for each VM, started and stopped independently



SEF Simultaneous Multiple Software-Defined Protocols with Isolation

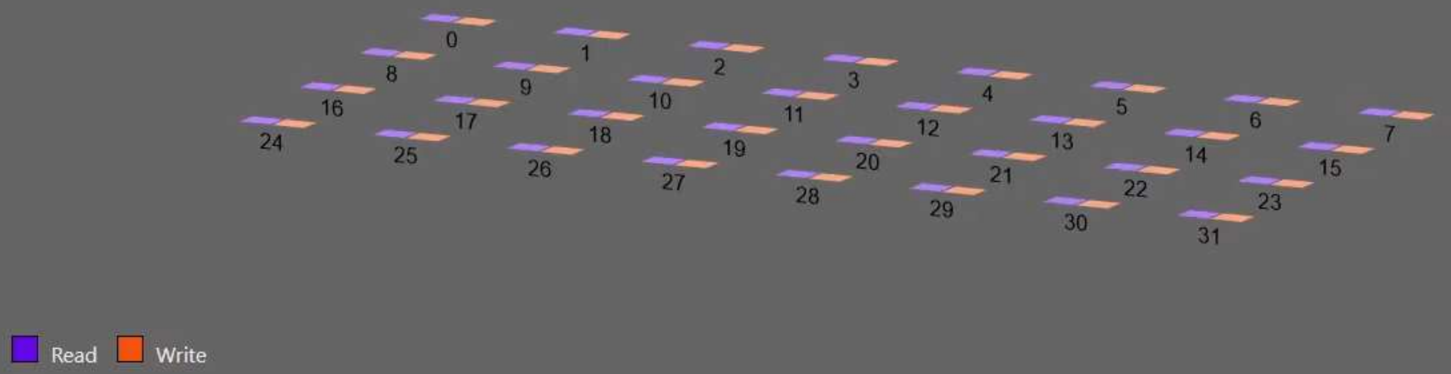
Using Self Driving Interface: Running

Stop Demo

- ☑ Read/Write Workload (FDP)
- ☑ Write Workload (ZNS)
- ☑ Read Workload (Block)

Software-Enabled Flash supports standard and application-defined protocols while isolating workloads to individual flash dies for complete control and isolation

Die Activity



Starting workloads with multiple software-defined protocols

Video used with permission from KIOXIA America
Demonstration recorded on 8/4/23

Demo has sucessfully started

Project and SDK Updates

- PoC1 firmware expected to be finalized in early October
- SDK testing on final firmware is gating SDK release…
  - Expectation is late October/Early November

Discussion topics for the OSS project

- Is there interest in including SPDK support in the next SDK version?
- Are there specific FTLs that should be included in the next SDK version?
- What applications should we make SEF native?

Q & A discussions

Collaboration Resources

- **GitHub**
  - https://github.com/SoftwareEnabledFlash/
  - https://github.com/SoftwareEnabledFlash/TSC/
- **Online API Docs**
  - https://softwareenabledflash.github.io/SEF-API/
- **Mailing List**
  - https://lists.softwareenabledflash.org/g/sef-dev/join
- **Sign Up for SEF Project**
  - https://enrollment.lfx.linuxfoundation.org/?project=sef

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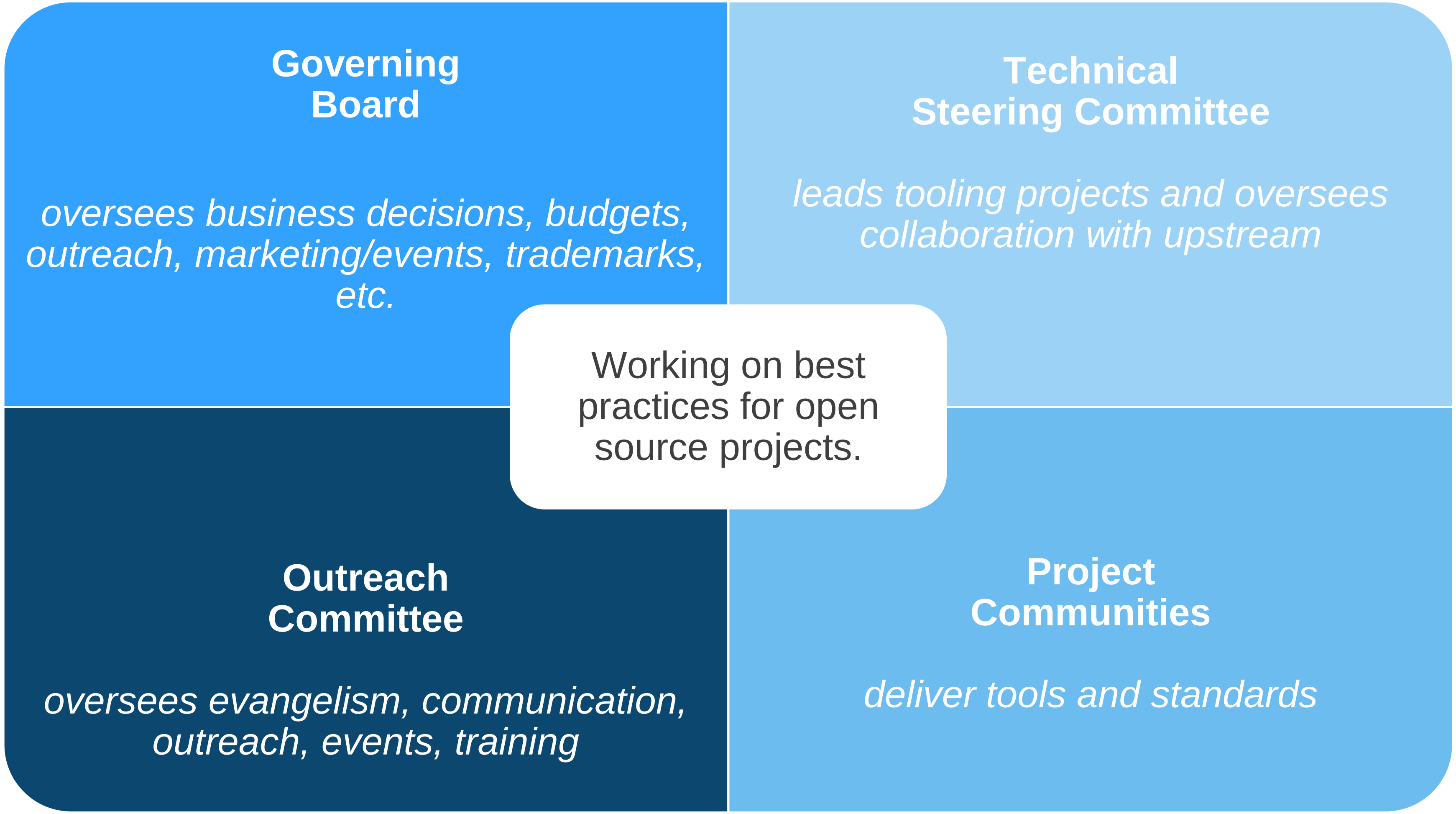
Governance Model for Software-Enabled Flash



Governing Board

oversees business decisions, budgets, outreach, marketing/events, trademarks, etc.

Technical Steering Committee

leads tooling projects and oversees collaboration with upstream

Working on best practices for open source projects.

Outreach Committee

oversees evangelism, communication, outreach, events, training

Project Communities

deliver tools and standards