Heterogeneous Multi-Processing in Software-Defined Cloud Storage Nodes

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Technology trends in Heterogeneous Computing

- Single Chip Solutions are available now
- Offload CPU from streaming functions & applications
- Separate Control flow and Data flow domains
  - Handle & Support many interfaces (Cflow <-> Dflow)
- Use AXI Streams for Data plane: Fifo-in Fifo-out
  - elastic buffers, back pressure
- Use OpenSource SPDK & DPDK - NVME storage framework
- Support PCI peer-peer functionality
Heterogenous Single-Chip Solution, Streaming Storage and Network Processor and Controller

Data Node

Processing System with quad core 64b processors (A53)

- Network management
- Memory management

Linux

FPGA fabric (PL)

- TCP/IP stack
- Router
- SD Services
- Key Value Store
- Abstraction (memcached)

Hybrid Memory System

- NVMe interface
- Memory controller

Netwk I/F

DDRx channels

M.2 NVMe drives

DDRx channels
Xilinx ZYNQ Ultrascale Heterogeneous MPSOC