INSIDER:
Designing In-Storage Computing System for Emerging High-Performance Drive

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"Moore’s Law" of storage drive: bandwidth doubles every two years.
Data Movement Bottleneck

• “Moore’s Law” of storage drive: bandwidth doubles every two years.

➢ The interconnection performance does not scale well.
Existing Work

Host

Drive

Controller

Storage Chips

cmd

much data
Existing Work

➢ In-storage computing.

Diagram:
- Host
- Drive
- Controller
- Storage Chips
- cmd
- much data
Existing Work

➢ In-storage computing.
Existing Work

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Existing Work

- In-storage computing.
Existing Work

- In-storage computing.

- Limited performance or flexibility.
  - ARM-based --- insufficient comp. speed.
  - ASIC-based --- specific to few workloads.

- High programming efforts.
- Not compatible with existing APIs.
- Requires considerable code modifications.
- Lack of crucial system supports.
- Drive prog. may access unwarranted data.
- No scheduling among drive programs.
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FPGA-based.
12X perf., 31X cost efficiency.

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File-based abstraction for in-storage computing

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**File-based abstraction for in-storage computing**

**A control plane that enforces perm. check and scheduling.**

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