NVMe-oF™ Enterprise Appliances

Sponsored by NVM Express® organization, the owner of NVMe™, NVMe-oF™ and NVMe-MI™ standards

Panelists

Kamal Hyder
Director of PLM
KumoScale
Toshiba Memory

Manoj Wadekar
Director HW Engineering
eBay

Yaniv Romem
CTO & Co-Founder
Excelero

Nishant Lodha
Product Marketing
Manager
Marvell (Cavium)

Moderator:
Jeremy Werner, Sr. VP and GM SSD
Business Unit, Toshiba Memory America

NVMe™ Enabling the Future

Powering the next generations of storage

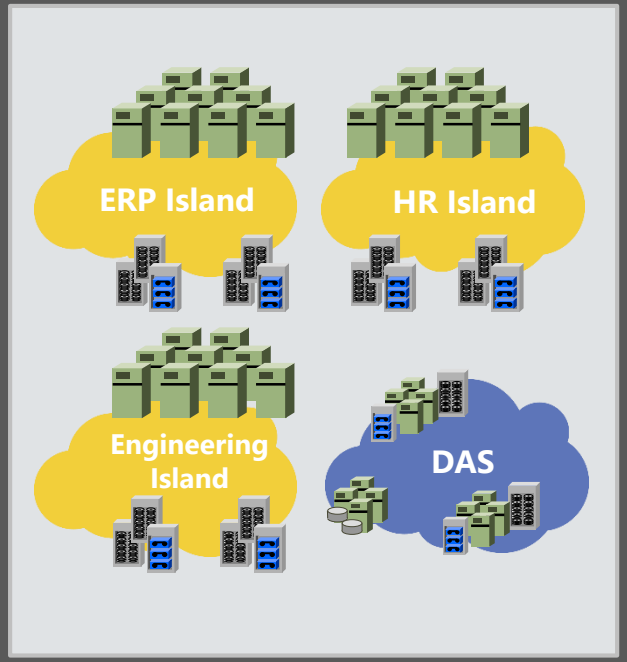
Kamal Hyder, Toshiba Memory America, Inc.

NVMe™ Excitement Continues!

- New Protocol, Exclusively for Flash
- Multiple Fabrics: RDMA, FC, TCP
- End-to-end support
- Native OS support
- Growing interest in Disaggregated Flash
- Suitable for Enterprise and Cloud Data Center Architectures
- Lowest Latency, Highest Performance ever! Storage no longer the Bottleneck
- Greenfield and Existing Environments
- Initiators to Switches to Targets
- Linux Kernel 4.9+, others in progress
- Multiple Vendors Supporting the Concept
- Bringing High Performance to Multiple Areas

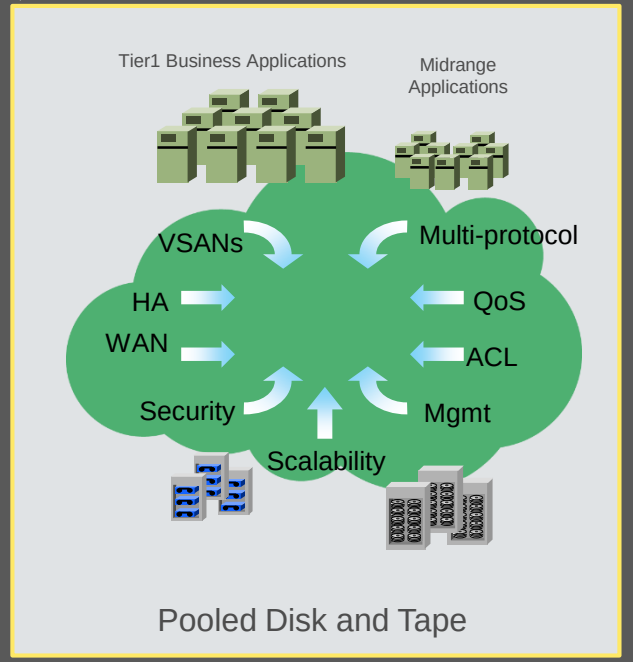
We've Seen the Consolidation Movie Before

Homogenous "SAN Islands"



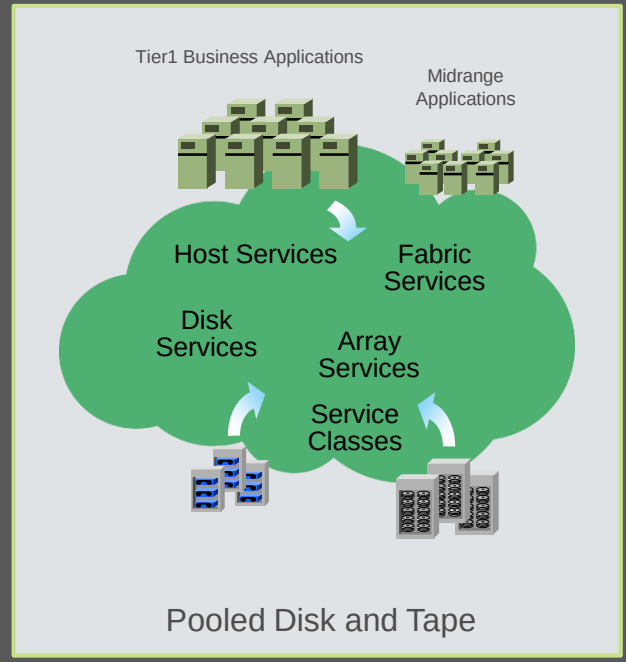
Phase I: Isolated Storage Islands

Consolidation over Multiprotocol Networks



Phase II: Consolidation/MultiProtocol Transport

Services at Multiple Layers – Fabrics and Storage

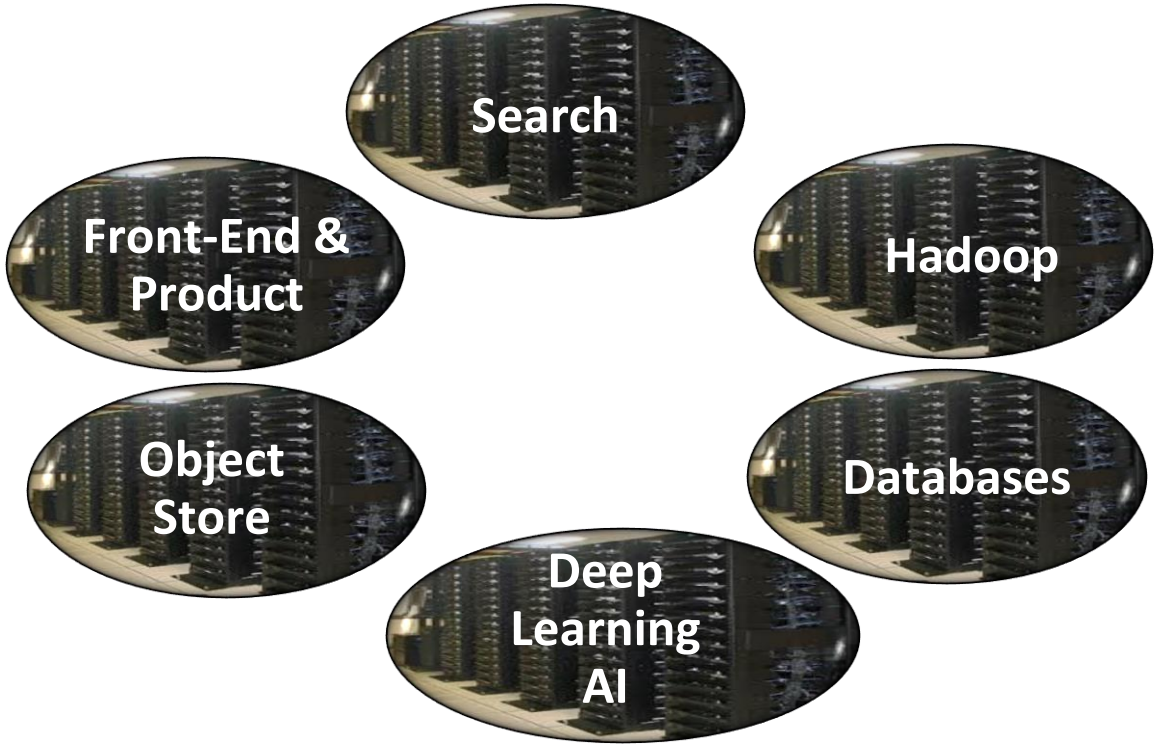


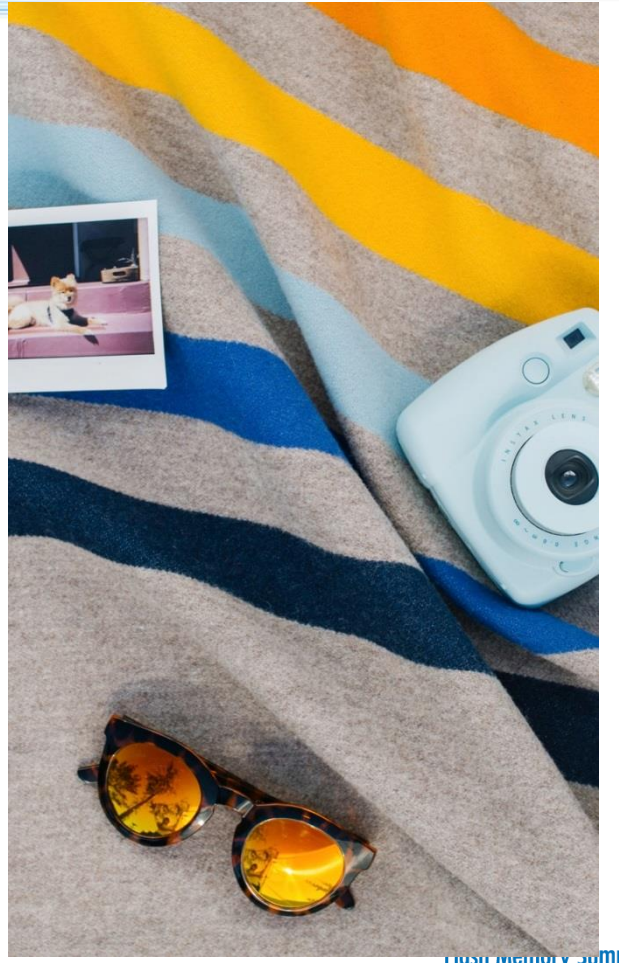
Phase III: Differentiated Services

HyperScale Storage

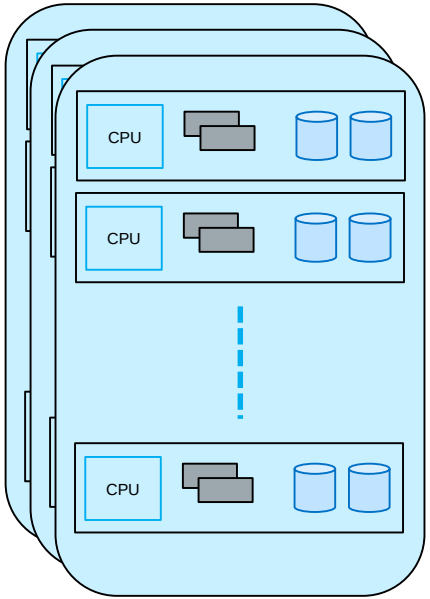
Manoj Wadekar, eBay

ebay Hyperscale Infrastructure





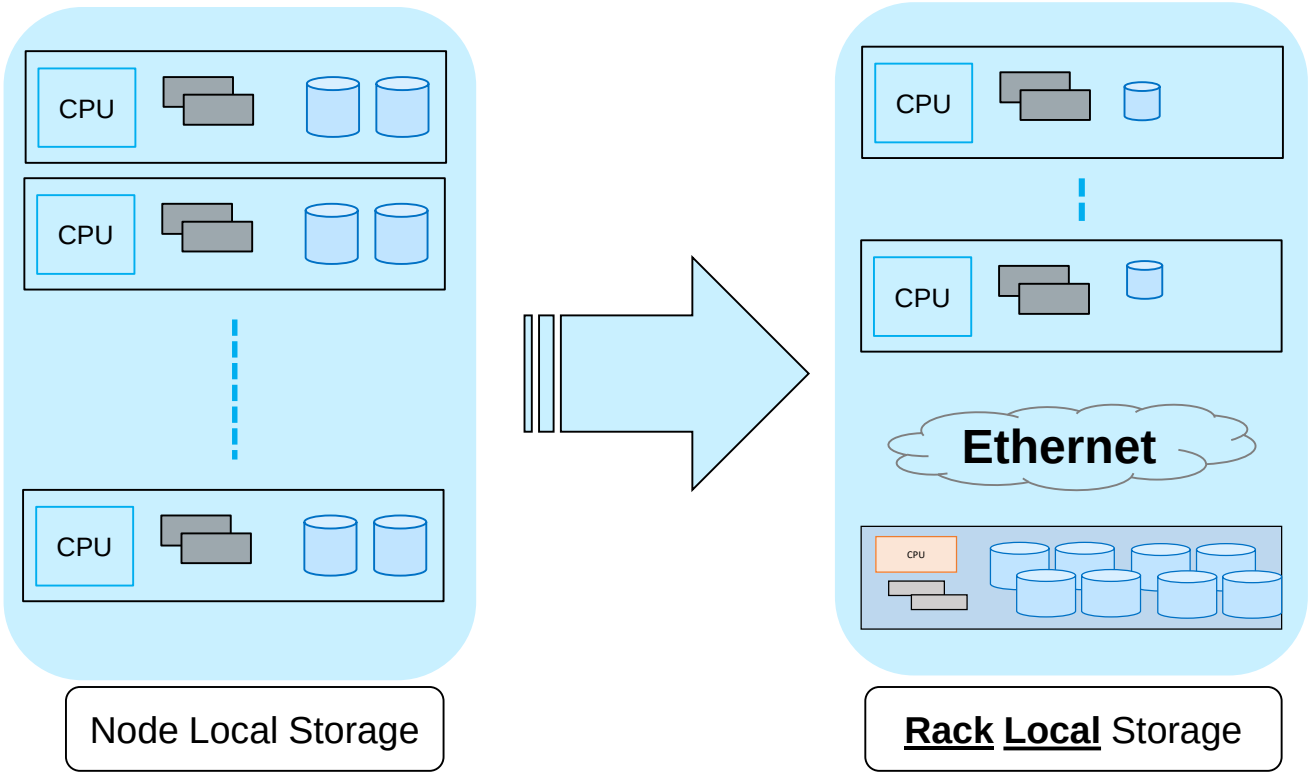
Typical Hyperscale Servers: Design Goals



Efficiency:
Utilization, commonality

Growth:
Performance, Capacity

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



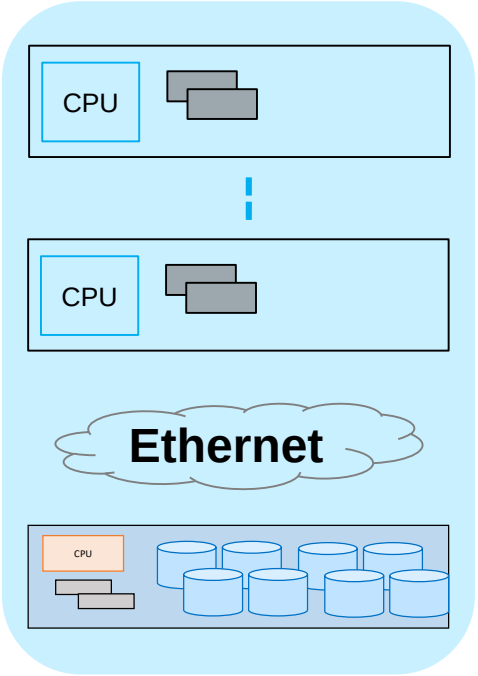
Rack-As-A-Compute

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



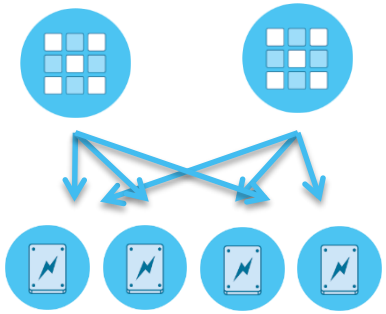
Distributed NVMe™ Architectures

Yaniv Romem, Excelero

How is flash deployed today?

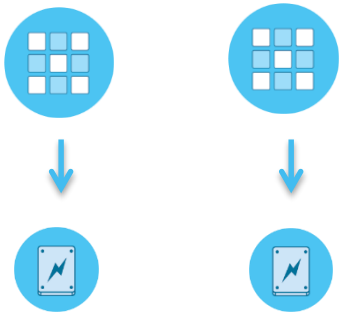
All Flash Array

- Separate application servers & scale-out flash appliances
- Share capacity & performance across applications
- Fabric/Network hop involved



In Server SSDs

- Application, CPU & Flash in one appliance
- Capacity & Performance cannot be shared among isolated appliances
- Applications can take full advantage of NVMe™ performance

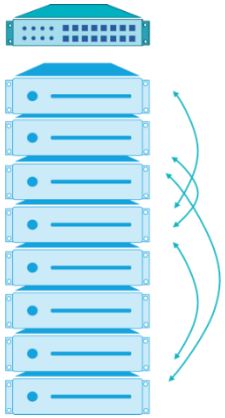


NVMe™ flash: So Many IOPs, So Much Bandwidth…

- NVMe solid state drives offer so much performance, one server struggle to make efficient use of a fully stuffed server
- This makes architectural choices even more important
  - Connectivity choice can impact performance
- Shared-nothing architectures have benefits

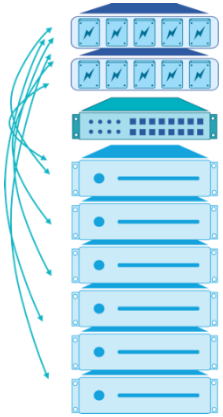
Distributed NVMe deployment options

Local Shared Storage in Application Servers



- Storage is unified into one pool
- Target Module & Client Block Driver run on all nodes
- Linearly scalable

Storage is Centralized



- Storage is unified into one pool
- Target Module runs on storage nodes
- Client Block Driver runs on server nodes
- Applications get performance of local storage

Hyperscale Challenges

Challenges for web-scale applications

- Maximize operational efficiency and architectural flexibility
- Achieve rigorous business objectives: 100% uptime, low TCO
- Meet complex application requirements: scalability, performance
- *New application workloads such as real-time analytics and AI make hyper-scale challenges more onerous*

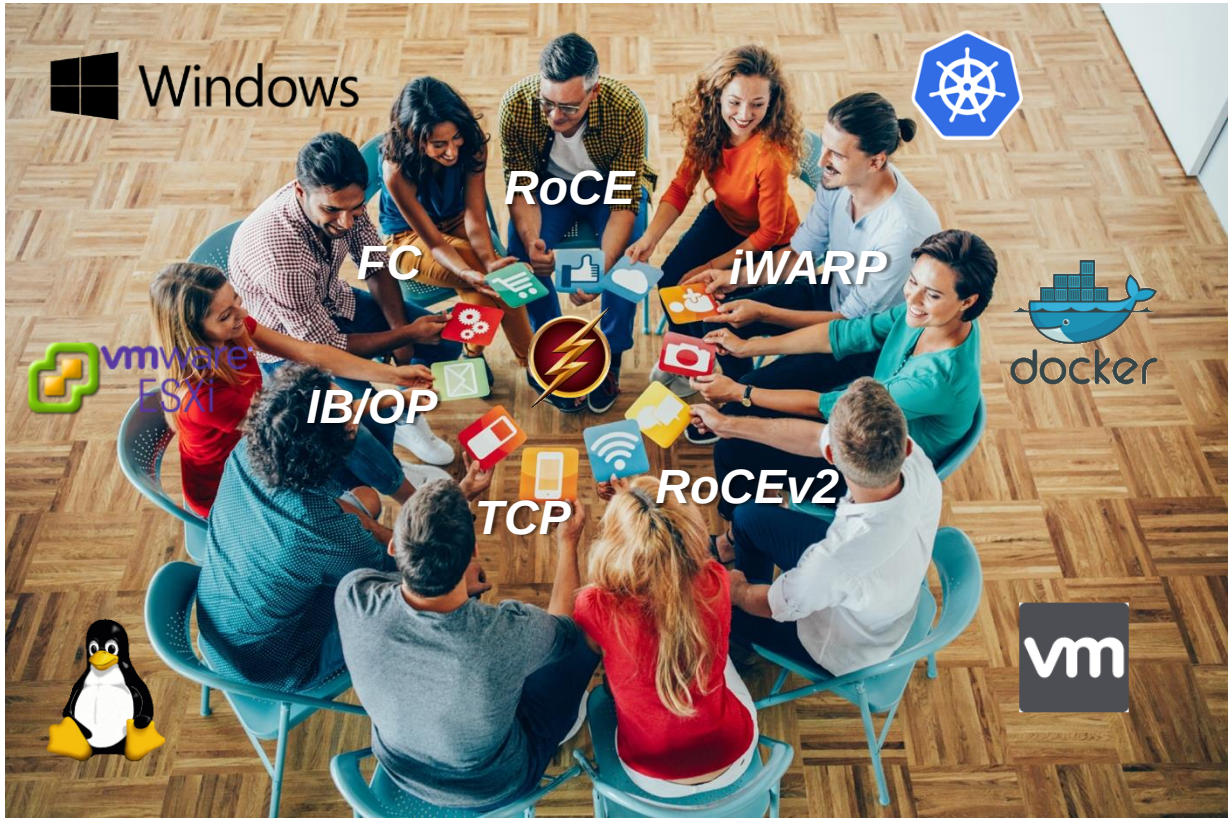
Benefits of Converged Architectures

- SDS on standard servers enables hardware homogeneity
- Maximum utilization of NVMe™ SSD's by creating a single pool of high-performance block storage
- No data localization for scale-out applications
- Can achieve predictable application performance – no noisy neighbors

The “*well-connected*” NVMe™!

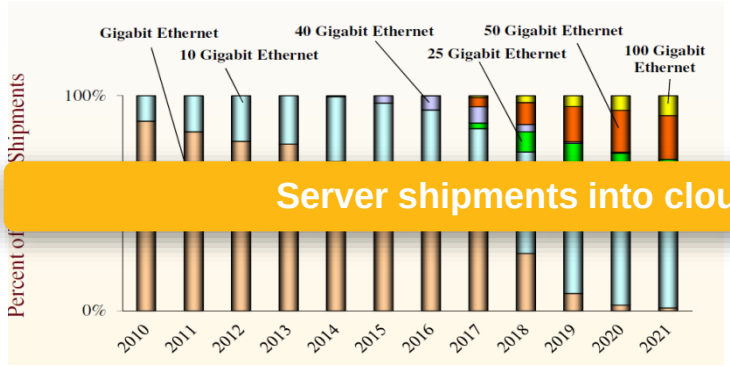
Nishant Lodha, Marvell (Cavium)

What Do You Mean “Well-Connected” NVMe™?

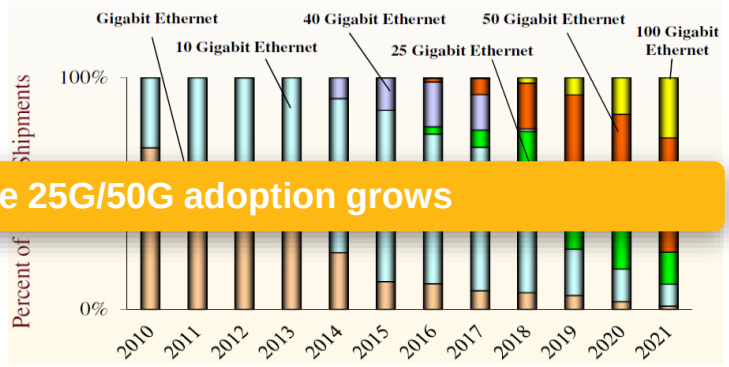


Ethernet Speeds and Feeds!

Server Speed Transition in Enterprise

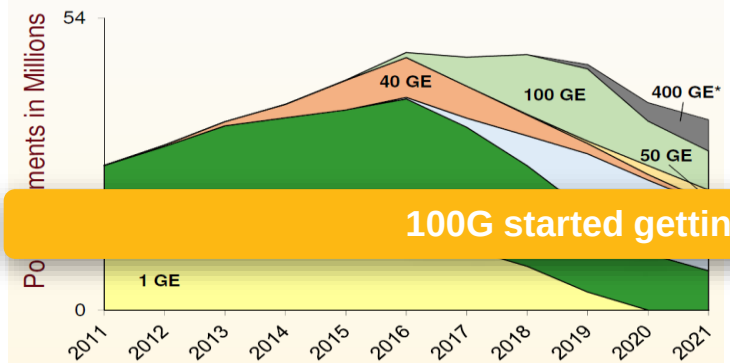


Server Speed Transition in Cloud

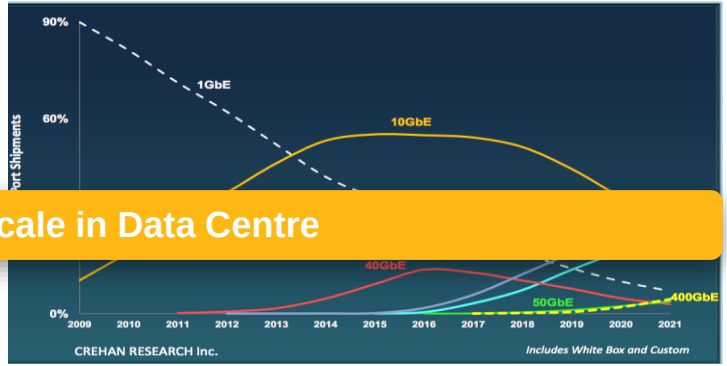


Server shipments into cloud continue while 25G/50G adoption grows

Ethernet Switch – Port Shipments (All)



Ethernet Switch - DC Port Shipments



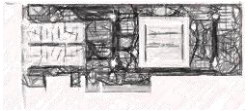
100G started getting deployed at Scale in Data Centre

Source: Del'Oro Research, 2017

Trending all around the DC!

Smart NICs recognized as new adapter category

SmartNICs



RegularNICs

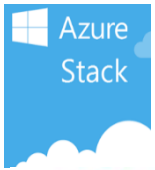
Industry embraces Open architectures

OCP 3.0 Mezz.

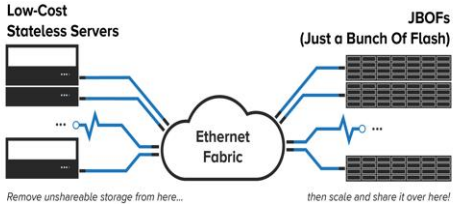
OPEN19 Foundation

OCP ACCEPTED

Emergence of Hybrid Cloud & secure Micro-services



Disaggregated Storage (AFA, JBOF)



Rise of SDN/NFV in Telco Cloud and birth of Edge Compute

vmware NSX

nuagenetworks From Nokia

OPENCONTRAIL

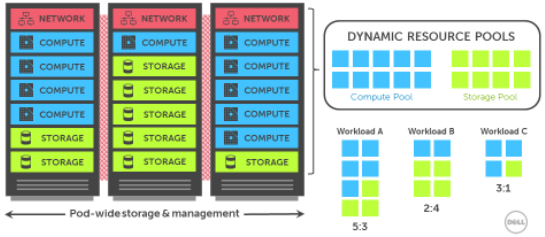
OvS Open vSwitch

OPEN DAYLIGHT

redhat.

openstack

Software Defined Data Center (SDDC)

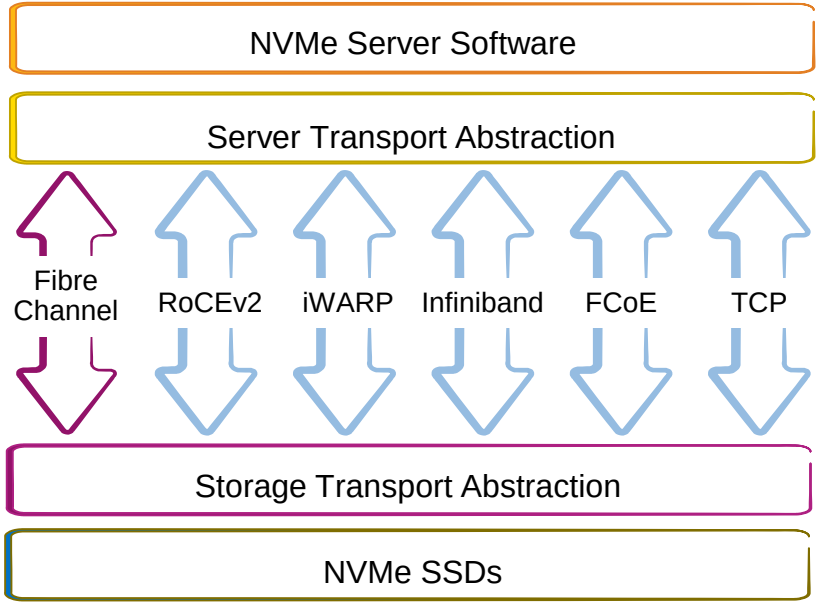


Scaling our NVMe™ Requires a (Real) Network

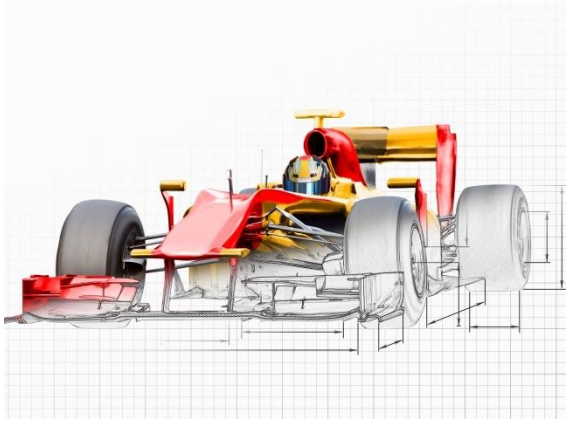
- Many options, plenty of confusion
- Fibre Channel is the transport for the vast majority of today's all flash arrays

  FC-NVMe Standardized in Mid-2017
- RoCEv2, iWARP and InfiniBand are RDMA-based but not compatible with each other

  NVMe-oF™ RDMA Standardized in 2016
- FCoE fabric is an option
- NVMe/TCP - making it way through the standards process



NVMe-oF™: Making the “Well-Informed” Choice?



Not “just” about “fabrics” performance

Culture and Install Base

Use Cases


nvm
EXPRESS®
Architected for Performance