Future Innovations in Software Defined Flash Storage

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Discussion Ideas

- Flash storage has moved beyond “speeds and feeds!”
- What are the pain points in flash storage today?
- What are the best common abstractions?
- How can developers specify their intent for flash storage?
- How to make it easy for developers?
- Do containers and VMs change the calculus?
- How about accelerators and DPU, do they have custom needs?
- What knobs are developers expecting?
Fundamentally redefines the relationship between the **host** and solid-state storage

- Brings control of media to software
- Host applications have complete control over storage functionality and behavior
- Solves legacy overhead problems and enables new features
- Maximizes flash flexibility, performance and parallelism…

**in other words, its value.**
Hardware + Software Working Together

PCle® Interface

DMA Logic
- Generation-Specific Program Logic
- ECC Generate/Check/Correction Logic

Micro-Controller Logic

SRAM (Page Programming)

Optional DRAM

User Applications
- File Systems
- SDS Stack
  - SEF Block Device Driver
  - SEF Reference FTL
- SEF API Library
- SEF Device Driver

Flash

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Workload Isolation

Latency Management

Flash Migration

Flash Maintenance
Noisy Neighbor Control

Data placement by die and superblock
Round Robin

Priority Queue

Die Time
Weighted Fair Queue

Latency Management

Count

Latency

Count

Latency

Weighted Fair Queue

Round Robin

Die Time
Weighted Fair Queue
Cloud-Scale Applications

QLC
Orchestrated by host software…
…performed by Software-Enabled Flash™ hardware

• Garbage collection
• Wear leveling
• Flash patrol reads
• Compaction
…and more…