AGENDA

• Storage Topology and Fabric Evolution

• Hyperscale storage considerations

• Fabric Requirements
LOCAL STORAGE:
PROCESS LOCAL DATA

Large machines
With lots of storage
(SCSI/SATA/SAS)
10-100Mbps Ethernet

• Scale-up Servers
  • Data analyzed locally
• Local Storage
  • Add drives as you need
• Fabric needs:
  • Storage traffic within the machine

Capacity, performance, availability: need for sharing
Large machines
With lots of storage
(SCSI/SATA/SAS)

10-100Mbps Ethernet

Large machines for compute
Shared storage to scale

100Mbps Ethernet
1 Gbps FC SAN
SHARED STORAGE: BRING DATA TO WORK

Large machines
With lots of storage
(SCSI/SATA/SAS)
10-100Mbps Ethernet

Large machines for compute
Shared storage to scale
100Mbps Ethernet
1 Gbps FC SAN

~1997

- Scale-up Servers
  - Data fetched over network
- **Shared** Storage
- Fabric Needs:
  - Special fabric to provide high performance, reliable, secure connectivity
  - Fabric separated from Ethernet

Massive big-data needed reengineering
LOCAL → SHARED → LOCAL

~1997

Large machines
With lots of storage
(SCSI/SATA/SAS)
10-100Mbps Ethernet

Large machines for compute
Shared storage to scale
100Mbps Ethernet
1 Gbps FC SAN

~2006

Small compute
Local storage
1→10Gbps Ethernet
LOCAL STORAGE (SCALE-OUT PROCESSING)
BRING WORK TO DATA

- Scale-out compute and storage
  - Jobs sent to storage

- Local Storage

- Fabric Needs:
  - Storage traffic within a node
  - Ethernet fabric for scale-out processing

But.. Data and compute keep growing..
WHICH LEADS TO..

Economies of scale
- Optimal utilization
- Small number of SKUs

Challenges
- CPU and Storage components growth unaligned
  - Stranded capacity or performance
- Shared destiny
  - Connected failures
- Silo’ed infrastructure
  - Unshared buffer capacity
  - Storage management per cluster
Large machines
With lots of storage
(SCSI/SATA/SAS)
10-100Mbps Ethernet

Large machines for compute
Shared storage to scale
100Mbps Ethernet
1 Gbps FC SAN

Small compute
Local storage
1→10Gbps Ethernet

Small compute
Disaggregated storage
25-100Gbps Ethernet
SHARED STORAGE (DISAGGREGATION)
BRING DATA TO WORK

- Independent scaling of compute and storage
  - TCO Efficient
  - Fungible Capacity
- Independence in availability strategies
  - Compute and storage
- Dynamic binding
  - based on workload requirements

However.. reliability, performance, scalability predictability, manageability... At Scale is important
STORAGE AS A SERVICE

- Commodity hardware, No SPOF,
- Scalable capacity and performance
- Service SLA, Durability
- S3, Google File System, CEPH etc.

Storage Fabric needs to provide:
Reliable, Good, Predictable performance
RELIABLE, GOOD, PREDICTABLE PERFORMANCE

Improper spread over fault domain can lead to data loss.

Network oversubscription
RELIABLE, **GOOD, PREDICTABLE PERFORMANCE**

Improper spread over fault domain can lead to perf loss

Network oversubscription
RELIABLE, GOOD, PREDICTABLE PERFORMANCE

Coexistence of low latency and large throughput use cases

Network oversubscription
FUTURE FABRIC NEEDS:

- Low latency IO
- Predictable
- Isolation
- High Performance
- Reliable fleet
- Low latency IO
- Predictable
- Isolation

- Large machines with lots of storage (SCSI/SATA/SAS)
  - 10-100Mbps Ethernet

- Large machines for compute shared storage to scale
  - 100Mbps Ethernet
  - 1 Gbps FC SAN

- Small compute local storage
  - 1-10Gbps Ethernet

- Small compute disaggregated storage
  - 25-100Gbps Ethernet
THANK YOU