Flash Memory Summit

Flash Memory Summit 2019
Santa Clara, CA

Implementing Computational Storage in an NVMe-oF-Based System

KALRAY

Patrice Couvert,
Technical Product Manager

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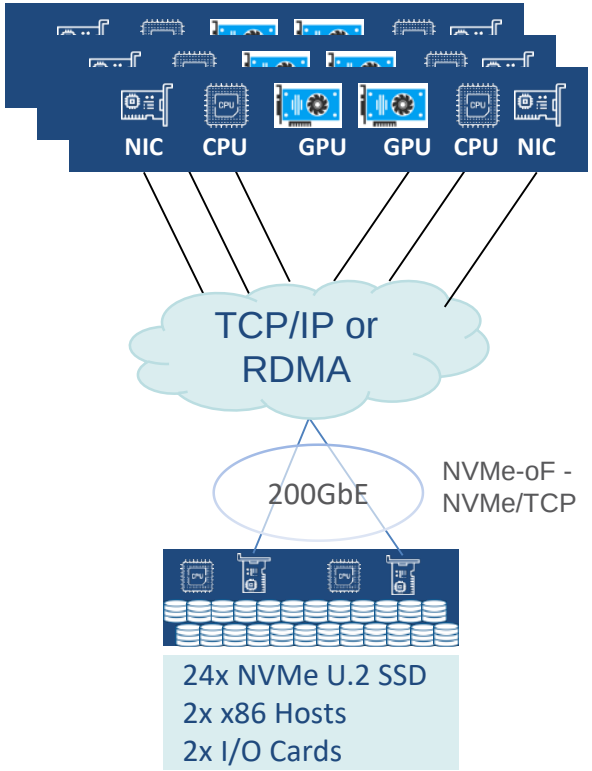
Why Computational Storage?

Use Case

Process

46 million

images stored on 24 SSDs, using resNet50



Why Computational Storage?

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Option 1

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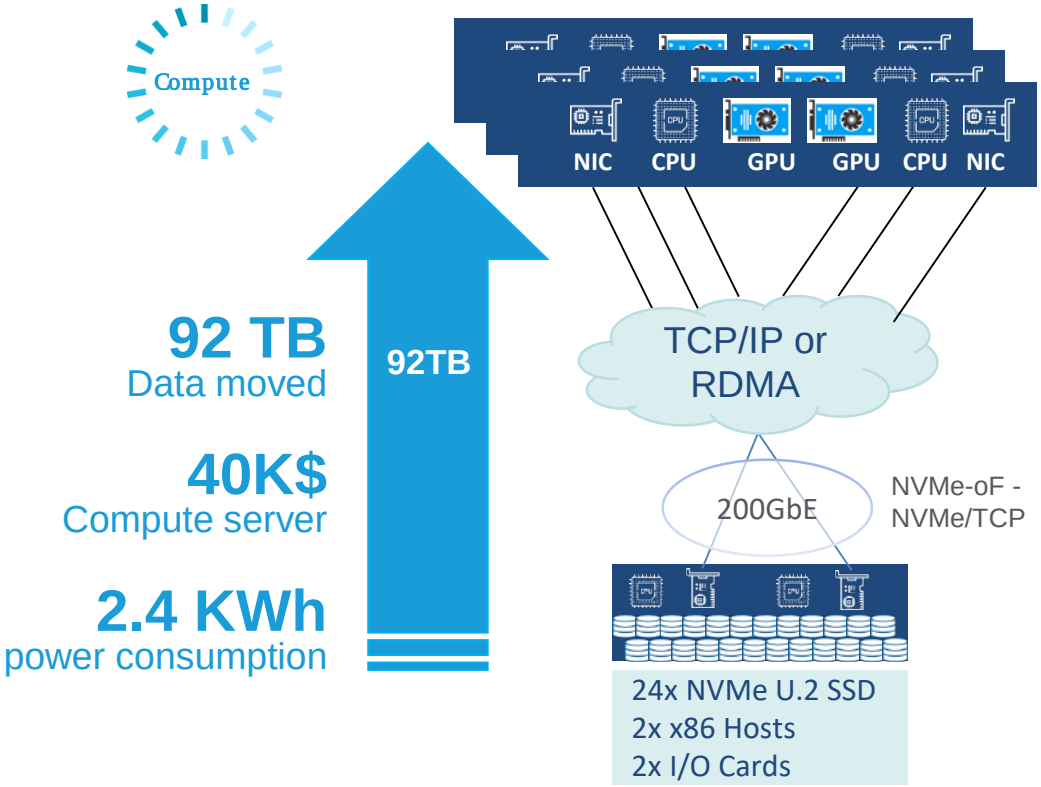

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Why Computational Storage?

Use Case

Option 2

Process

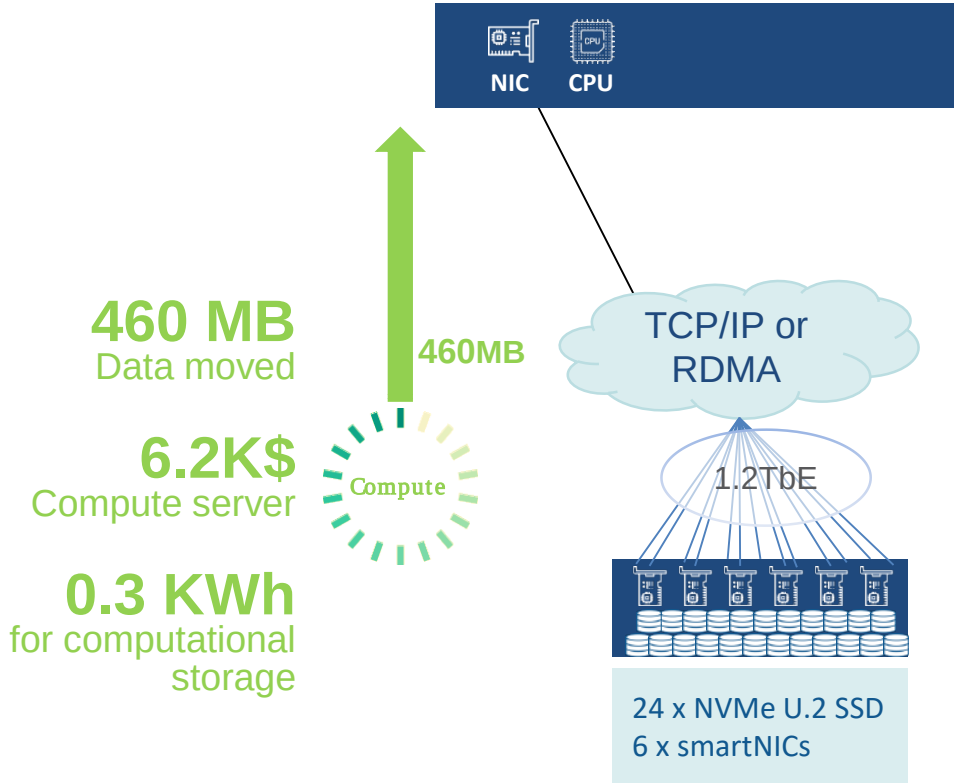
46 million

images stored on 24 SSDs, using resNet50

460 MB
Data moved

6.2K$
Compute server

0.3 KWh
for computational storage



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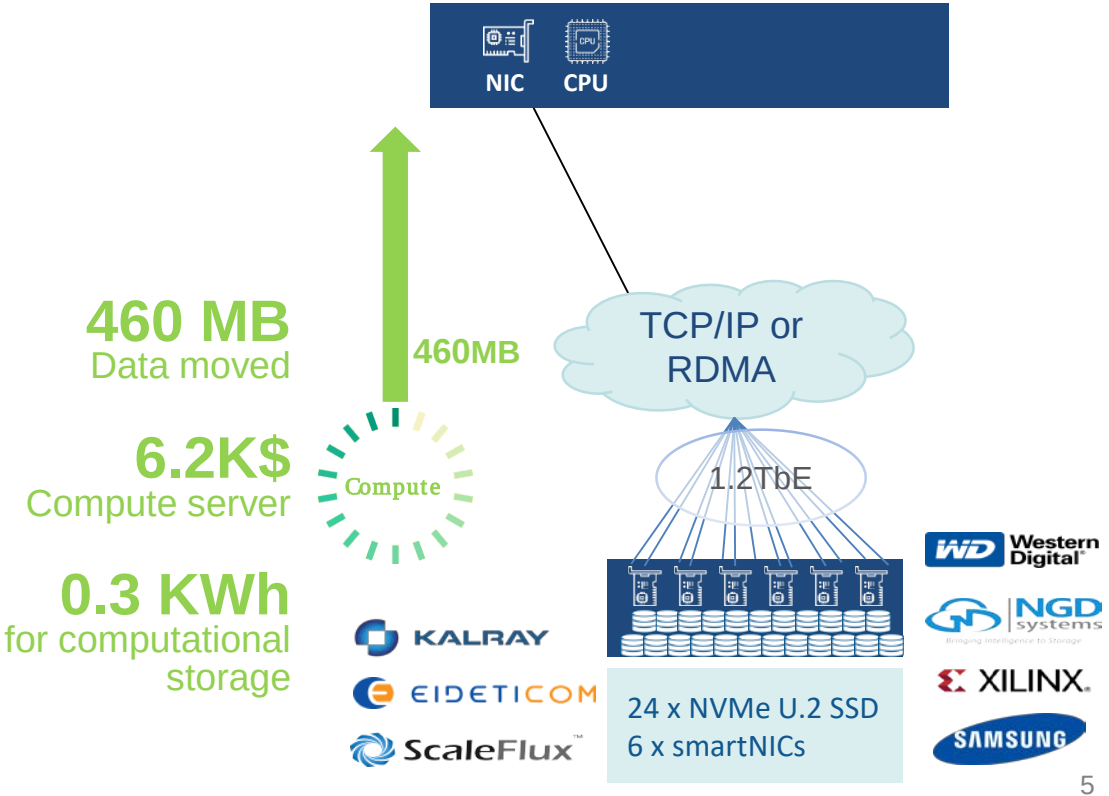
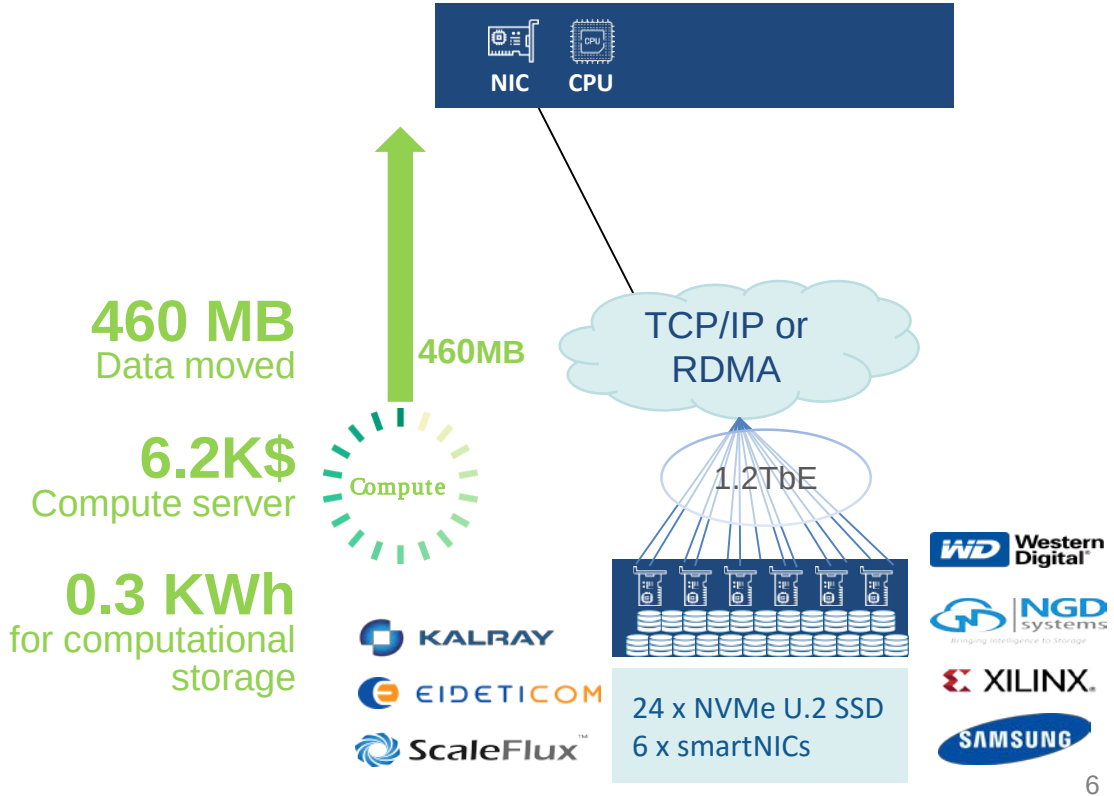


Benefits & Challenges

Benefits

- Cost saving
- Lower data traffic
- Lower power



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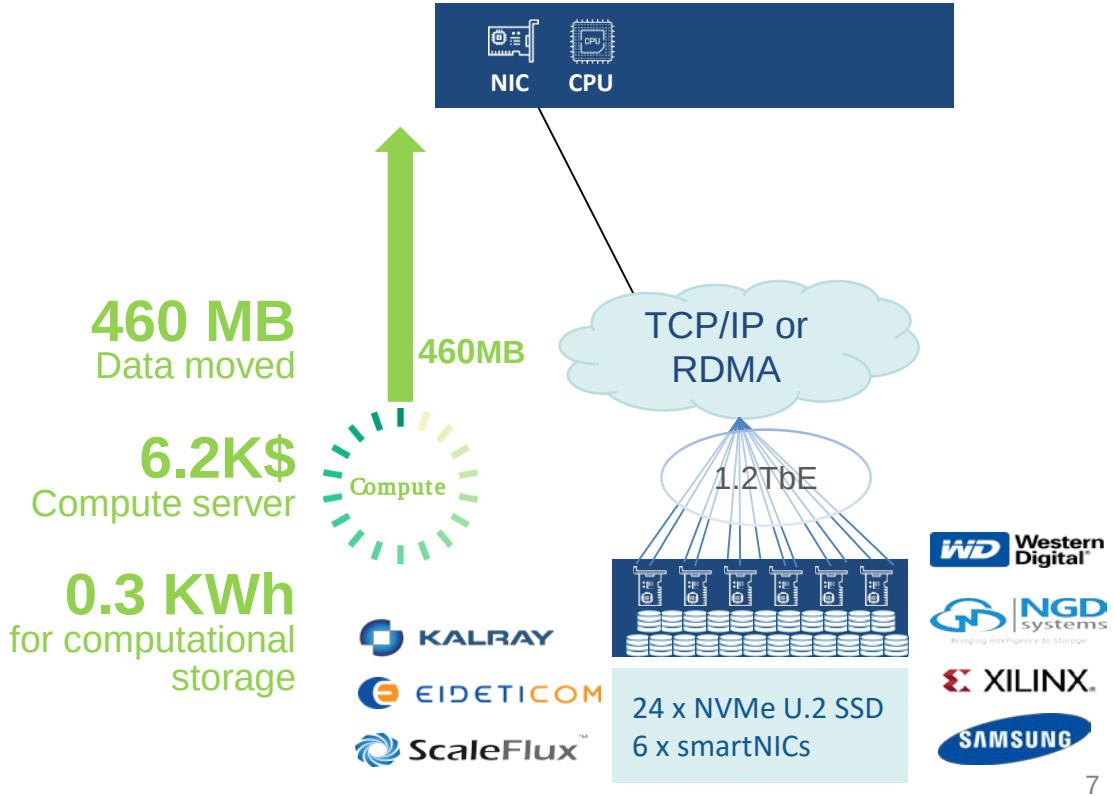
Benefits & Challenges

Benefits

- Cost saving
- Lower data traffic
- Lower power

Challenges

- Ensure a seamless integration
- Keep storage performance and density



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Computational Storage Enablers

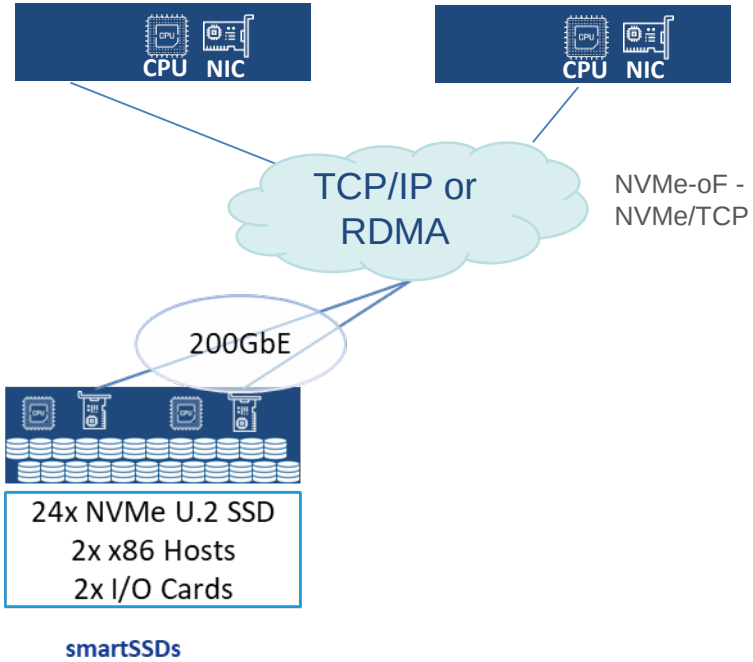
Smart SSD	Smart U.2 Accelerator	SmartNIC

Programmability	Ease of application porting
Low Power	Fit within 25W/75WPCIe slots power budget
High Performance	Offload CPUs and GPUs
High Throughput	Avoid compute engines starvation
Standard APIs	For a wide adoption / ease of integration

Options & Strategies

Smart SSD	Smart U.2 Accelerator	SmartNIC

- Programmability
- Low Power
- High Performance
- High Throughput
- Standard APIs



Options & Strategies

Smart SSD	Smart U.2 Accelerator	SmartNIC

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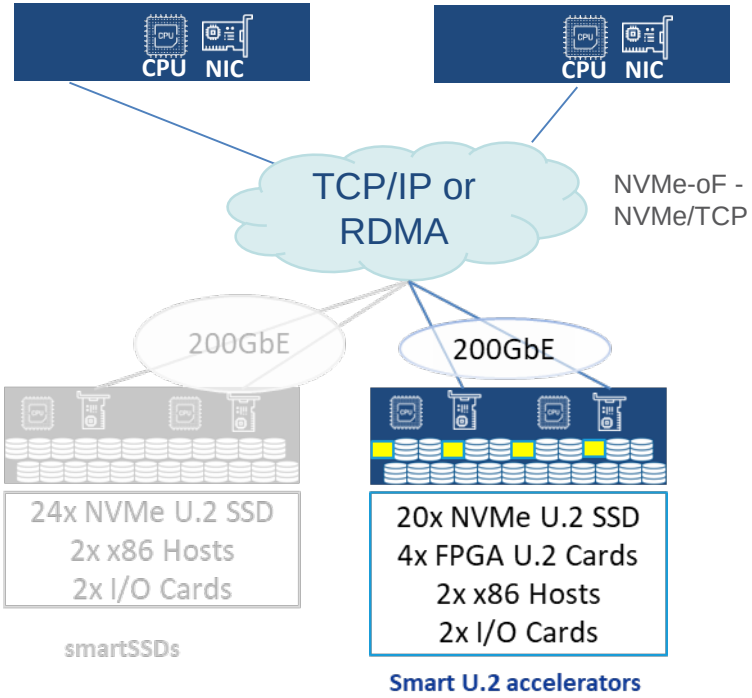
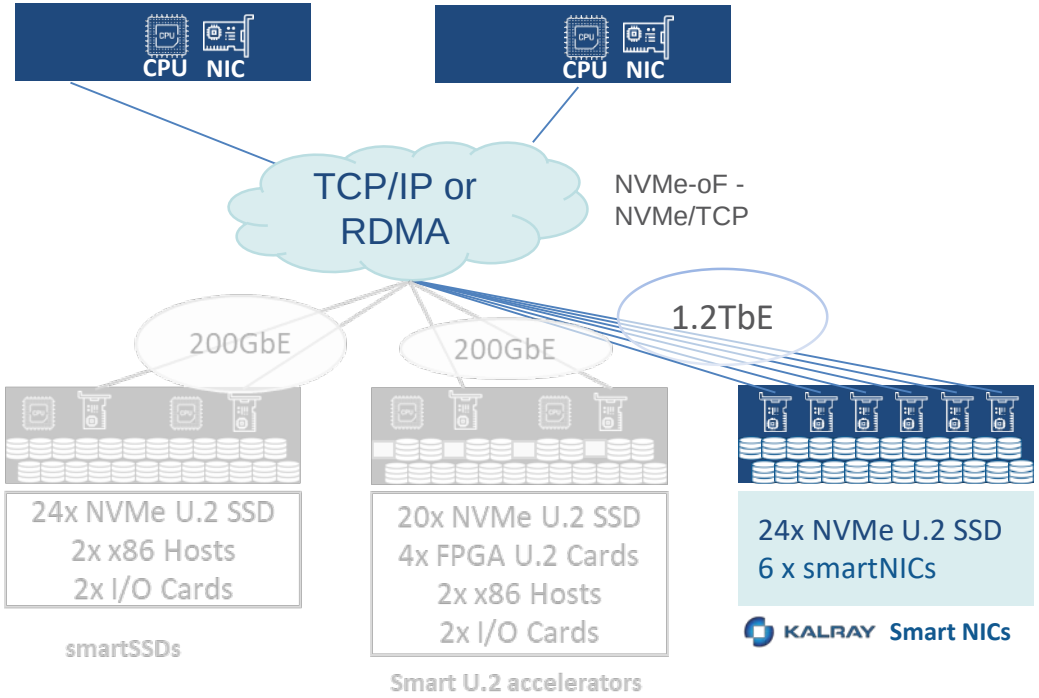
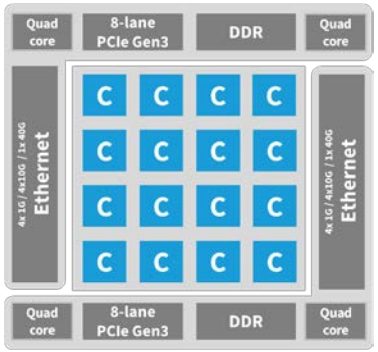


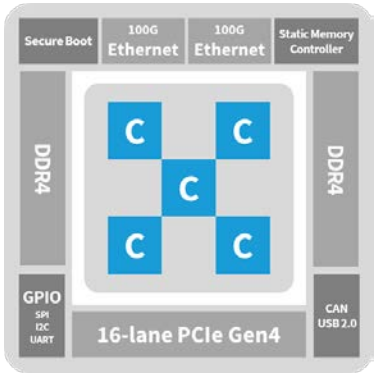
Options & Strategies

Smart SSD	Smart U.2 Accelerator	SmartNIC KALRAY
Programmability		●
Low Power		●
High Performance		●
High Throughput		●
Standard APIs		●



Kalray SmartNIC Solution

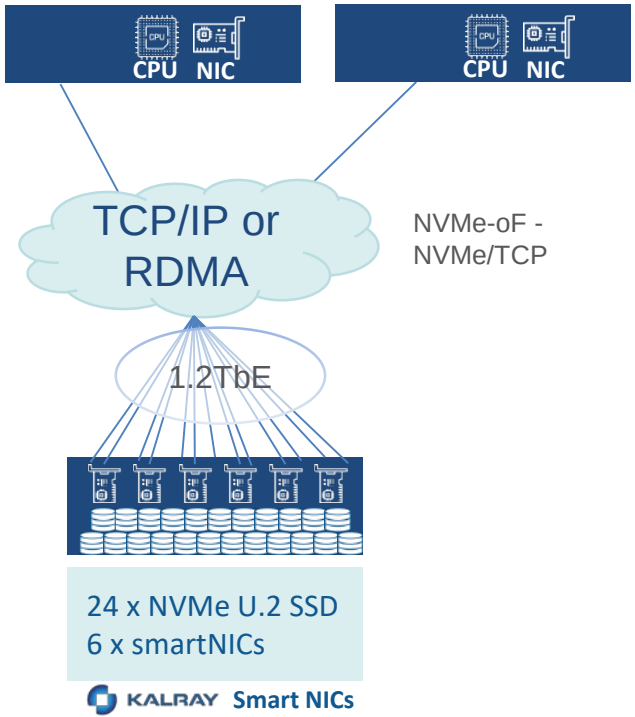




Based on Kalray MPPA processors

- Scalable number of cores 80/160/256
- Low power (25W typical)
- Optimized for High Speed packet processing
- **Optimized instruction for AI, Erasure Coding, …**
- Multi heterogeneous applications using cluster architecture
- **Standard C/C++,** OpenCL programming **with Linux environment**

Kalray SmartNIC Solutions



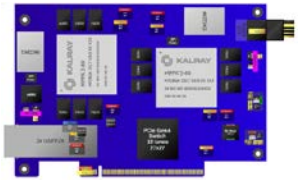
Kalray Target Controllers

- Support both NVMe-oF (RoCE) and NVMe/TCP
- Free cores for additional processing

2x 40G / 2.5 MIOPS

2x 100G / 9 MIOPS

2x 100G / 9 MIOPS



One SmartNIC for all

SmartNIC
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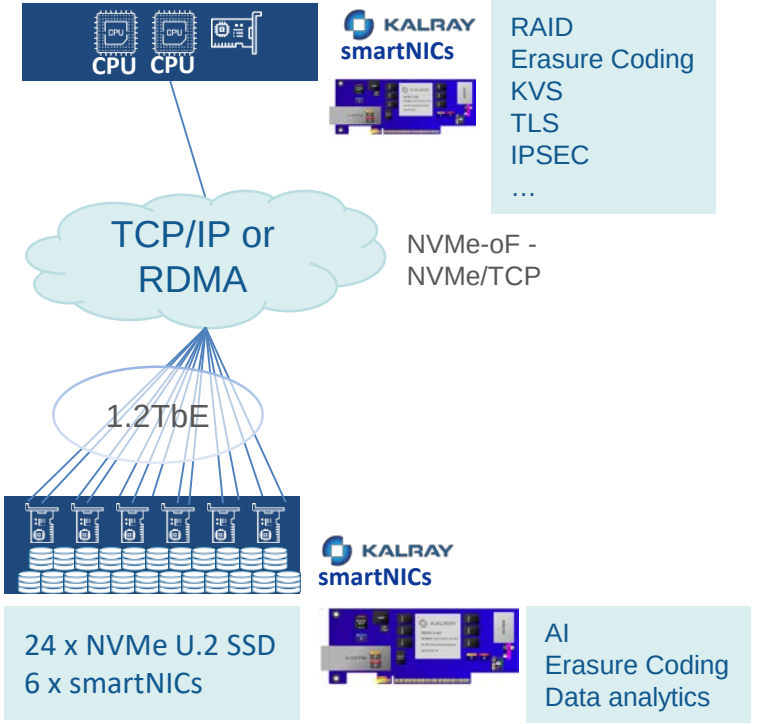
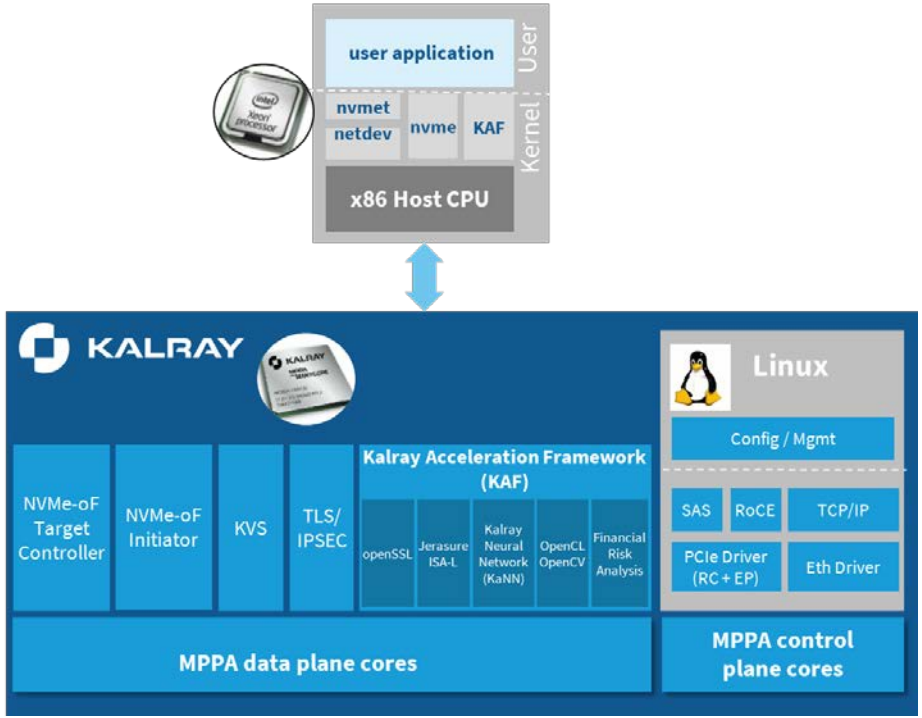
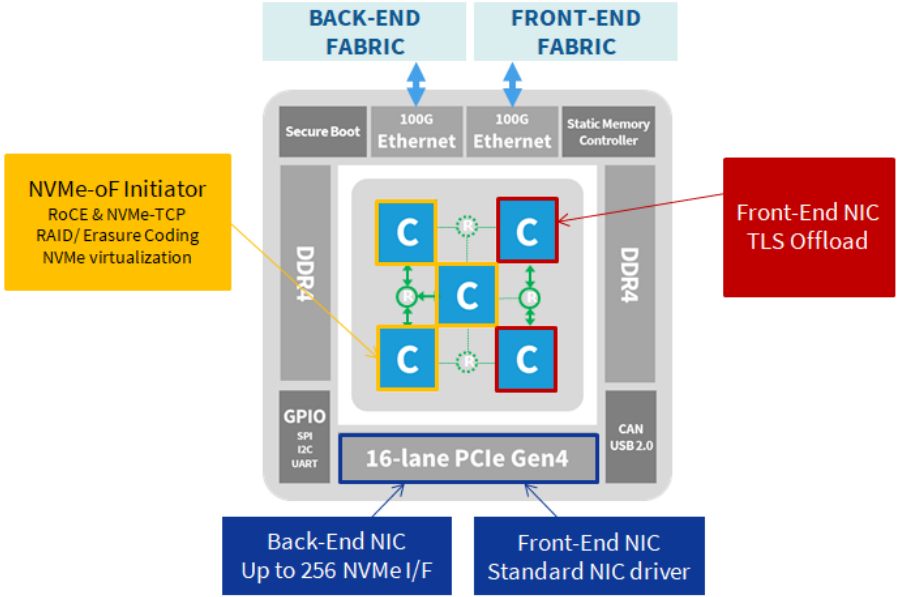
NVMe-oF initiator + RAID / EC
TLS offload
KVS Offload
NVMe-oF Target
…



Compose your own Solution

composable toolkit for computational storage and more …





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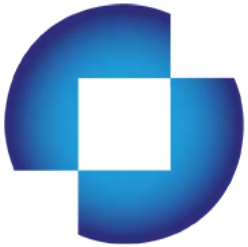
Come and Visit us !



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Booth #**815**

- NVMe-oF (RoCE) - NVMe/TCP on KTC
- Multi-CNN Application on Kalray processor
- … and much more!