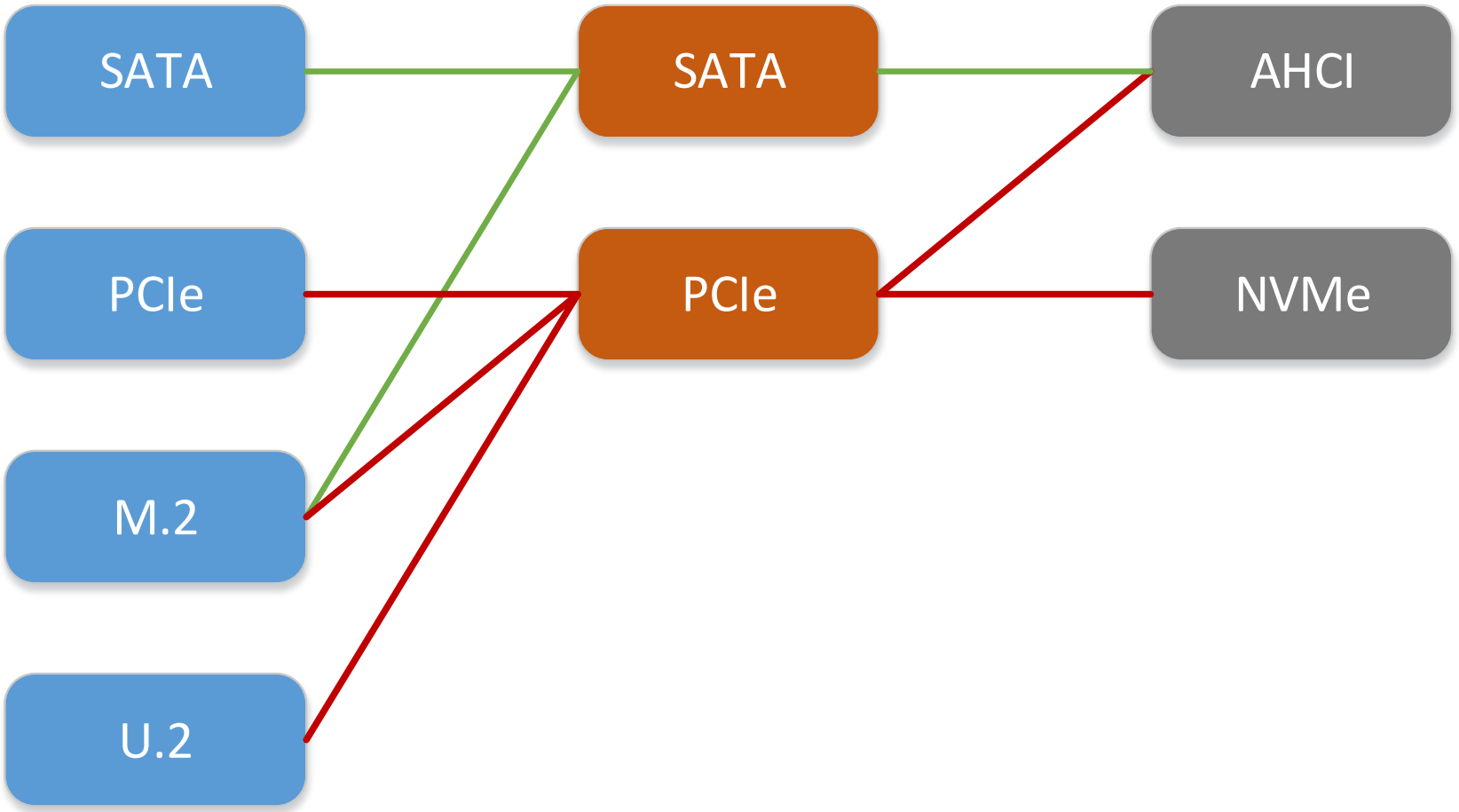
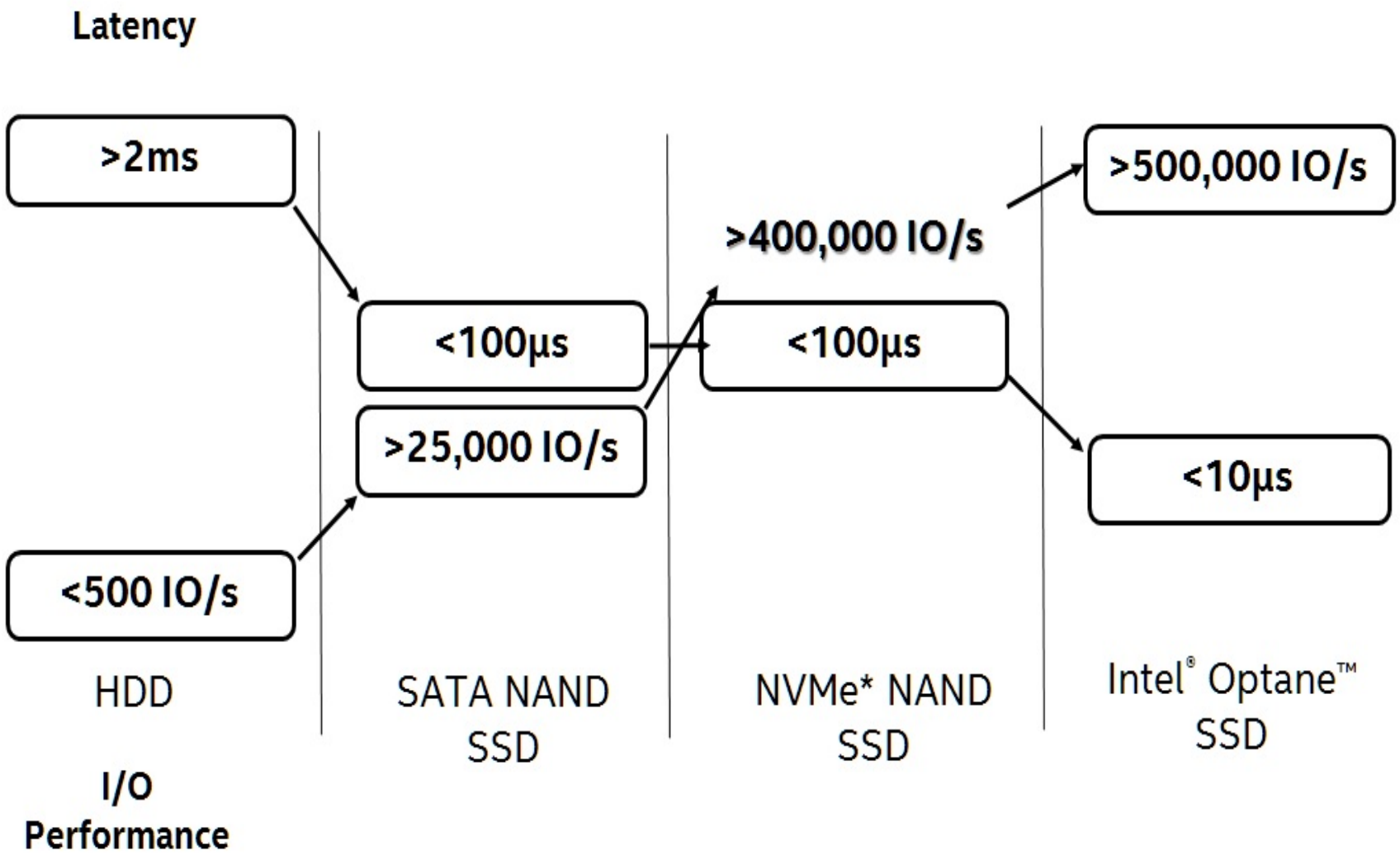
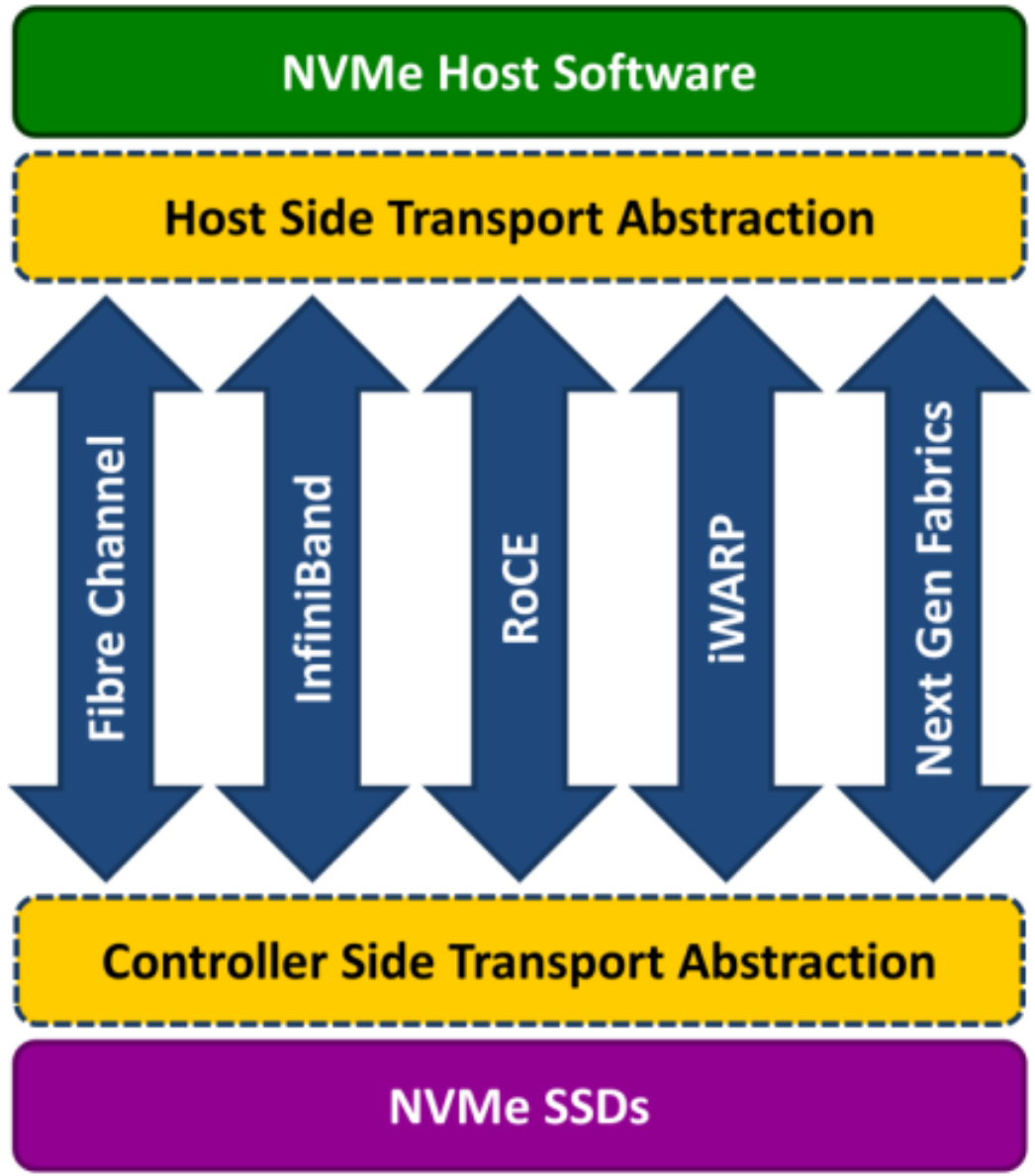
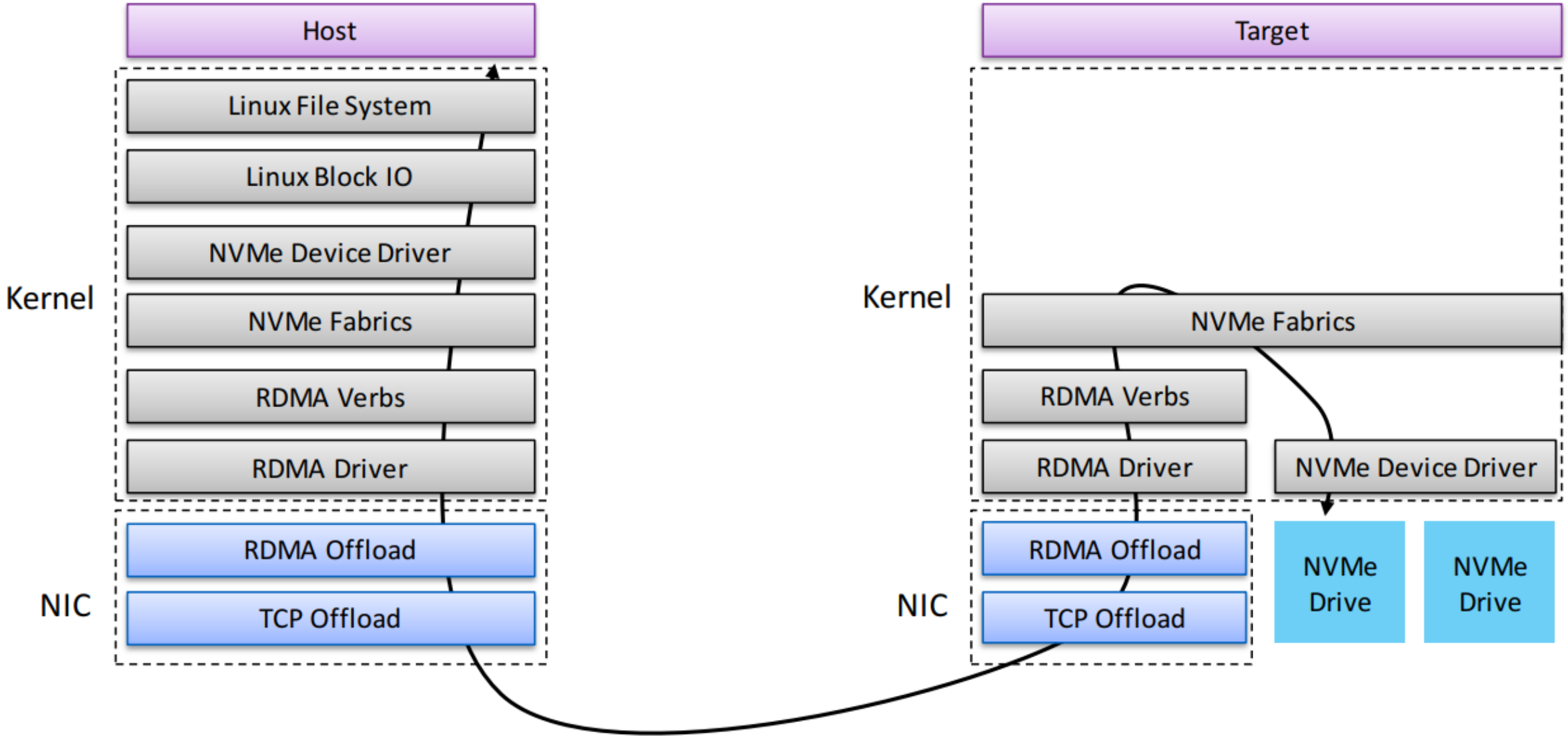
NVMe and NVMeof

Ren Qiaowei, Intel

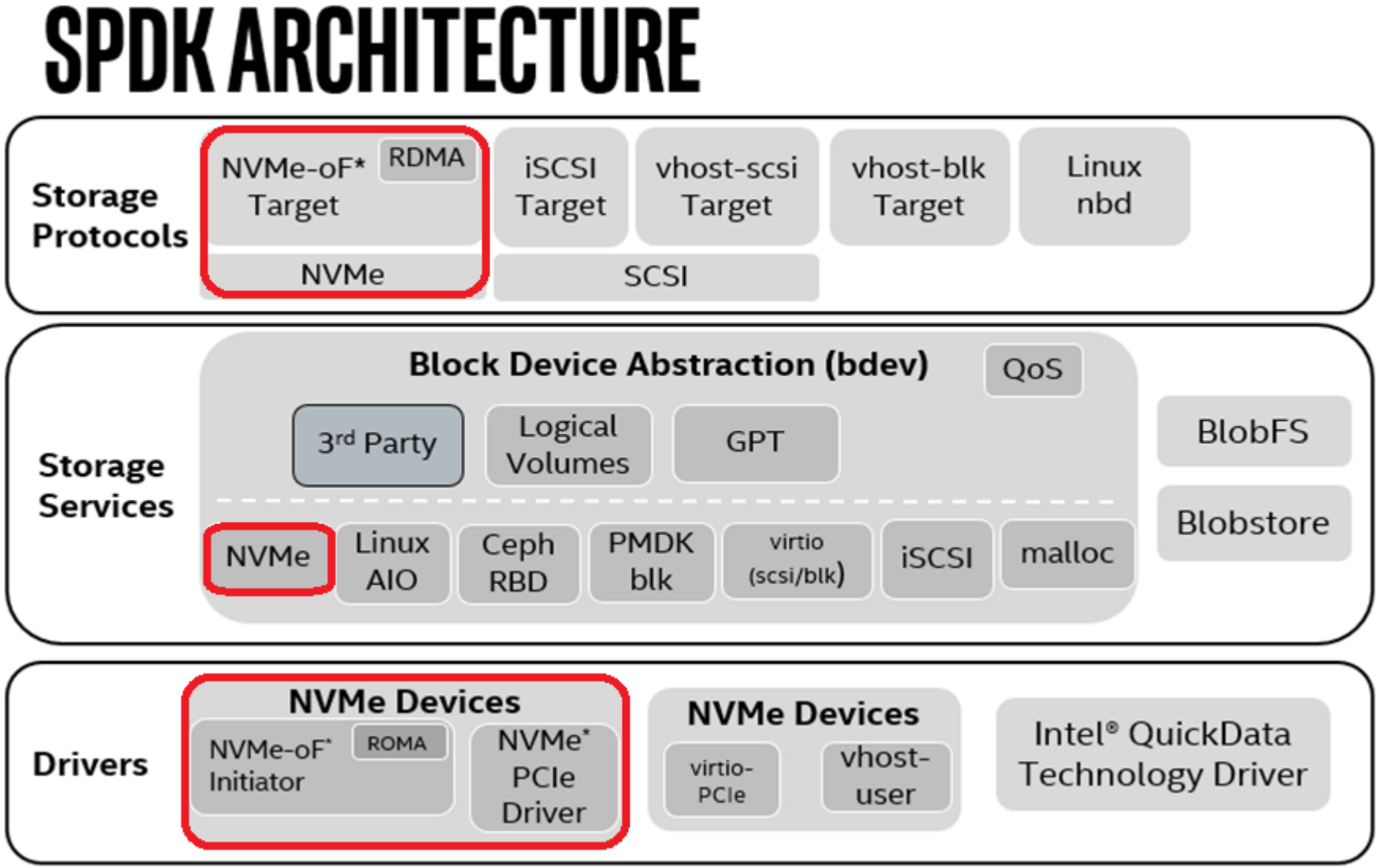

SATA
PCIe
M.2
U.2
SATA
PCIe
AHCI
NVMe


Latency
>2ms
<500 IO/s
<100µs
>25,000 IO/s
>400,000 IO/s
<100µs
>500,000 IO/s
<10µs
HDD
SATA NAND SSD
NVMe* NAND SSD
Intel® Optane™ SSD
I/O Performance

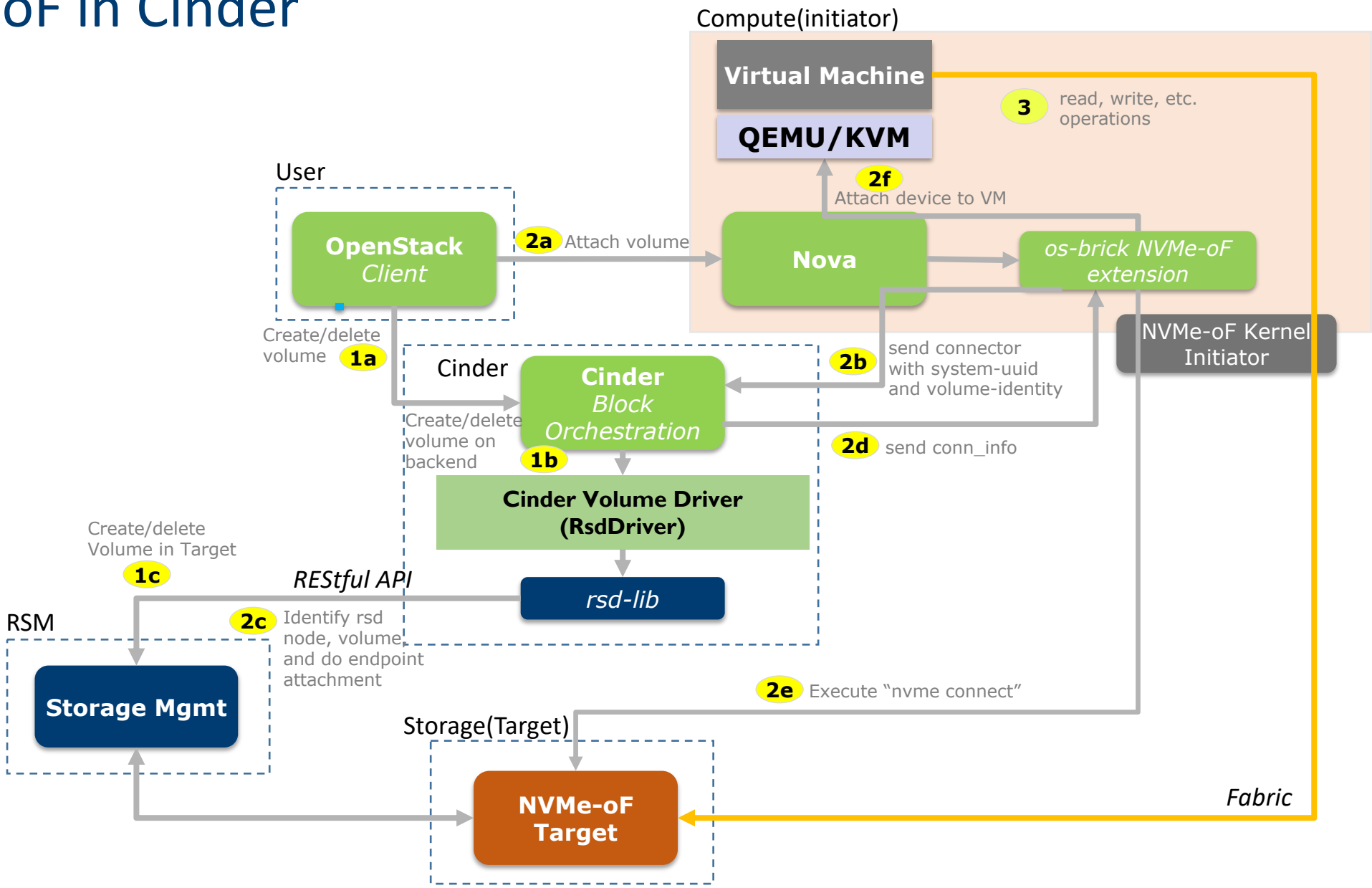

NVMe Host Software
Host Side Transport Abstraction
Fibre Channel
InfiniBand
RoCE
iWARP
Next Gen Fabrics
Controller Side Transport Abstraction
NVMe SSDs


Host
Linux File System
Linux Block IO
NVMe Device Driver
NVMe Fabrics
RDMA Verbs
RDMA Driver
Kernel
RDMA Offload
TCP Offload
NIC
Target
Kernel
NVMe Fabrics
RDMA Verbs
RDMA Driver
NVMe Device Driver
RDMA Offload
TCP Offload
NIC
NVMe Drive
NVMe Drive

NVMeoF in SPDK

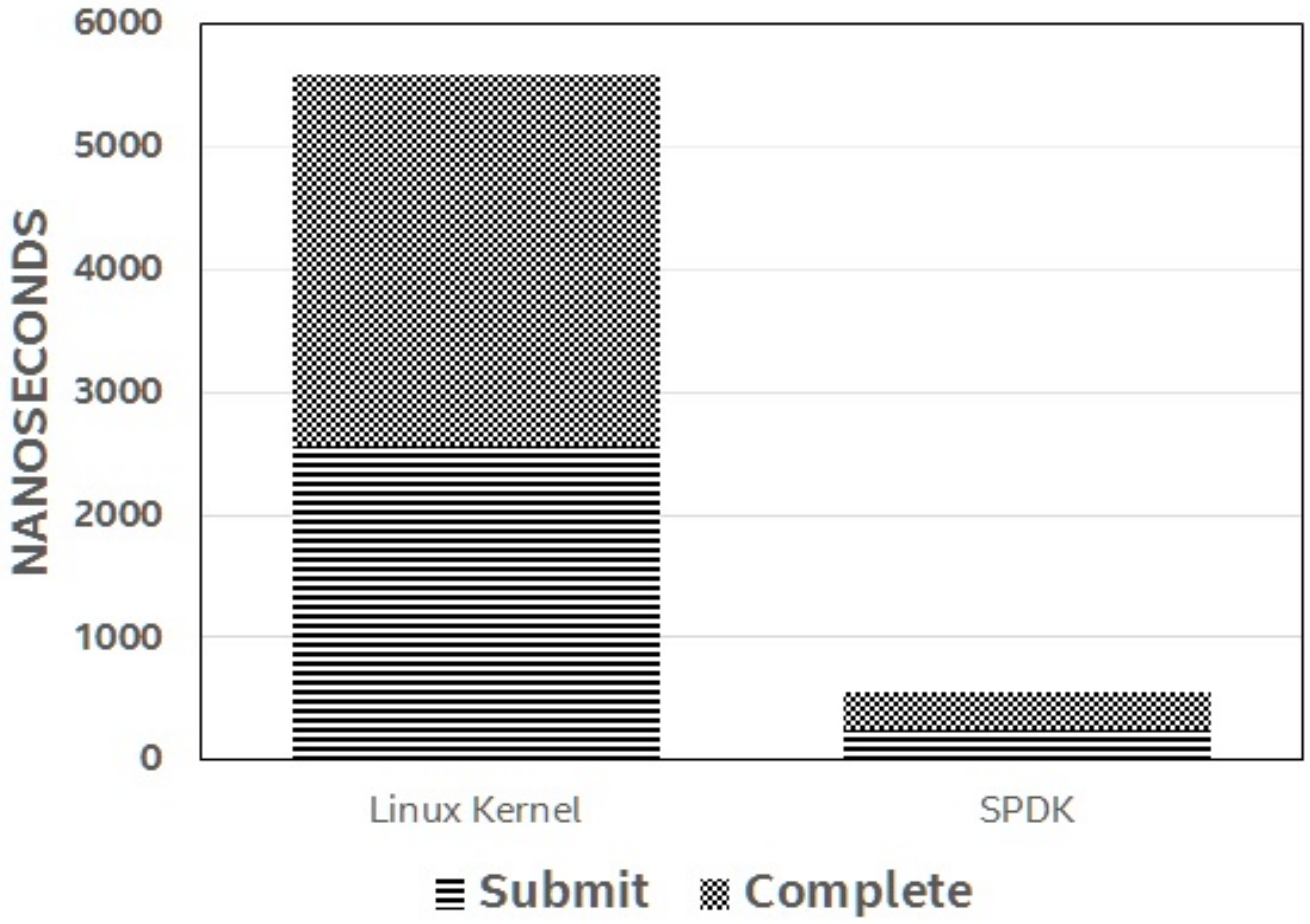


NVMeoF in Cinder



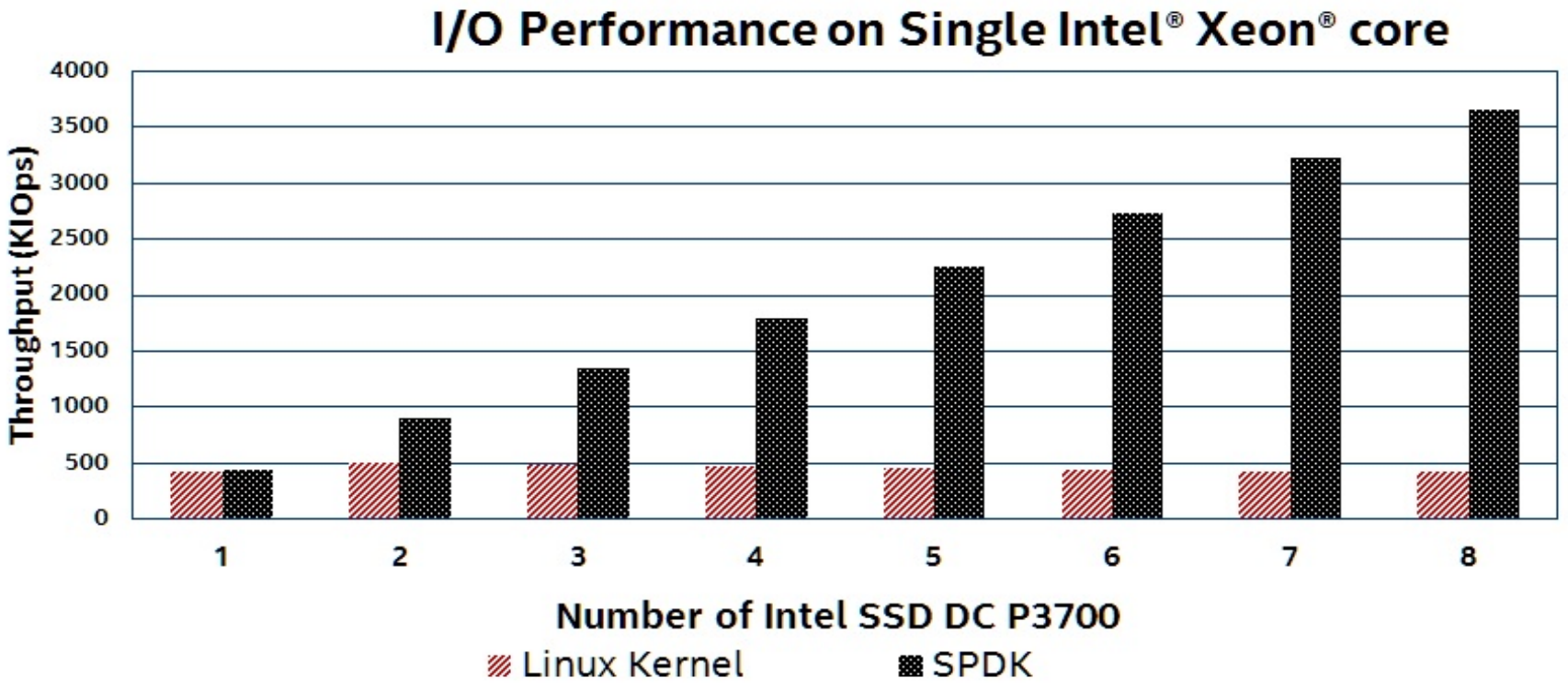
Backup

SPDK NVMe Performance



System Configuration: 2x Intel® Xeon® E5-2695v4 (HT off), Intel® Speed Step enabled, Intel® Turbo Boost Technology disabled, 8x 8GB DDR4 2133 MT/s, 1 DIMM per channel, CentOS* Linux* 7.2, Linux kernel 4.7.0-rc1, **1x Intel® P3700 NVMe SSD** (800GB), 4x per CPU socket, FW 8DV10102, I/O workload 4KB random read, Queue Depth: 1 per SSD, Performance measured by Intel using SPDK overhead tool, Linux kernel data using Linux AIO

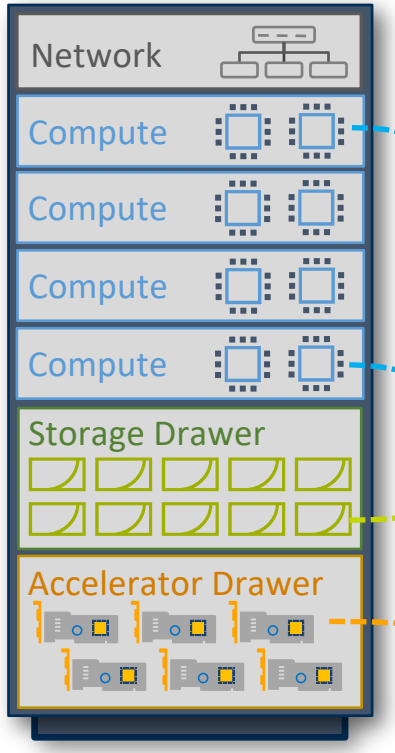
SPDK NVMe Performance



System Configuration: 2x Intel® Xeon® E5-2695v4 (HT off), Intel® Speed Step enabled, Intel® Turbo Boost Technology disabled, 8x 8GB DDR4 2133 MT/s, 1 DIMM per channel, CentOS* Linux* 7.2, Linux kernel 4.10.0, **8x Intel® P3700 NVMe SSD** (800GB), 4x per CPU socket, FW 8DV101H0, I/O workload 4KB random read, Queue Depth: 128 per SSD, Performance measured by Intel using SPDK perf tool, Linux kernel data using Linux AIO

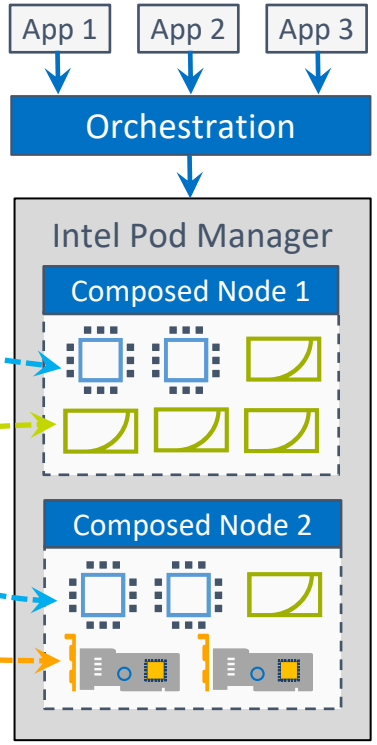
Intel RSD

Disaggregated



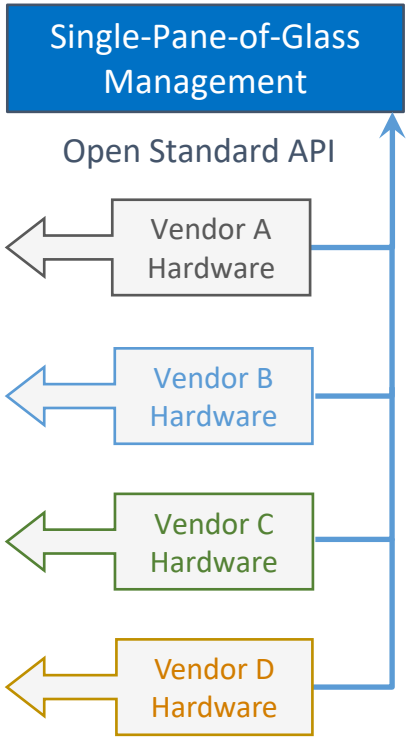
Buy less up front and
Save money over time

Composable



Compose hardware
resources “on the fly”

Interoperable



Choose the best now without
vendor lock-in

Intel® Rack Scale Design

DELL EMC
ERICSSON
GIGABYTE
inspur
QCT
Inventec
SUPERMICRO
wiwynn

OEMs* with solutions
based on Intel RSD