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Breaking Boundaries with Disaggregated Storage

Alex Segeda | Director, Business Development | Storage Platforms

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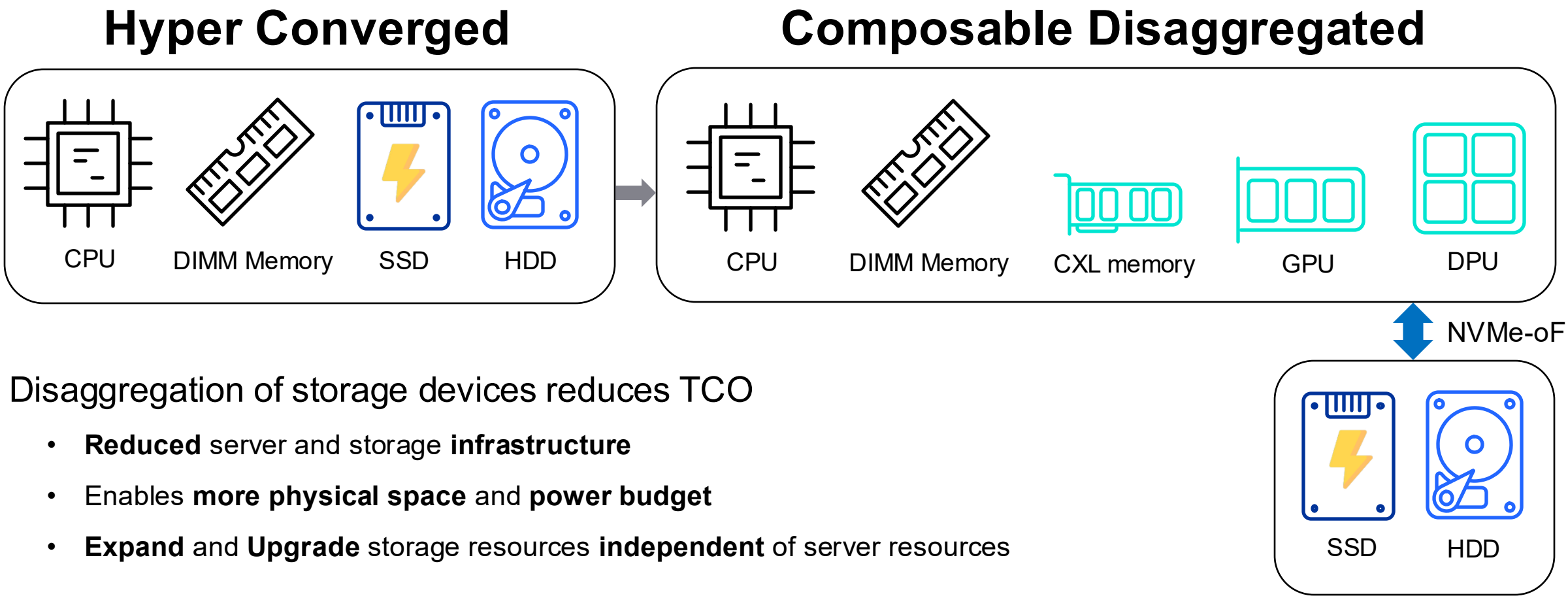
Composable Disaggregated Infrastructure (CDI)

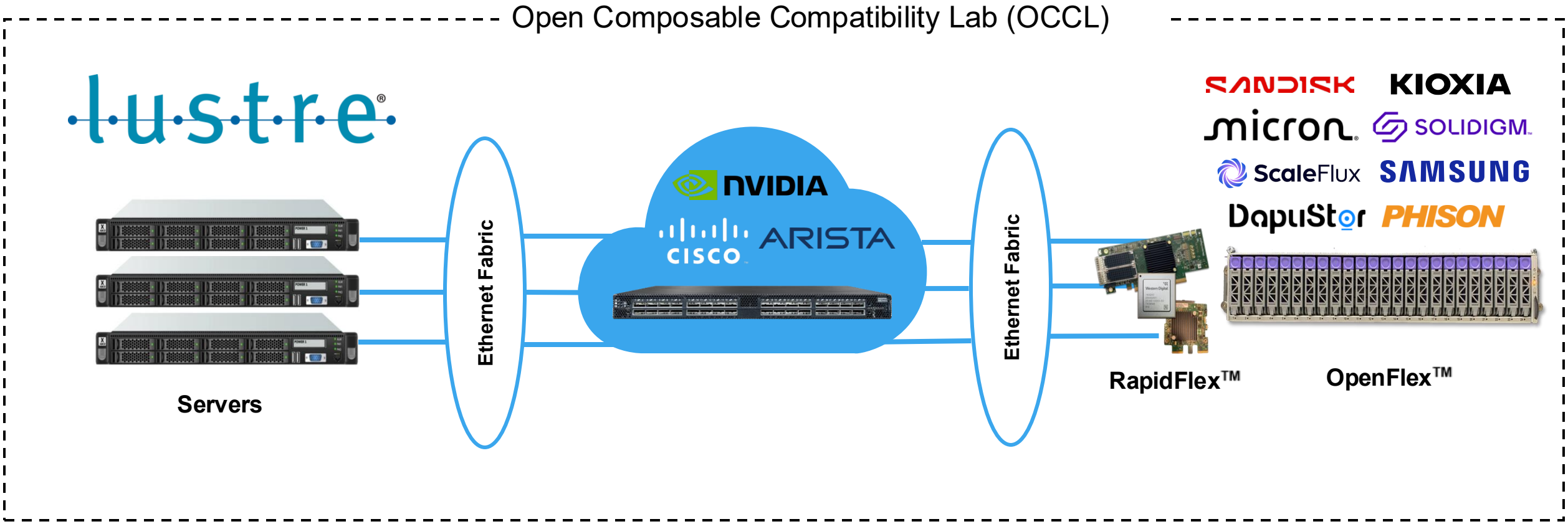


Disaggregation of storage devices reduces TCO

- **Reduced** server and storage **infrastructure**
- Enables **more physical space** and **power budget**
- **Expand** and **Upgrade** storage resources **independent** of server resources

Independent Data Storage Infrastructure Provider

Pioneering the shift to disaggregated Storage with Ethernet and NVMe-oF



NVMe-oF Ethernet Bunch of Flash

OpenFlex Data24 – 4000 Series

High Level Specifications

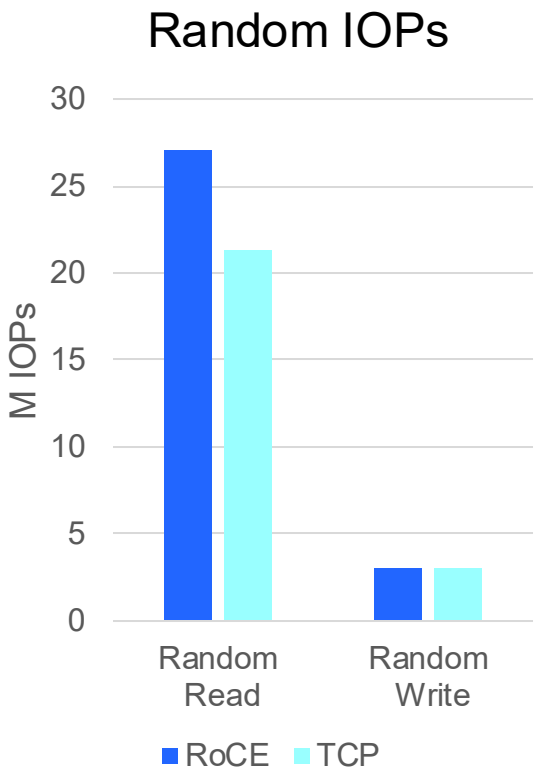
- 2U, 24-Bay, NVMe-oF Ethernet JBOF or EBOF
- RoCEv2 or TCP Supported
- 12 or 24 **NVMe Dual Port Hot-Plug SSDs**
  - Ultrastar DC SN655 (1 DWPD): 3.84 / 7.68 / 15.36 / 30.72 / 61.44 TB
  - SE, ISE and TCG Ruby
  - 3rd party SSDs
- High Availability with dual IOMs and dual Titanium Efficiency PSUs
- N+2 fan redundancy
- 12 x 100GbE ports using RapidFlex A2000 Fabric controllers
- Short chassis depth (< 28”)

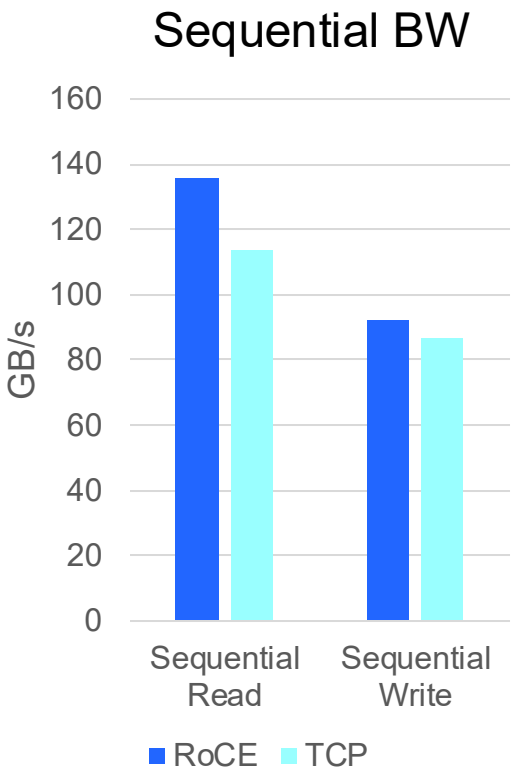
Key Capabilities

- Bandwidth matched performance from network port to SSD
  - PCIe Gen4 from front-end to back-end
- Device Sharing (NTB) to provide connections from any port to any SSD
  - Saves on 100GbE switch ports for direct connect configurations
- 4200 uses **dual-port NVMe SSDs** and is HA from end-to-end
- Simple unified management through Resource Manager
- Industry-leading 5-year warranty

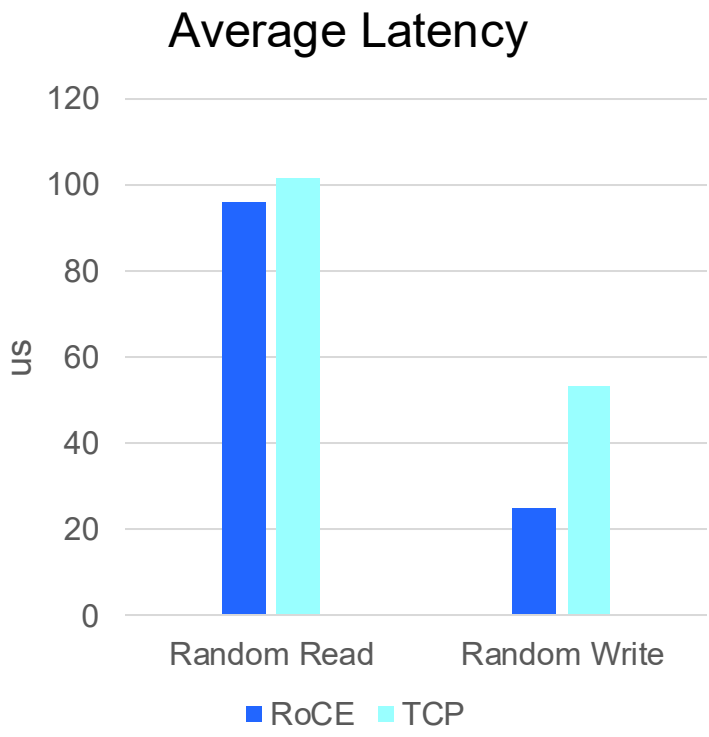
Data24 4200 Performance

IOPs, Bandwidth, and Latency



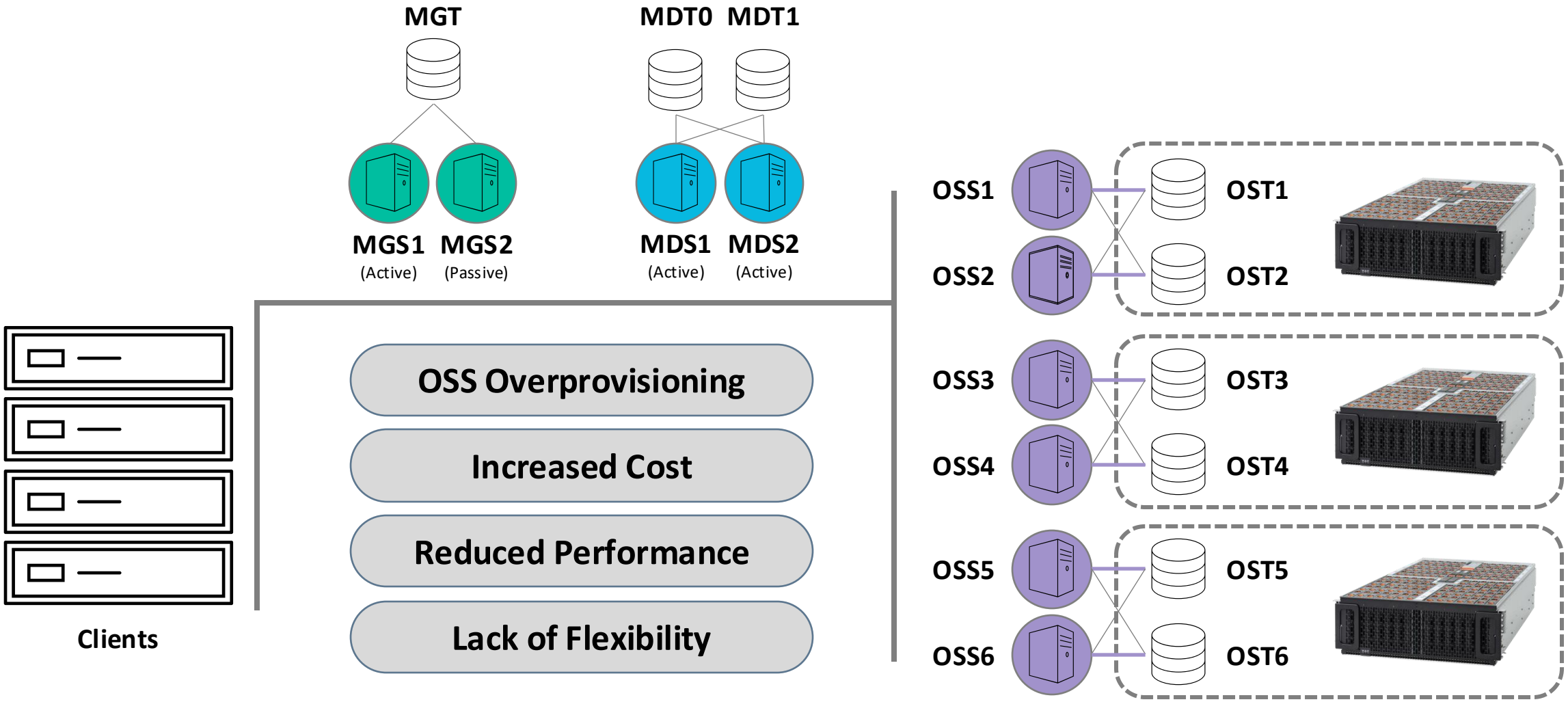


Results with WD Ultrastar SN655 SSDs
12 hosts with 8 namespaces each
Random IOPs with 4kB block size
Sequential Read with 32kB block size
Sequential Write with 128kB block size

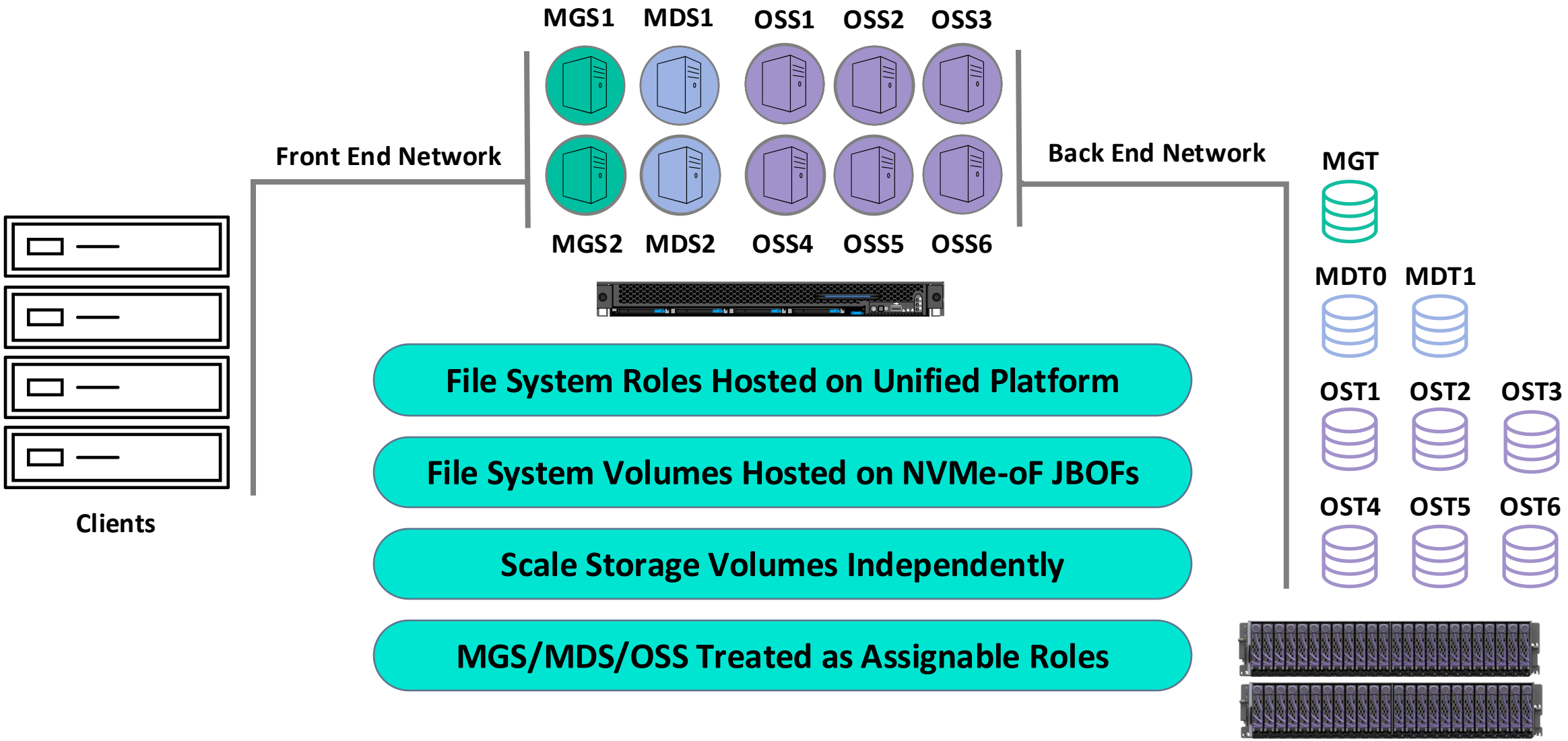


Results with WD Ultrastar SN655 SSDs
1 hosts with 8 namespaces each
4kB block size

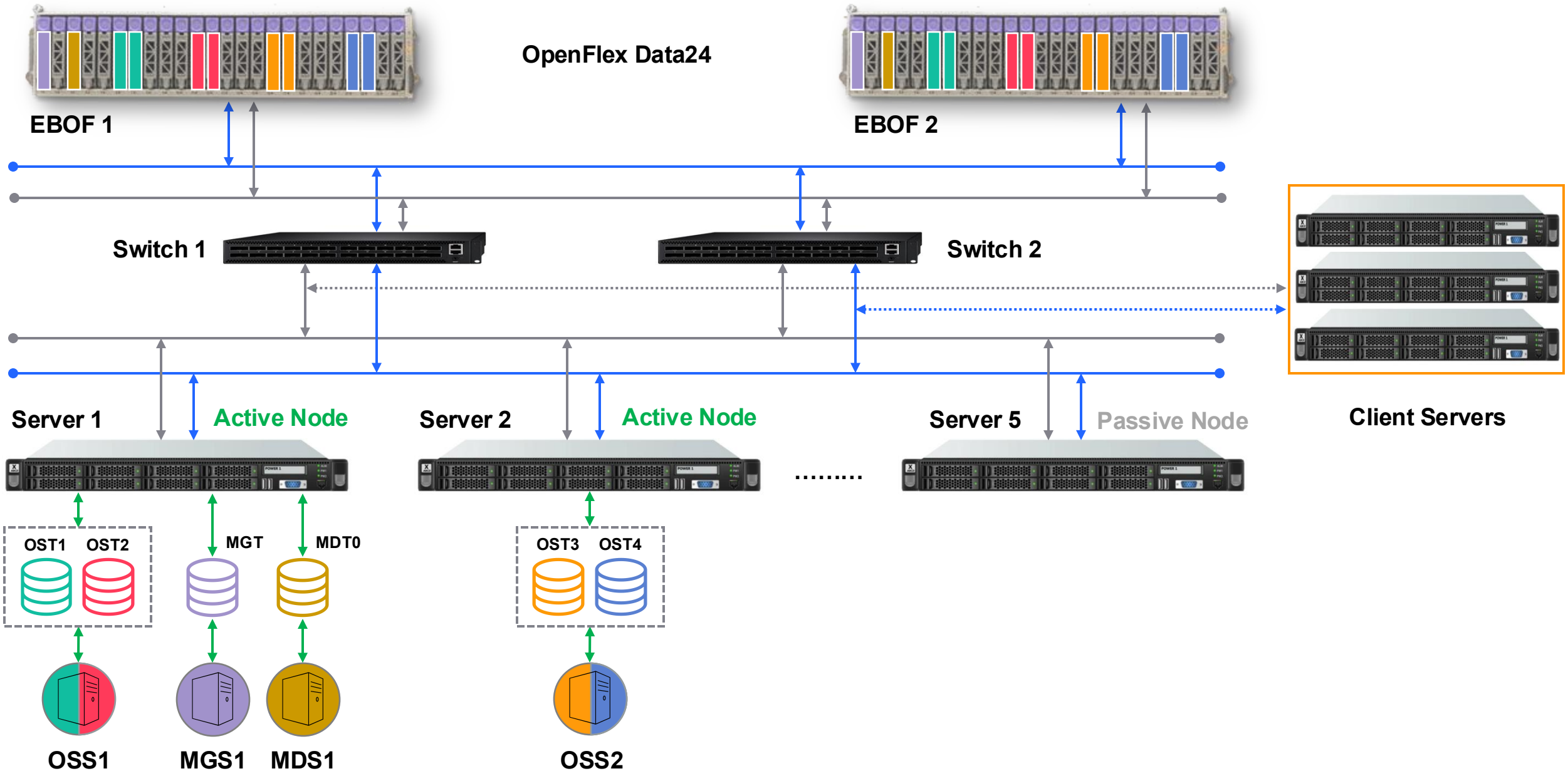
Traditional Lustre Architecture



NVMe-oF Based Lustre Architecture



Disaggregated HA Deployment Diagram for Lustre



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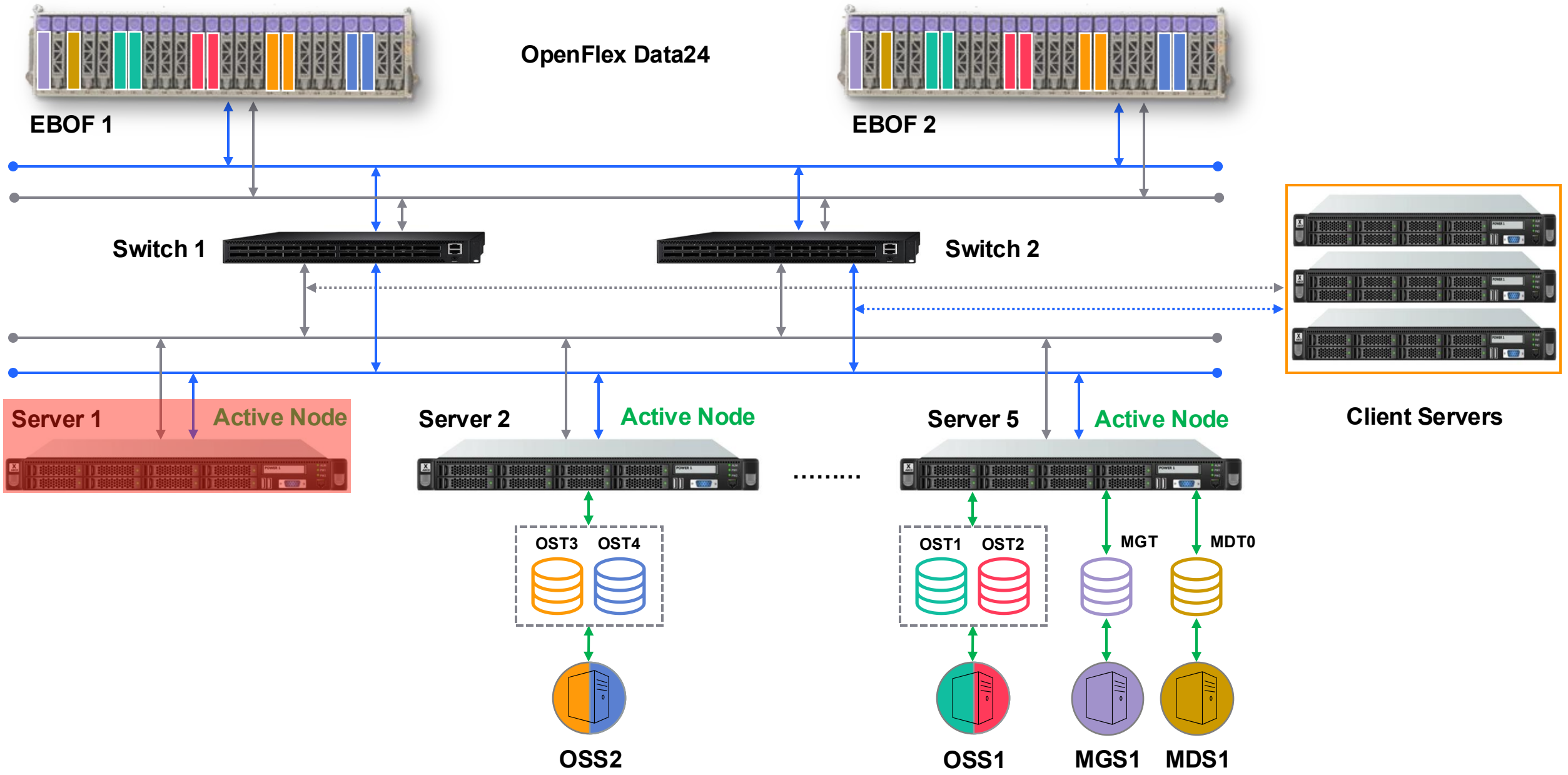
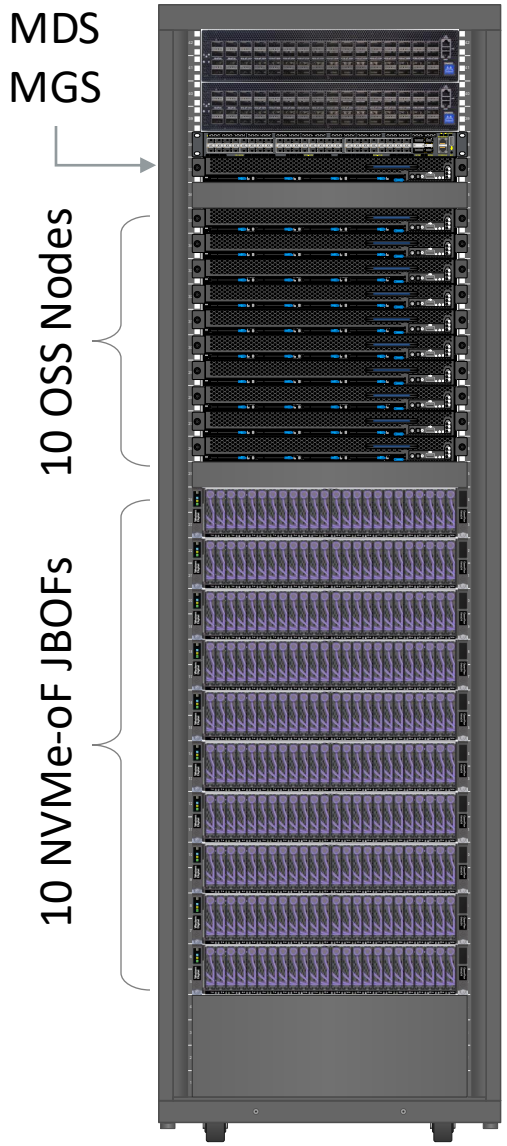


NVMe-oF Rack Architecture & Benefits



- 20% of Compute resources are reserved for failover
- 50% Reduction in Server Count
- 30% Reduction in Per Rack Power Requirement
- Improved HA with RAID Across Multiple Enclosures

Summary

- Gain flexibility via Composable Disaggregated Storage
- Don’t waste resources: cores, servers, power, rack space
- Talk to me about your Proof-of-Concept project

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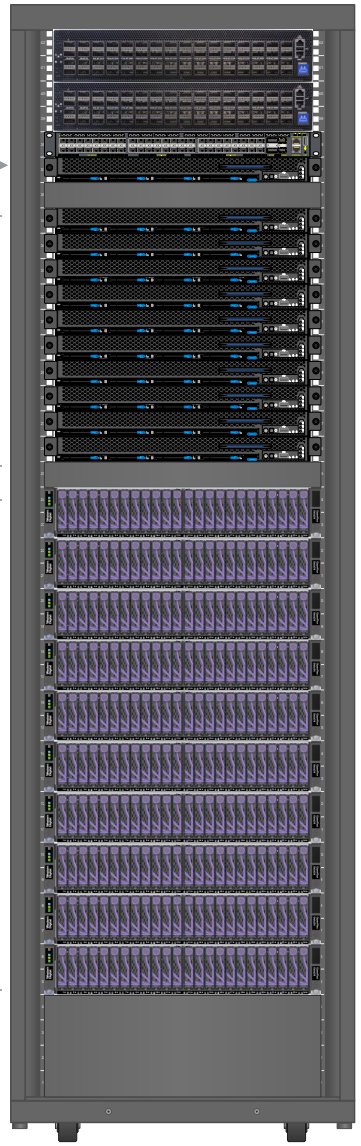
NVMe-oF Lustre Architecture Gains

Feature	Traditional Storage(SAS)	HA NVMe Disaggregated Storage
Server-Storage Pairing	Fixed	Dynamic, any-to-any
RAID Scope	Local to server	Across multiple enclosures
Failover Impact	Performance drops	Minimal impact
Scalability	Limited	Horizontal, modular
Performance	Moderate	High
Latency	High	Low
Server Count	High	Reduced by ~50%

NVMe-oF Rack Architecture Savings



	NVMe-oF Approach	HA Node Approach
#EBOFs	10	
#OSS	8+2	20
#OST	24	60
Power	12kW	17kW