

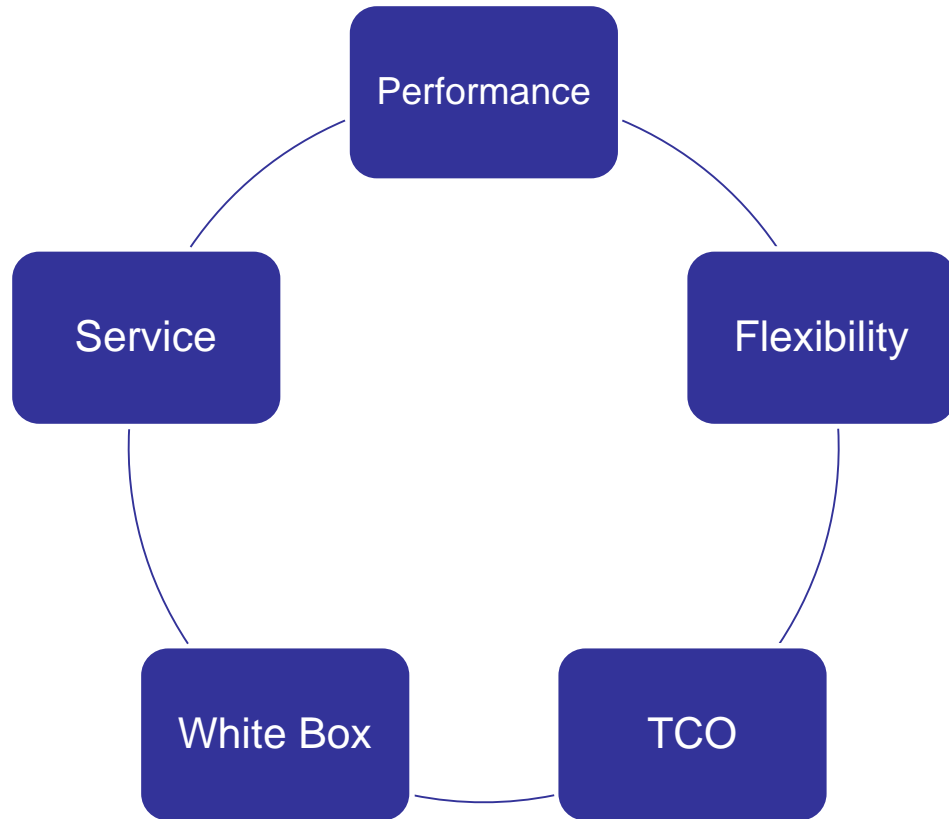


Flash Memory Summit

# Alibaba Open Channel SSD for Next-Generation Data Centers

2018/8

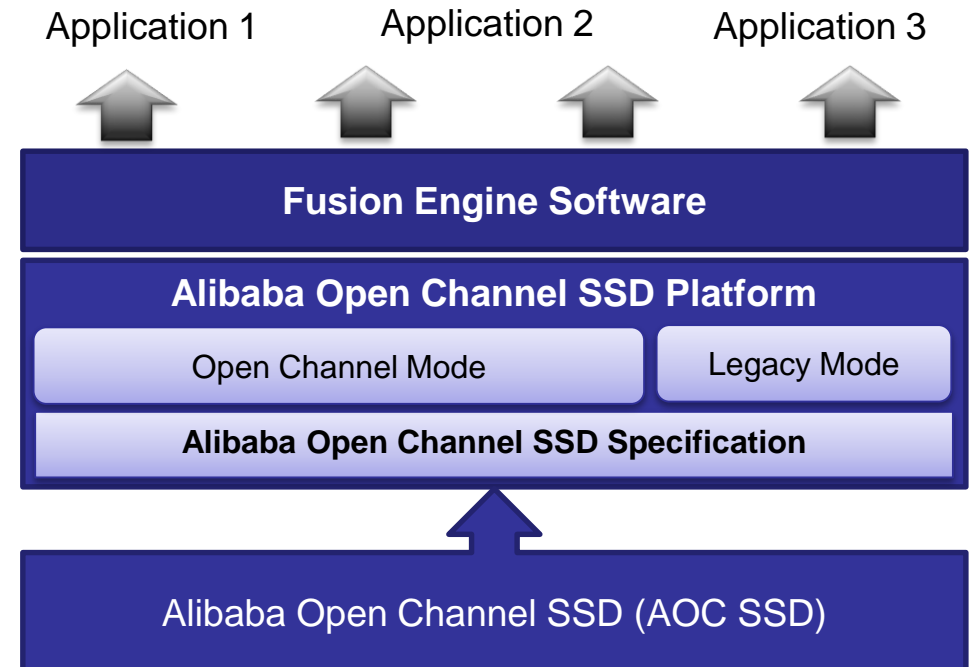
# Motivation



- Different challenges in hyperscale data centers
- Demand for hardware/software co-optimization
- Diversified, fast-changing workloads
- Continuous pressure for TCO and supply improvement
- Demand for “white box” of I/O path - more control and determinism
- Quick response to issues and feature requests

# Alibaba Open Channel Architecture

- New SSD architecture for next-generation data centers
- Enable hardware/software co-optimization
- Maximum flexibility for different workloads
  - Generic block device
  - Customized FTL
  - Deep integration with applications
- Reduce time & complexity of SSD qualification
- New media ready: QLC NAND, SCM, ...



# First Productionized Open Channel SSD

- Alibaba's home-developed Open Channel SSD - AliFlash V3
- Deployment ongoing in data centers
- Major milestone since the announcement of Alibaba's Open Channel SSD Architecture in FAST'2018
- Collaborating with multiple SSD vendors to build an ecosystem

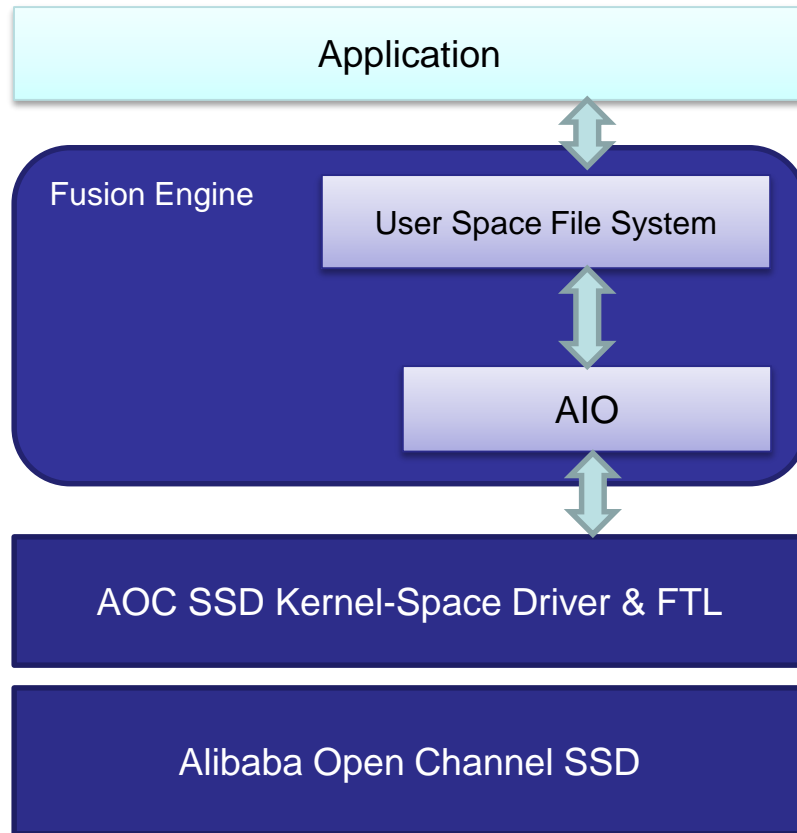




# Alibaba Open Channel SSD Software

- Host-side software stack developed by Alibaba
- Kernel-space AOC SSD Driver + Block Device FTL
- User-space AOC SSD Driver integrated with Alibaba's Fusion Engine software
- User-space customized FTL solutions
- Management, monitoring and test tools

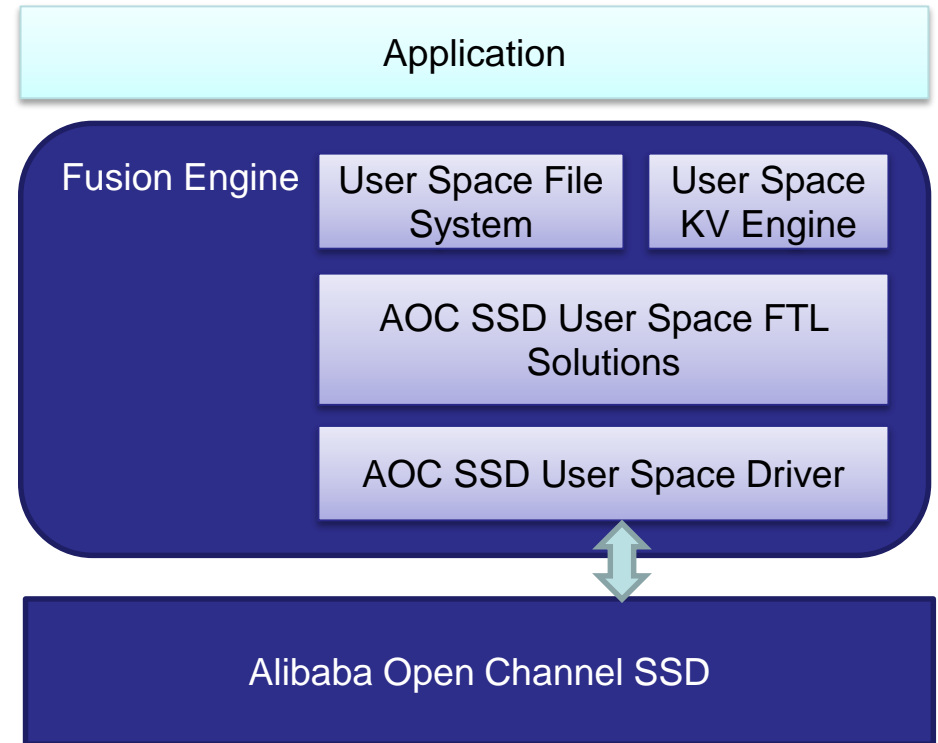
# Kernel-space AOC SSD Solution



- Work like generic block device
- Covers most of the legacy use cases
- Equivalent performance and functionality as standard NVMe SSD
- Customized improvements and extensions (e.g. scheduling & QoS)

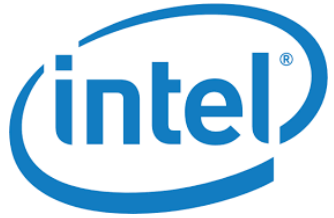
# User-space AOC SSD Solution

- Entire I/O path in user space - low software overhead
- Deep integration with application - full benefits from hardware/software co-optimization
- Optimize data placement, coordinated background tasks (garbage collection)
- Customized FTL solutions (e.g. Object SSD)





# Alibaba Open Channel Ecosystem



As Alibaba's **strategic partner** on Open Channel SSDs, Intel has worked with Alibaba extensively since 2017 to co-develop and co-validate this innovative solution. Alibaba's strength as a leading cloud service provider combined with Intel's strength as the leading memory and storage innovator puts us in a position to deliver the industry's 1st Open Channel SSD product.



- Alibaba is collaborating with major vendors in industry to build an ecosystem for Open Channel SSD
- Share development & debug resources
- Reduce time & complexity for SSD qualification in Alibaba
- Massive deployment in 2019





# Current Status of Alibaba Open Channel SSD

- Alibaba Open Channel SSD (AliFlash V3) already deployed in datacenter
- Massive deployment of vendor AOC SSDs in 1H'2019

# Conclusion Remarks

- Hyperscale data centers face unique challenges
- Hardware/software integrated solution is the key
- Customized designs driven by applications
- Alibaba is open to industry collaboration