NICA: An Infrastructure for Inline Acceleration of Network Applications

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#MELLANOX TECHNOLOGIES
FPGA-based SmartNICs
A key-value store cache
CoAP cryptographic authentication

SmartNIC

FPGA

IoT server

Network
Challenges for cloud inline accelerators

- No operating system abstractions
- No virtualization support:
  - performance & state isolation

The NICA infrastructure fulfills these requirements
NICA operating system abstractions

- SmartNIC
  - AFU
  - NICA hardware runtime

- CPU
  - Process
  - Network stack

Network
NICA virtualization

SmartNIC

AFU
vAFU 1
NICA hardware runtime

Network

CPU

Process
Network stack
NICA key-value store cache results
• FPGA processes hits at 40 Mtps, 21× faster than a 6-core CPU
• Linear scaling with #VMs
• Host integration: 107 lines of code

Come hear our talk at
USENIX ATC’19

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Thursday, July 11, 2019, 11:15 am, Track I