How to Network Flash Storage Efficiently at Hyperscale

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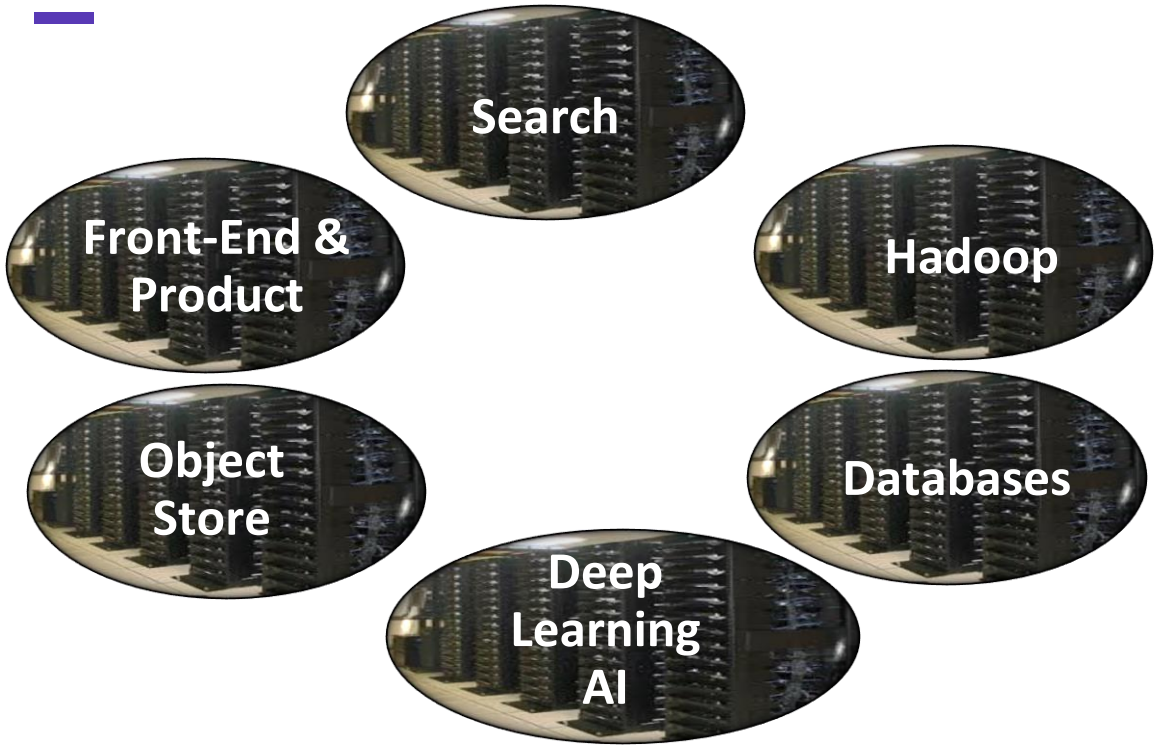
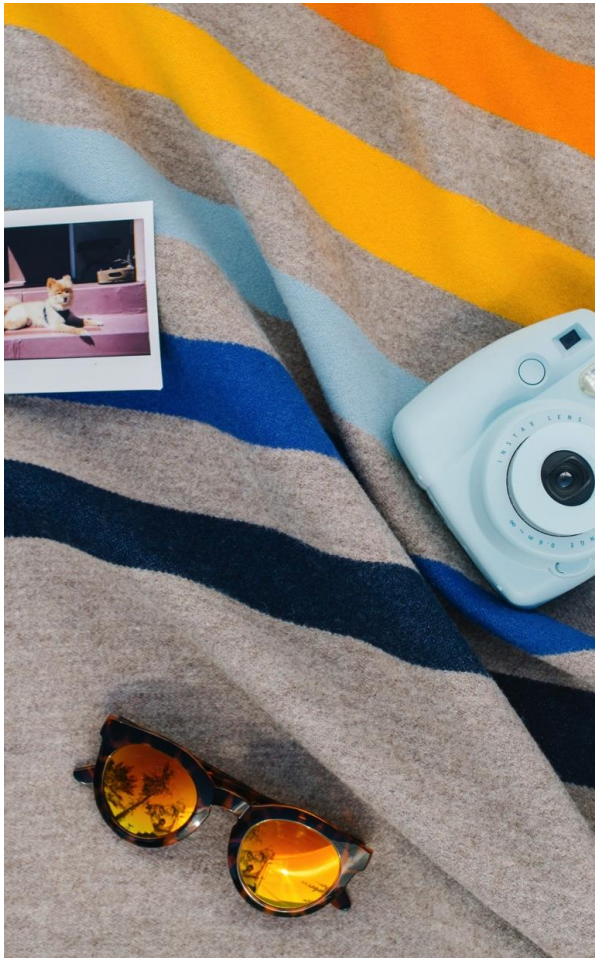
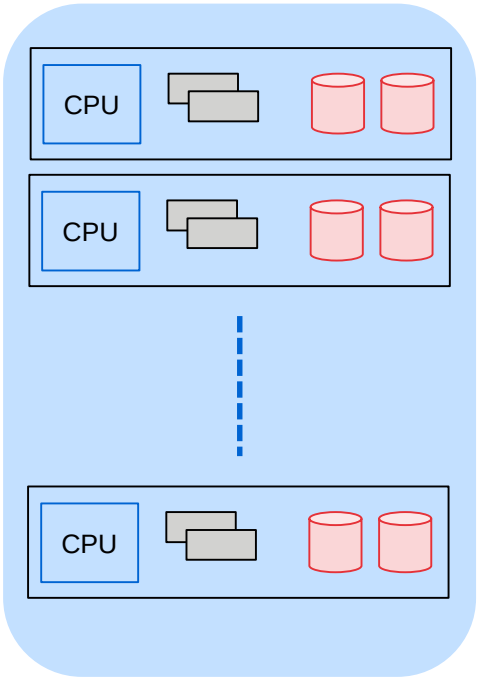
Mellanox TECHNOLOGIES

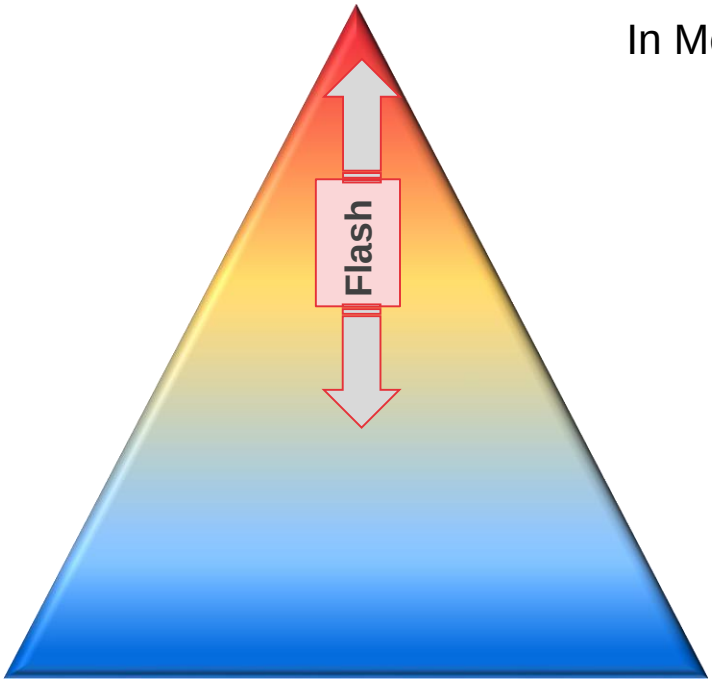
ebay Hyper scale Infrastructure





Typical hyper scale servers





Performance Needs

In Memory/Search

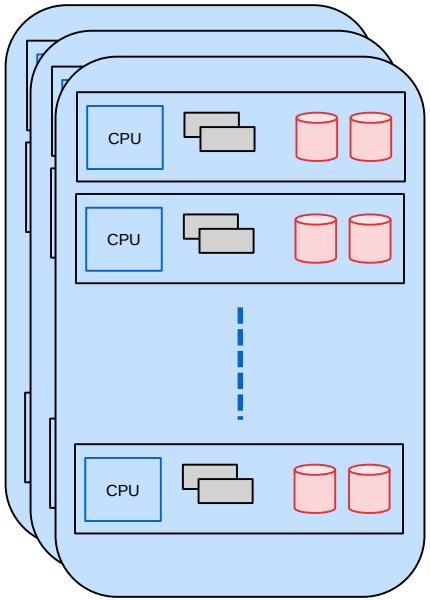
Databases

Hadoop

Object Store
FE/Dev

Archival/Cold

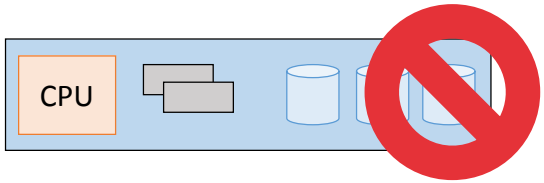
Typical hyper scale servers: Design goals



Efficiency:
Utilization, commonality

Growth:
Performance, Capacity

Converged Infrastructure: challenges



Mismatched App Needs:

- Compute/Storage needs can change for different clusters.
- Can result in under-performance or wastage

Inefficiency:

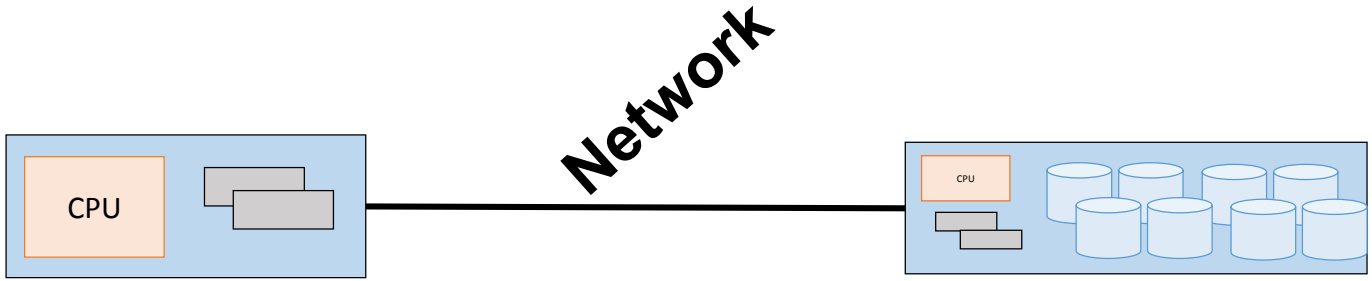
- Spend, infrastructure space, power utilization
- Further challenge to justify high density/high performance drives

Scale Challenge:

- “Cattle” use cases for data-heavy workloads may result in large data movement
- Complicated storage scheduler leads to constrained scaling

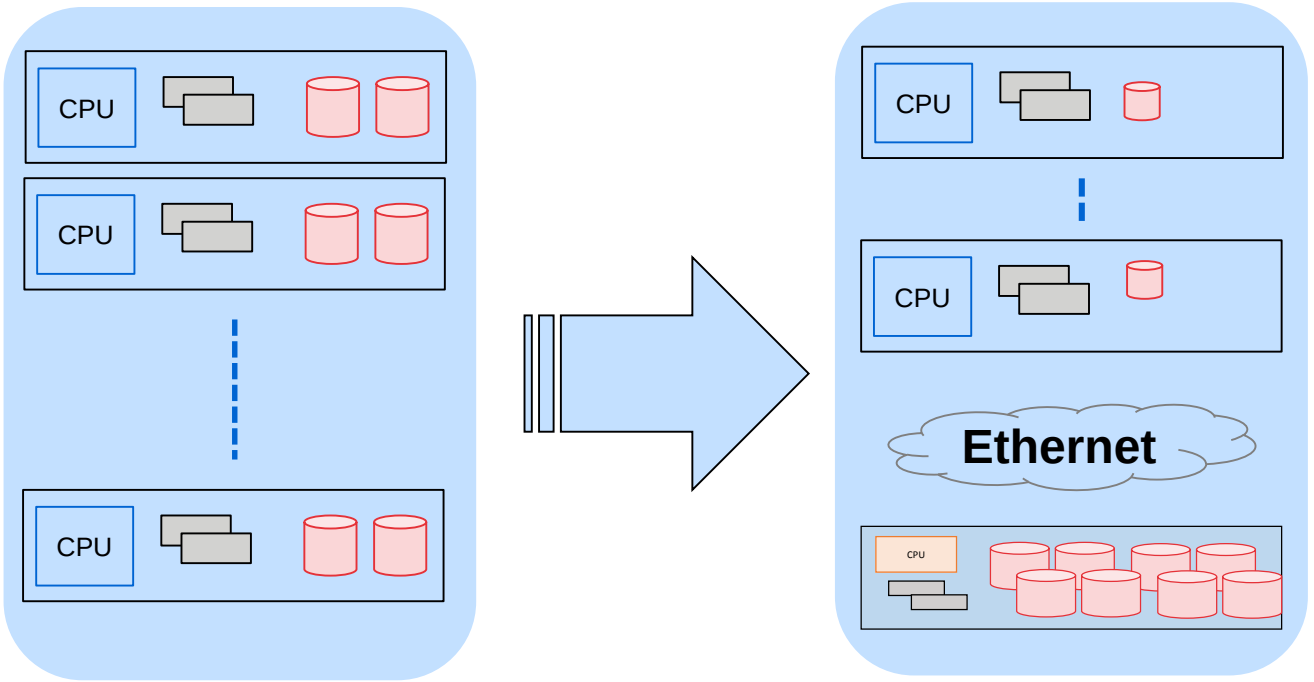
Server Platform: Shackled to local storage

What's needed: Disaggregated Storage



Separate out storage and compute resources

What's needed: Rack-As-A-Compute



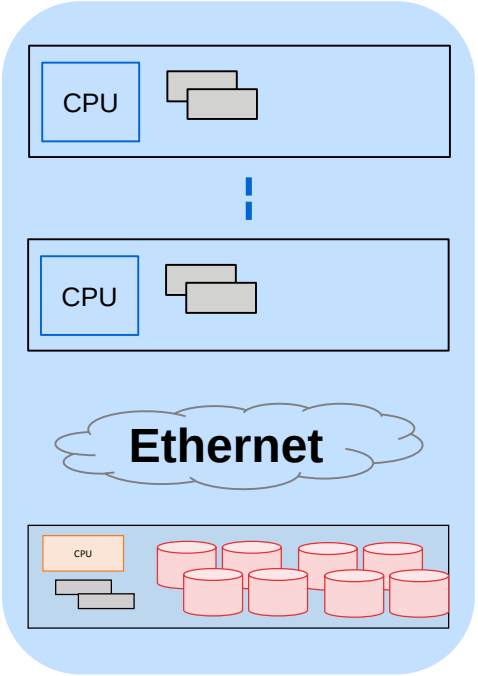
Why: Rack-As-A-Compute

Right Sizing:

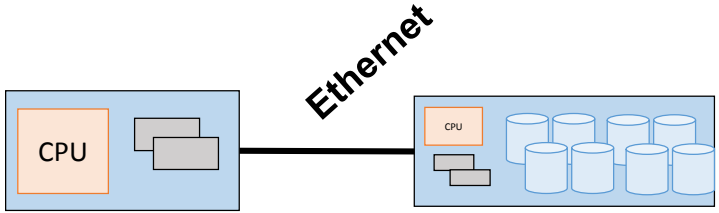
- Clusters can use optimized ratio of compute and storage.
- Allows reducing wastage and improve performance

Independent Scaling:

Compute and storage capacities can be scaled per need



Disaggregated Storage: Interconnect Needs



Throughput:

- Sequential workloads driven by throughput
- Aggregated storage drives higher needs

Latency:

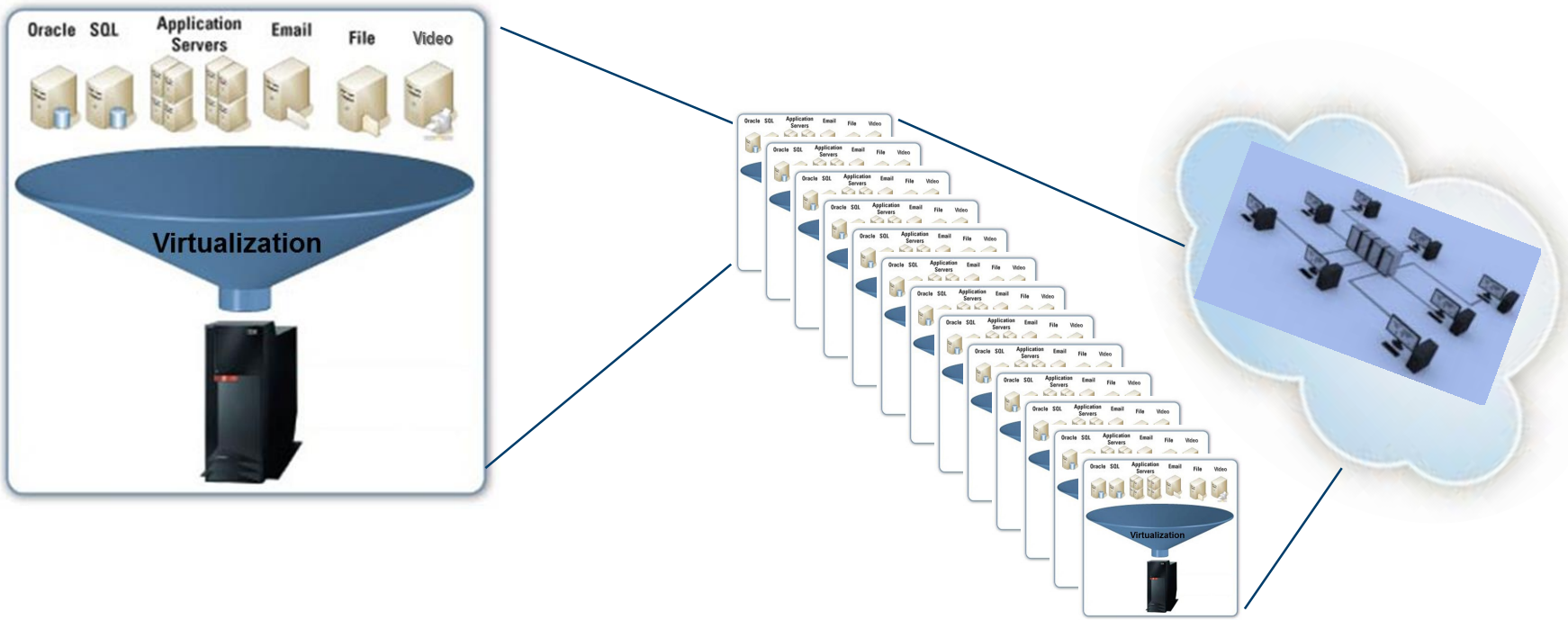
- IOPs sensitive workloads
- Appropriate deployment topologies

Simplicity:

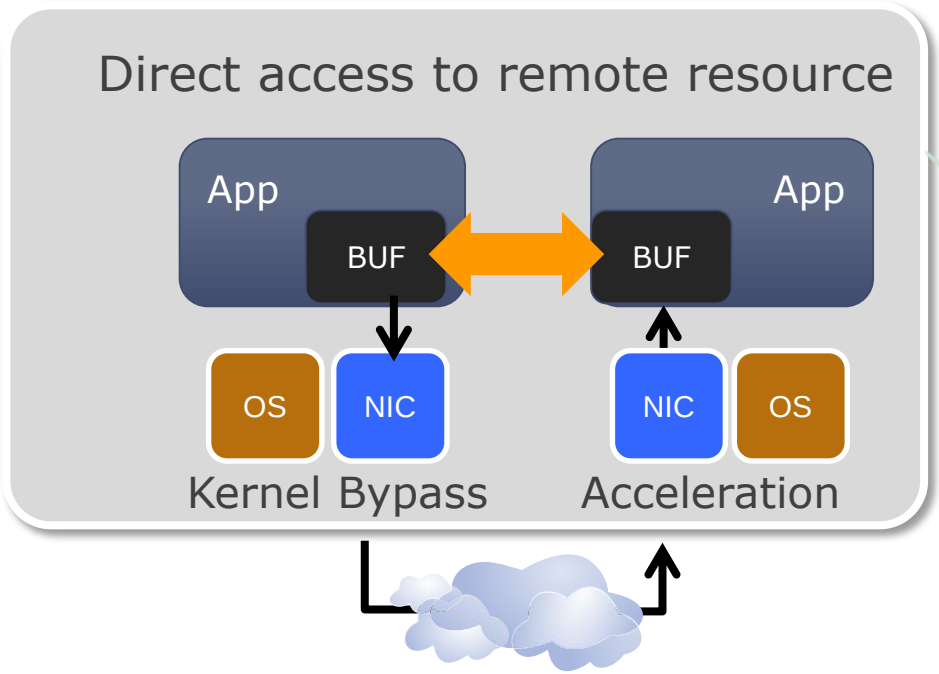
- Known, ubiquitous network

Is Ethernet Ready?

The Paradigm Shift – Resource as a Service



RDMA: Data Center Infrastructure Foundation



RoCE™

RDMA over Converged Ethernet – RoCE

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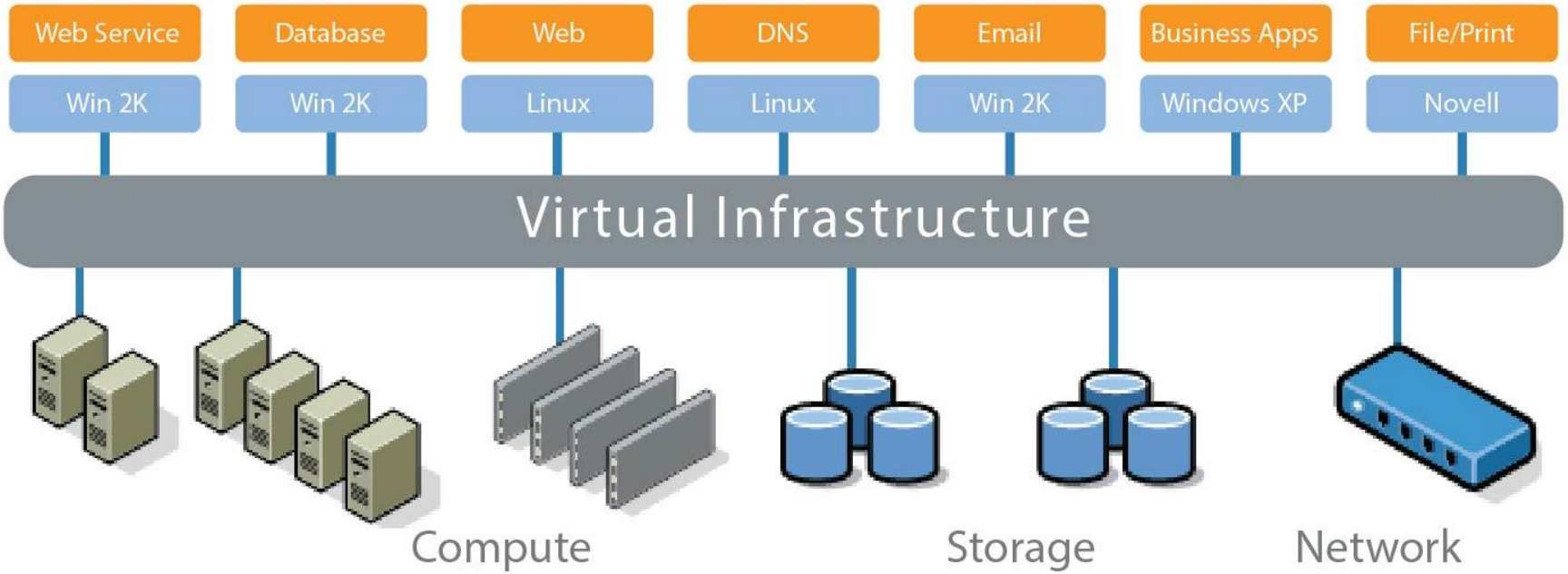
RDMA-Enabled Cloud Infrastructure



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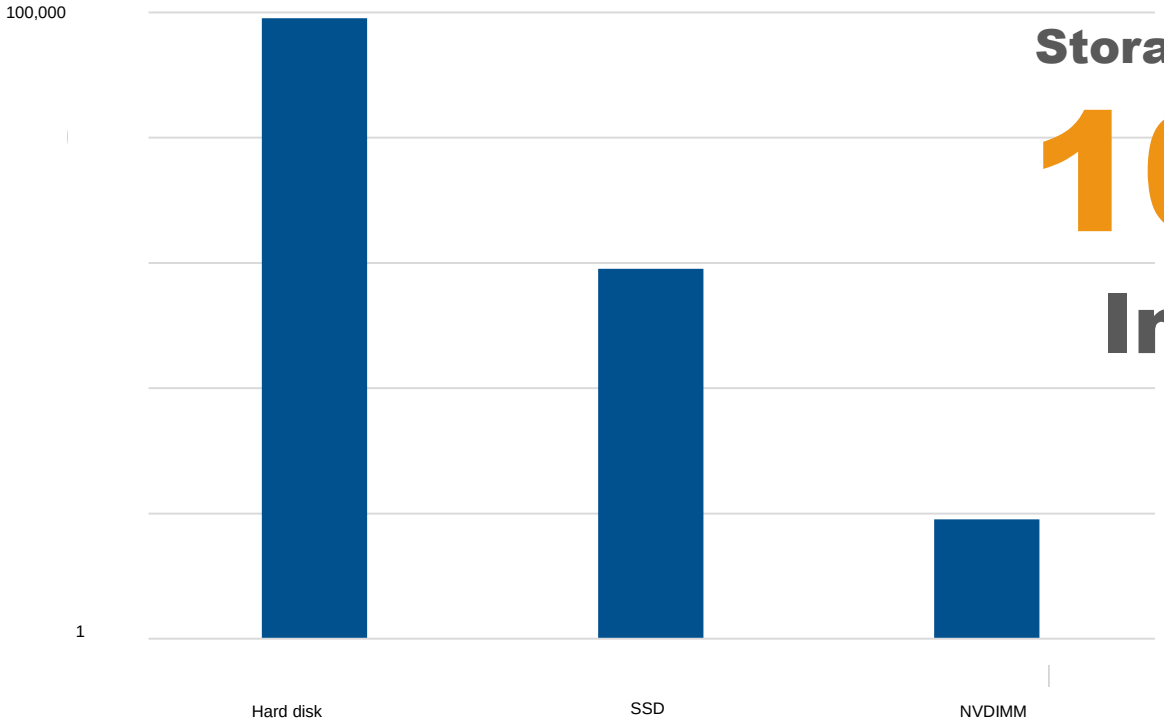
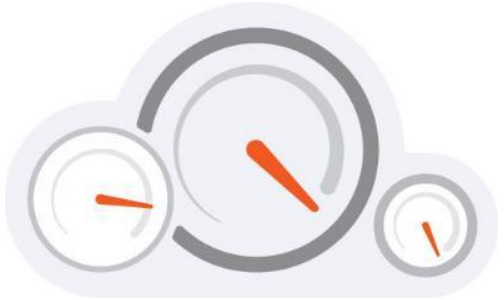
Storage Media Technology



Storage Media Access Time

10,000X

Improvement



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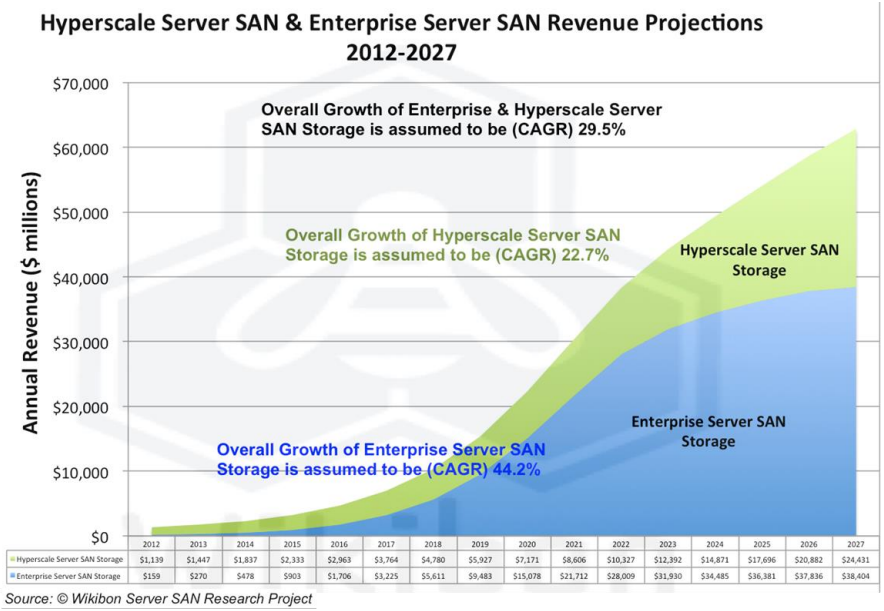
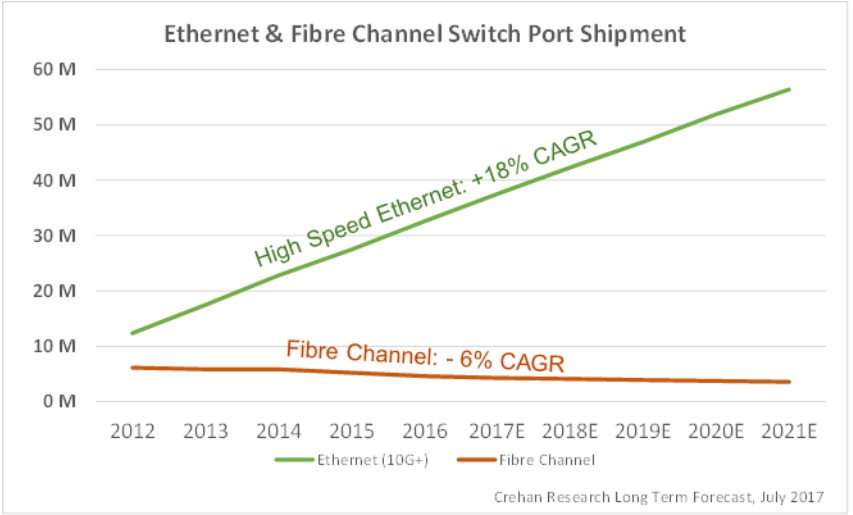
Networked Storage Continues Growth and Movies to Ethernet



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Hyperscale Server SAN Storage	$1,139	$1,447	$1,837	$2,333	$2,963	$3,764	$4,780	$5,927	$7,171	$8,606	$10,327	$12,392	$14,871	$17,696	$20,882	$24,431
Enterprise Server SAN Storage	$159	$270	$478	$903	$1,706	$3,225	$5,611	$9,483	$15,078	$21,712	$28,009	$31,930	$34,485	$36,381	$37,836	$38,404

Source: © Wikibon Server SAN Research Project



- Networked Storage (SANs)
  - Better utilization: capacity, rack space, power
  - Scalability, management, fault isolation

- Ethernet growing very rapidly driven by:
  - Cloud & Hyper Converged Infrastructure (HCI)
    - No Fibre Channel in the Cloud
  - NVMe Over Fabrics
  - Software Defined Storage

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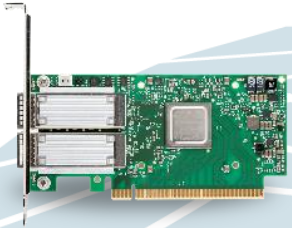
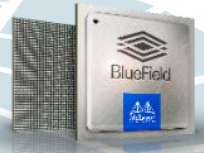
Ethernet Storage Fabric – We've Got You Covered



Ethernet Storage Fabric



Everything a Traditional SAN Offers but …
Faster, Smarter, & Less Expensive

Performance | **Efficiency** | **Ubiquity**

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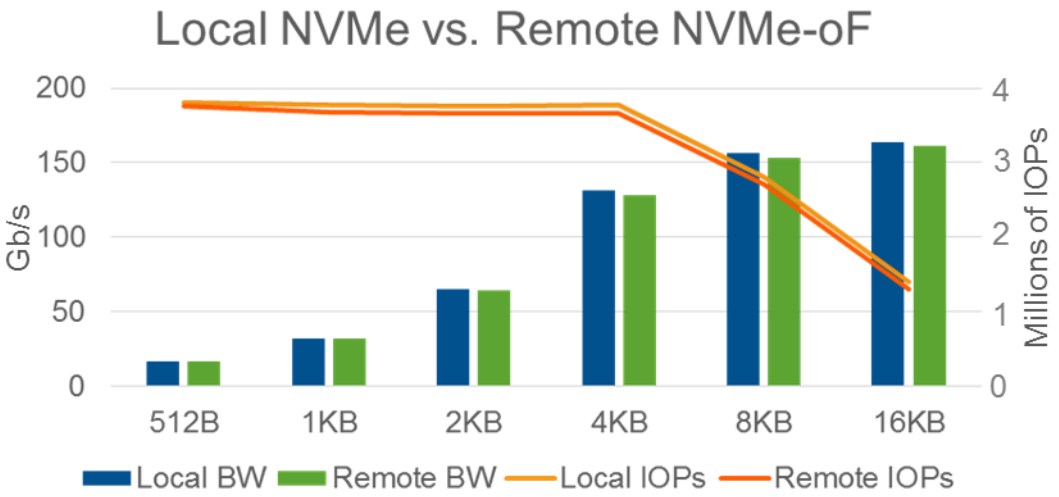
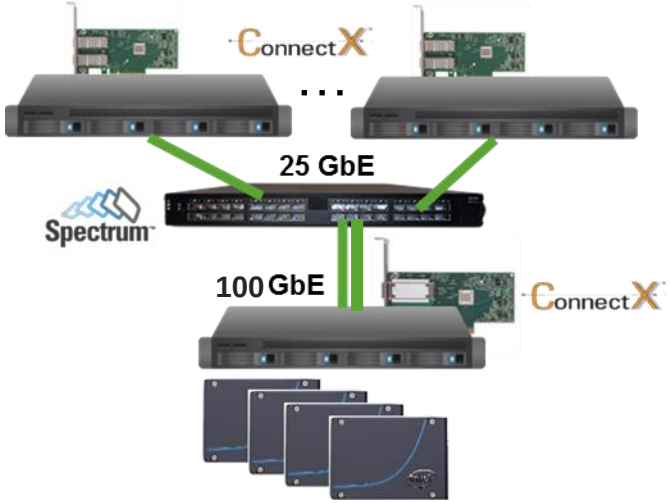
NVMe-oF Performance with Open Source Linux





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BlueField: High Performance Yet Cost Effective Storage

200 Gb/s of throughput

BlueField

More than 5 million IOPS

Industry-Leading ConnectX Intelligent Offload

Tile Multicore ARM Architecture

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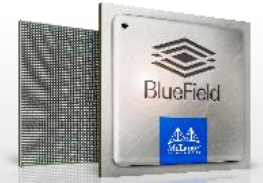
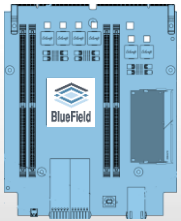
BlueField Building Blocks for Storage Platforms

ASIC



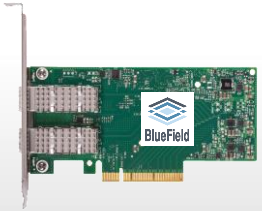
- **Family of products**
  - **4, 8, 16 cores**

Storage Controller



- **NMVe storage solutions**
- **Customized per-OEM**

Adapter



- **Smart NIC**
- **Standard PCIe slot**

Open Platform Software – Standards Based
BlueOS Linux – Built from kernel.org
Standard Linux development tools to build your application

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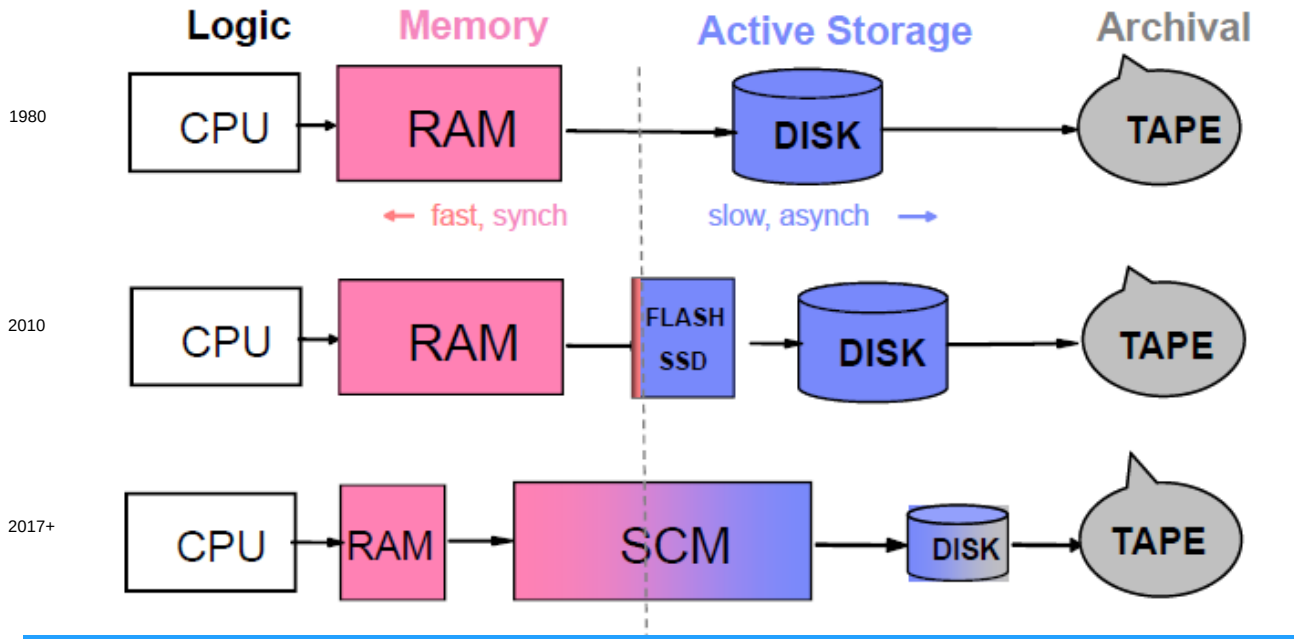
Storage Class Memory (SCM)



SCM Over Fabrics Definition WIP in IBTA

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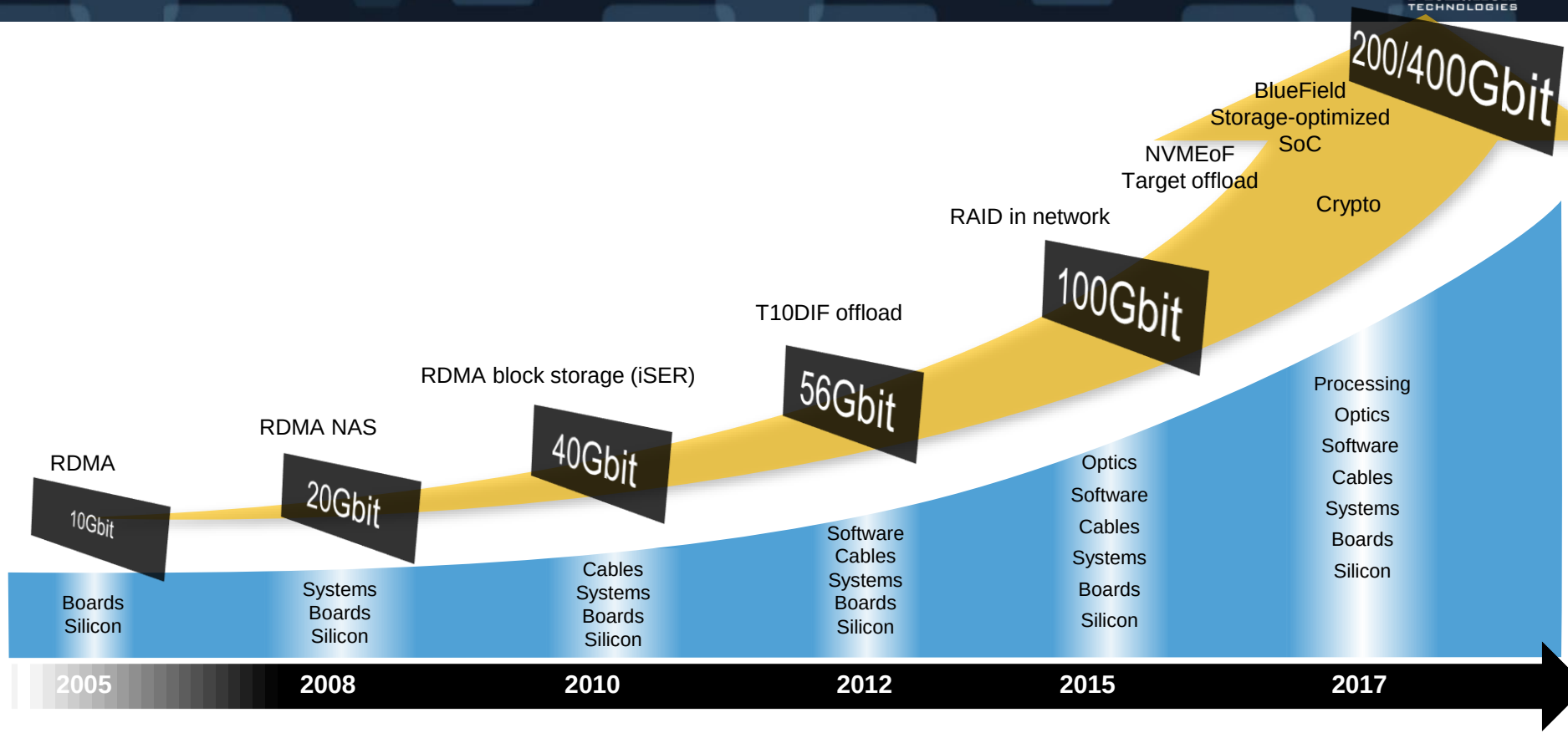
Technology Leadership



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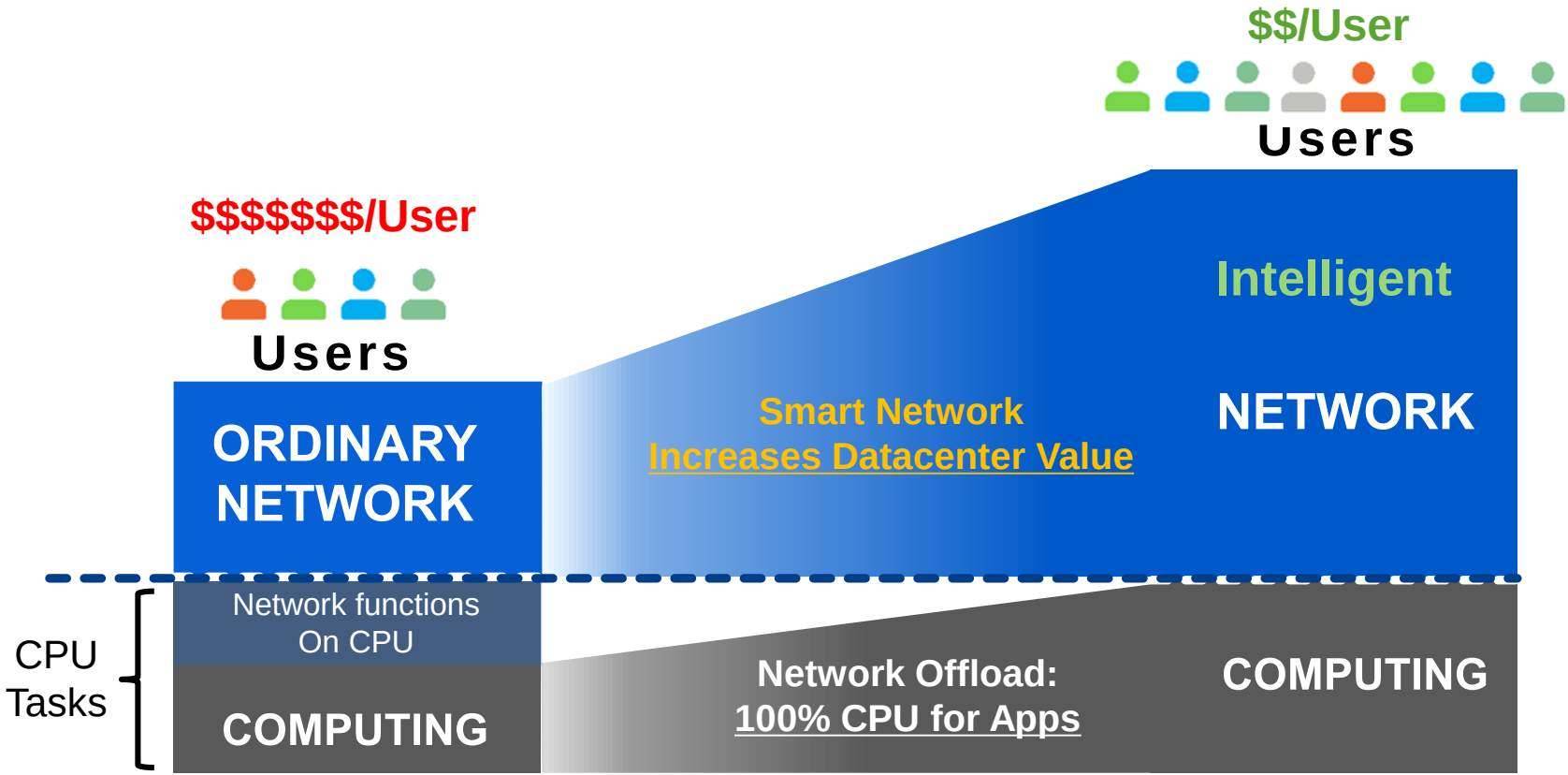
Network is a Computer – Deliver Value



Questions?

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