Trends of Storage in Edge Computing

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IoT Brings challenges that Require Flash-Based storage

- Research data of IDC, by 2020
  - 50 Billion Smart Devices
  - 50 Million PB of Data
- So far from device to Cloud
  - Data Transmission Delay
  - Data transmission congestion
- Need timely data processing
Edge computing in IOT

- Augmented reality, Virtual reality
- Drones
- Healthcare
- Automated vehicles
- Remote monitoring
Data features in edge computing

- Data features
  - Mass sensor, Big Data
  - Data attributes are relatively simple
  - Data repeatability

- Data can be classified
  - Sensor type
  - Application
Storage requirements for edge computing

- High Bandwidth, Low Latency
- Low Power
- Data security
  - Hardware encryption module
  - Attack defense against encryption
Storage requirements for edge computing

- High Capacity
- Non-volatile storage media diversification
- Small Form Factors
- Power Loss Protection
- High Endurance & Reliability
- Self health management

Flash Memory Summit 2018
Santa Clara, CA
Keyway Technology Co., Ltd
Interface and protocols

- **OS**
  - Linux: Android Things, Raspbian, Debian

- **Interface**
  - SD, SATA, USB
  - Type-C, PCIe

- **Protocols**
  - NVMe, NVMe+TCP/IP, NVMe+RDMA
Trends of SSD in Edge Computing

Cloud/Data Center SSD

Host
- FTL
- Flash Mgmt
- Log Mgmt

Device
- Flash Mgmt

Standard SSD

Host
- Log Mgmt

Device
- Flash Mgmt
- FTL
- Log Mgmt

Edge Side SSD

Host

Device
- LSM Tree
- Index Eng
- AI Eng
- AI Eng

※ Cloud
※ Data Center
※ Consumer
※ Office
※ Edge side
※ IOT
※ AI
SSD for edge computing

- Computing & accelerator
  - Max/Min searching
  - Mean value calculation
  - Key value searching
  - Fixed data format conversion
  - Some AI algorithms calculations sink into the SSD controller
SSD for edge computing

- File perception
  - File attribute perception
  - Date based file management

- Machine learning
  - IO optimize
  - Cache optimize
  - Hot/Cold data queue optimization
Date based file management
Conclusion

- SSD Performance requirement
  - High Bandwidth
  - Low delay
- Date based file management
- AI feature
  - Key value Searching
  - Calculate
  - Machine learning
Thanks You

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