

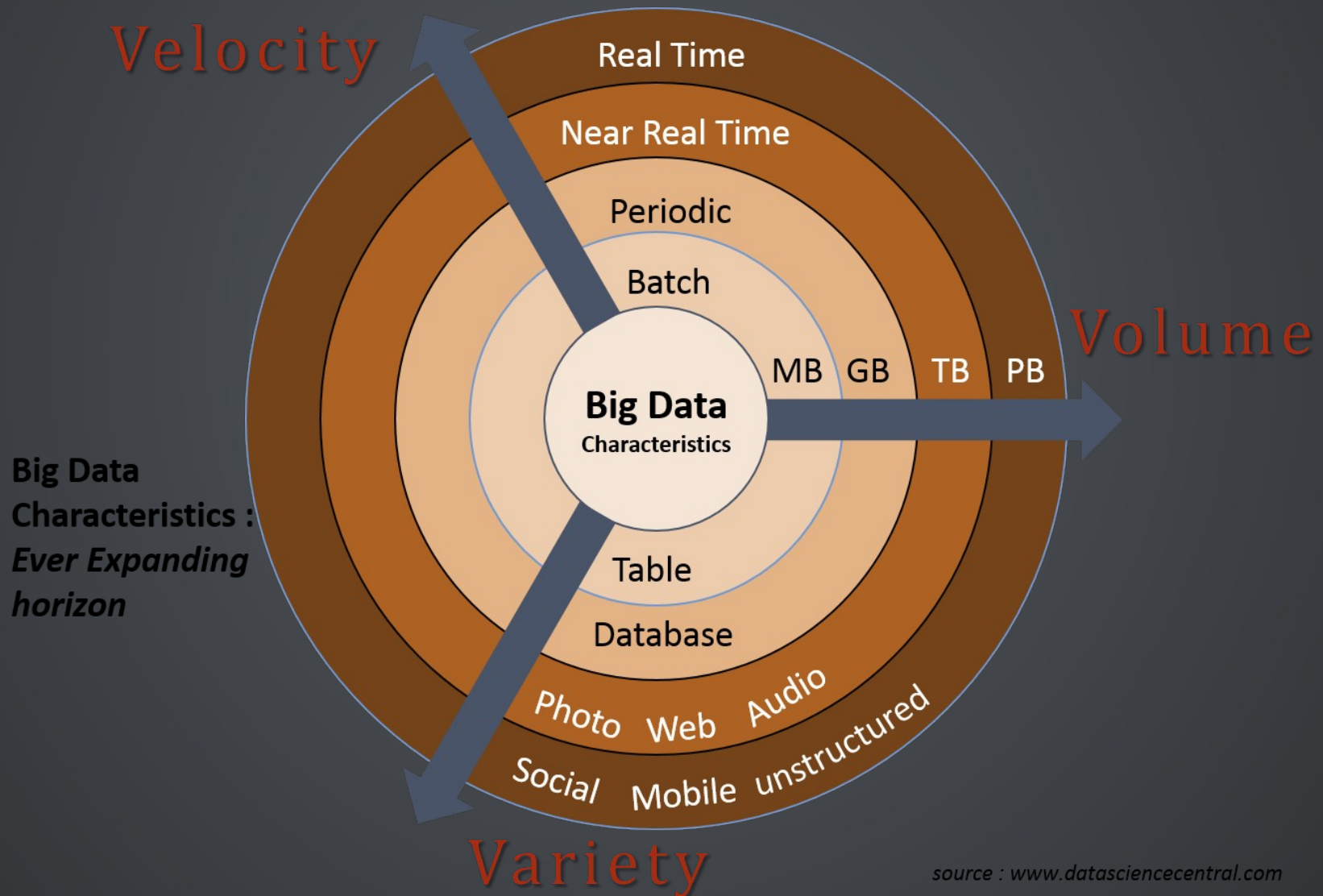
# Services Overview

Javier Cacheiro



# **1. Big Data & Storage**

# 3Vs of Big Data



# Variety

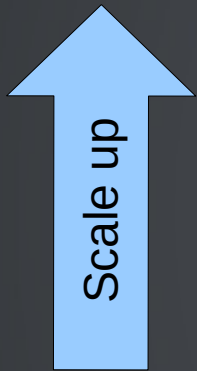
## *Structured Data*



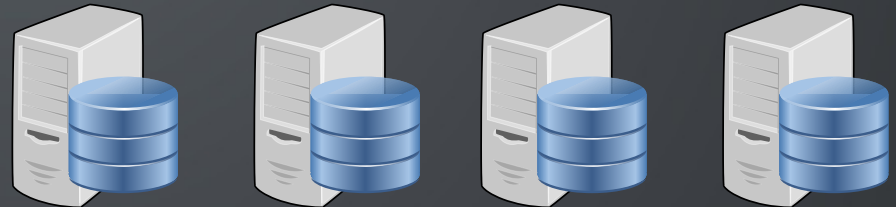
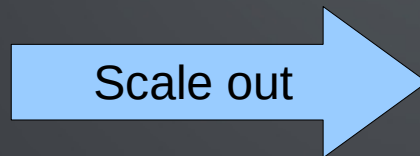
0.103	0.176	0.387	0.300	0.379
0.333	0.384	0.564	0.587	0.857
0.421	0.309	0.654	0.729	0.228
0.266	0.750	1.056	0.936	0.911
0.225	0.326	0.643	0.337	0.721
0.187	0.586	0.529	0.340	0.829
0.153	0.485	0.560	0.428	0.628

## *Unstructured Data*





# Scaling Options



# DATA CENTRIC

Compute centric:

Bring the **data** to the **computation**

Data centric:

Bring the **computation** to the **data**

# Hardware Infrastructure

- 38 nodes: 4 masters + 34 slaves

Storage capacity **816TB**

Aggregated I/O throughput **30GB/s**

**64GB** RAM per node

**10GbE** connectivity between all nodes

# Hardware Master Nodes

- Model: Lenovo System x3550 M5
- CPU: 2x Intel Xeon E5-2620 v3 @ 2.40GHz
- Cores: 12 (2x6)
- HyperThreading: On (24 threads)
- Total memory: 64GB
- Network: 1x10Gbps + 2x1Gbps

Disks: 8x480GB **SSD** SATA 2.5" MLC G3HS

Controller: M5210 1GB Cache **FastPath**



# Hardware Slave Nodes

- Modelo: Lenovo System x3650 M5
- CPU: 2x Intel Xeon E5-2620 v3 @ 2.40GHz
- Cores: 12 (2x6)
- HyperThreading: On (24 threads)
- Total memory: 64GB
- Network: 1x10Gbps + 2x1Gbps
- Disks: 12x 2TB NL **SATA** 6Gbps 3.5" G2HS
- Controller: N2215 SAS/SATA HBA

# BD|CESGA Software

- Hadoop Platform
- PaaS Platform

# Hadoop Platform

- HDFS
- MapReduce
- Hive
- HBase
- Kafka
- Spark

# PaaS Platform

- MongoDB
- Cassandra
- PostgreSQL
- MariaDB
- etc

# Parallel Storage

- HDFS
- Ceph
- Lustre

# Lustre FT2

- 4xOSS Servers
- 2xMDS Servers
- 8xNetApp E5600 (OSTs):
  - 480x2TB HDD SAS 7200 RPM
- 1xNetApp E2724 (MDS):
  - 24x1TB HDD SAS 10.500 RPM

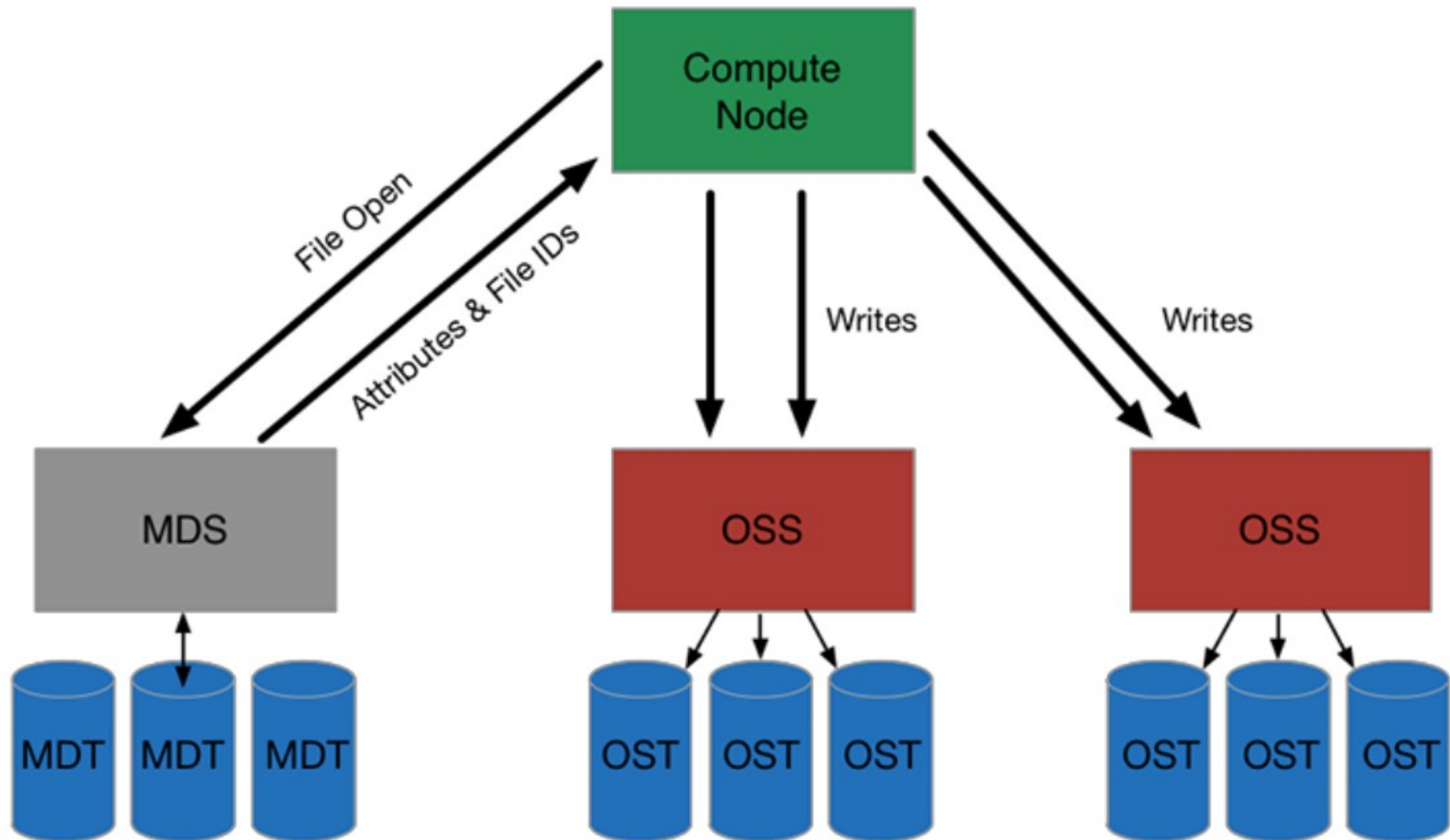
# Lustre FT2

Bandwidth: **24GB/s**

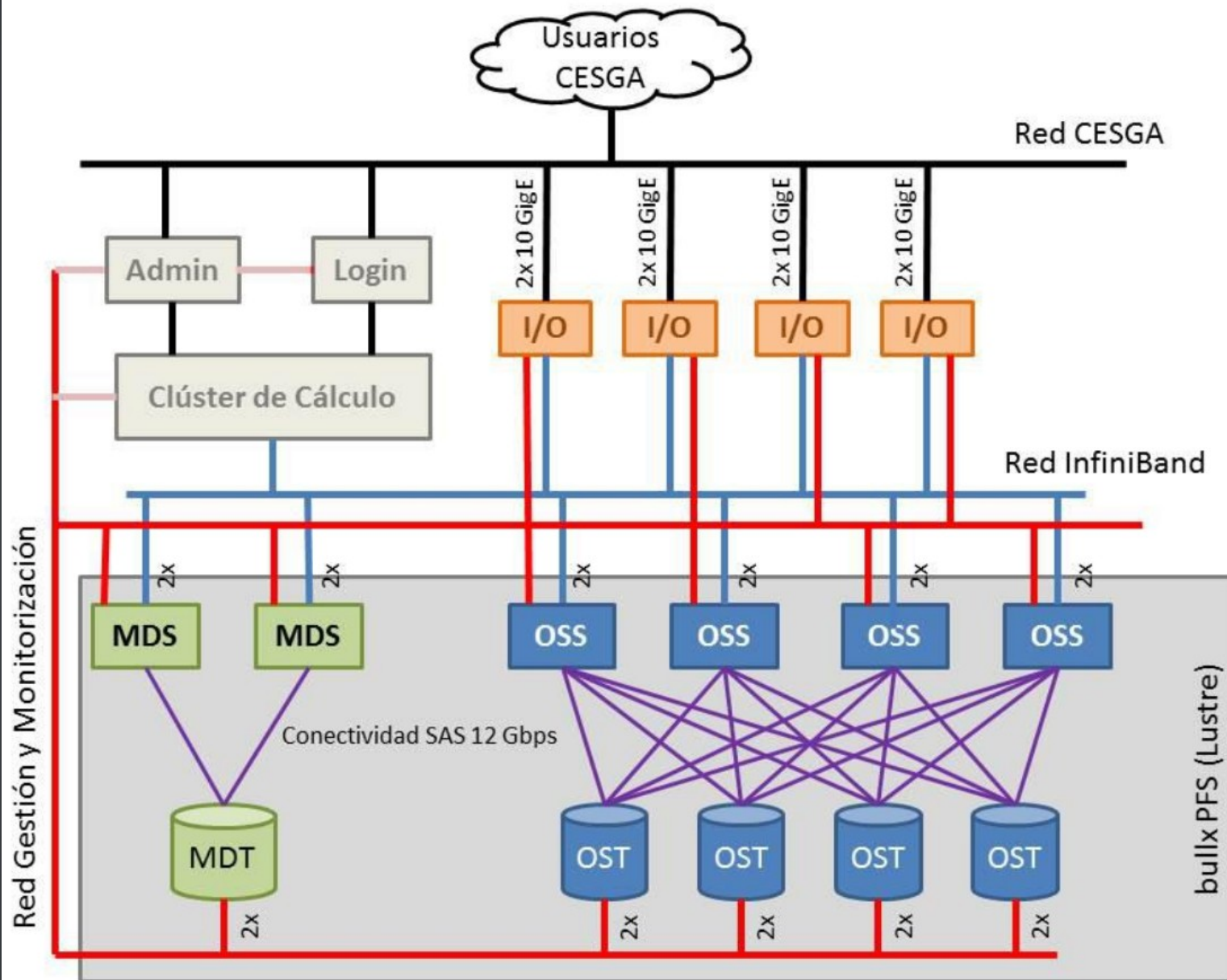
Capacity: **695TB**

Connectivity: **Infiniband FDR 56Gbps**

# Lustre







# FT3 Storage

**Almacenamiento de altas prestaciones**  
**Lustre 1 PB**

**Almacenamiento de alta capacidad**

**Sistema de almacenamiento  
permanente de datos en disco**  
**4 PB Lustre + HSM (Robinhood +  
QSTAR)**

**Sistema de almacenamiento  
permanente en cinta**  
**20 PB**

**Librería de cintas**  
**12x LT09 + 4x LT06**  
**1600 slots**

# Backups: Tape Library



# Netapp FAS9000HA

Big Data/FT2/FT3 HOME

- High availability
- High cost
- Lower parallel performance

# Netapp

Bandwidth: **14GB/s**

Capacity: > **1PB**

Performance: **1.5M IOPS**

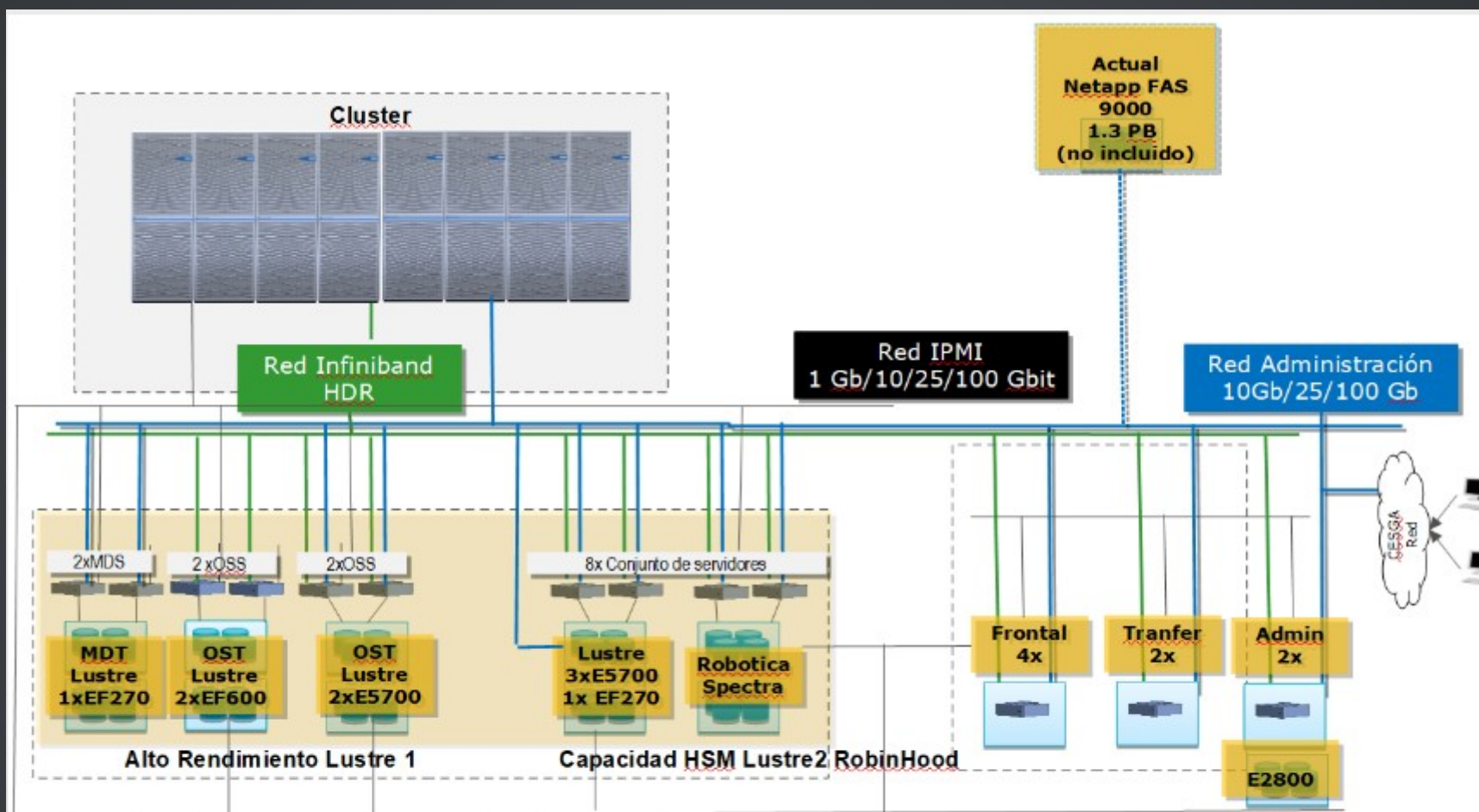


## **2. Computing**

# FinisTerra III (FT3)

- 708 x procesadores Intel Xeon Ice Lake 8352Y de 32 cores, 2.2GHz
- 22.656 núcleos de proceso (cores)
- 144 aceleradores matemáticos GPU Nvidia A100 y Nvidia T4
- 118 TB de memoria agregada
- 355 TB capacidad agregada en discos SSD NVMe
- Red Infiniband HDR 100





**Potencia de cómputo de 4 PetaFLOPS**

	Thin nodes	GPU nodes	Viz nodes	Fat nodes	Transfer nodes	QLM node
Cantidad	256	64	16	16	2	Simulador de circuitos cuánticos Atos 30 qbits
Procesador	2x Intel Xeon Ice Lake 8352Y 32 cores 2.2 GHz					
Cores	64					
Memoria	256 GB			2 TB	256 GB	
Disco local	960 GB SSD NVMe			1920 GB SSD NVMe	960 GB SSD NVMe	
GPU	2x Nvidia A100		Nvidia T4			
Red baja latencia	Infiband HDR 100					

# **3. Cloud**

	Cloud 1	Cloud 2	Cloud 3
Year	2009	2013	2021
Cores	1.200	1.464	6.240
Memory	2,4 TB	3,5 TB	24 TB
Storage	5,6 TB	63 TB	3.000 TB
Software	Opennebula 1	OpenNebula 5	OpenStack Xena

