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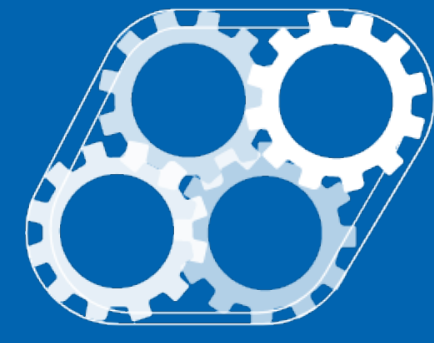
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PIANO NAZIONALE DI RIPRESA E RESILIENZA



Consiglio Nazionale delle Ricerche



CNR-IAC
Istituto per le Applicazioni del Calcolo



H2IOSC
Humanities and cultural Heritage Italian Open Science Cloud



DARIAH-IT

OPERAS
IT

AMELIA High Performance Computing cluster

Authors

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Introduction

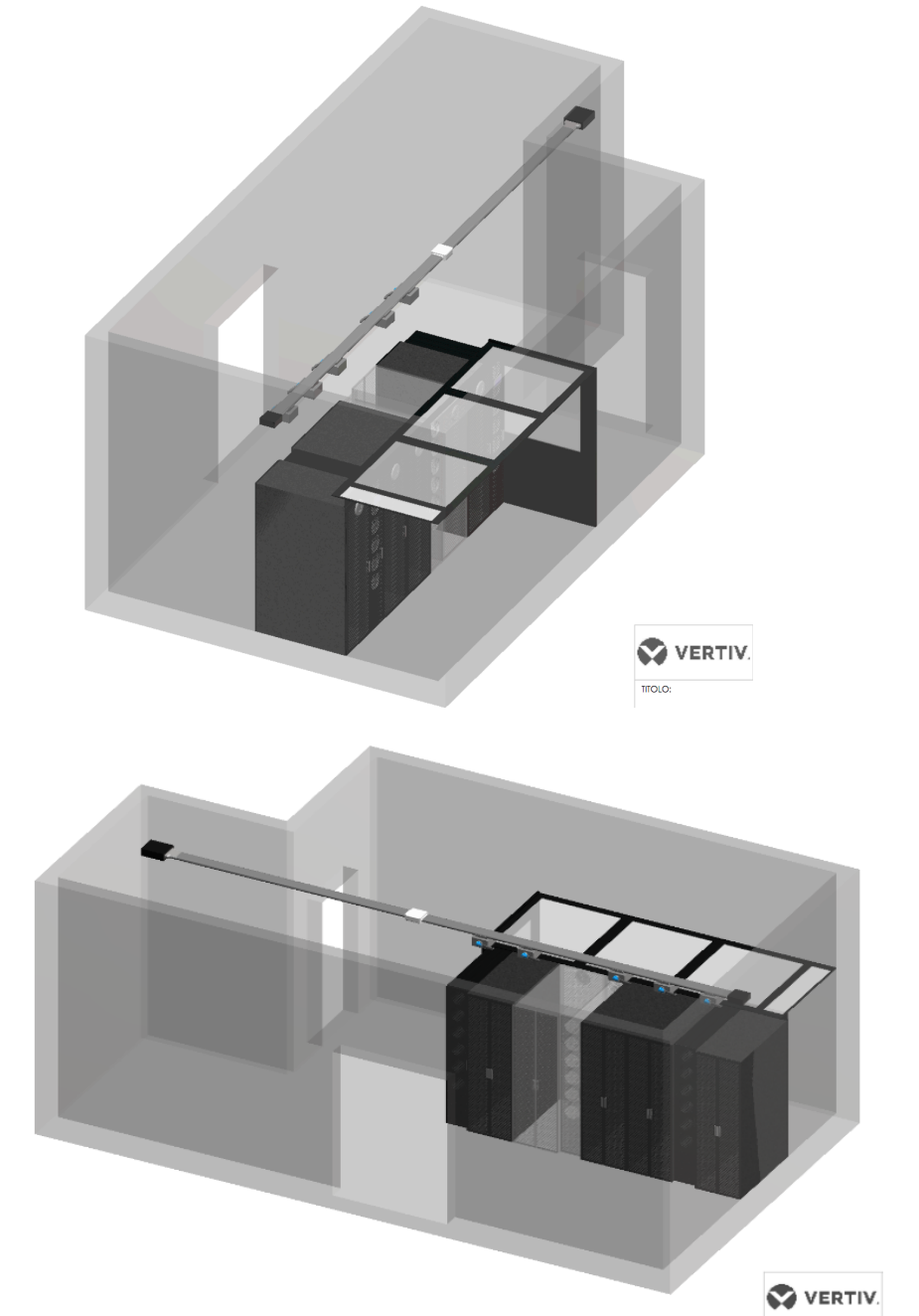
CNR-IAC has a strong tradition in High-Performance Computing and was recently awarded a grant through the **H2IOSC** project, funded by Italy's **National Recovery and Resilience Plan (PNRR)**.

HPC Cluster with 1 PFLOPS of Peak Perf.

A resource for research in Scientific Computing, ML, AI with applications in cultural heritage, quantum mechanics and numerical linear algebra.

The Cluster Project

Architecture	Cluster of GPU-accelerated nodes
Interconnection	Infiniband HDR 200 Gb/s
Control network	4 Ethernet 1 Gb/s
CPU model	2 sockets of 32 cores Intel Xeon Gold 6883 2.00 GHz
GPU type	NVIDIA A30 24GB 933GB/s Memory PCIe Gen4: 4GB/s
Peak performance	380 TFLOPS CPUs and 1TFLOPS GPUs
Number of nodes	25 Compute and 4 Control
RAM each nodes	1.0 TB DDR3 REGISTERED ECC
OS	Rocky Linux 8.9 - OpenStack
Scheduler	SLURM 23.11.6
Storage	512 GB of system disk every node. 7 TB of local scratch disk every node. (/scratch/local) 650 TB of Storage Area Network (/ifs/hpc)



Floor consolidation, power, cooling and continuity supply

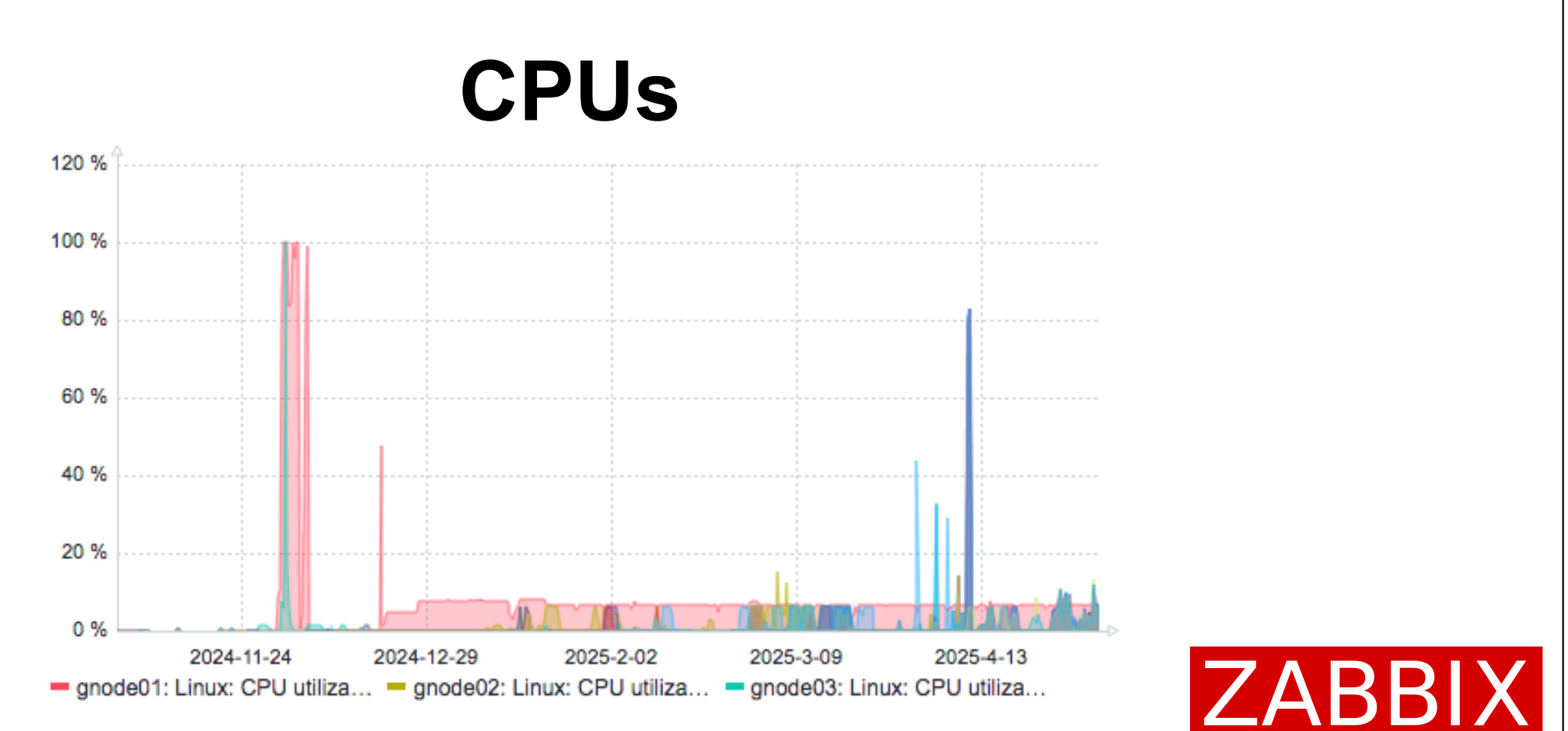
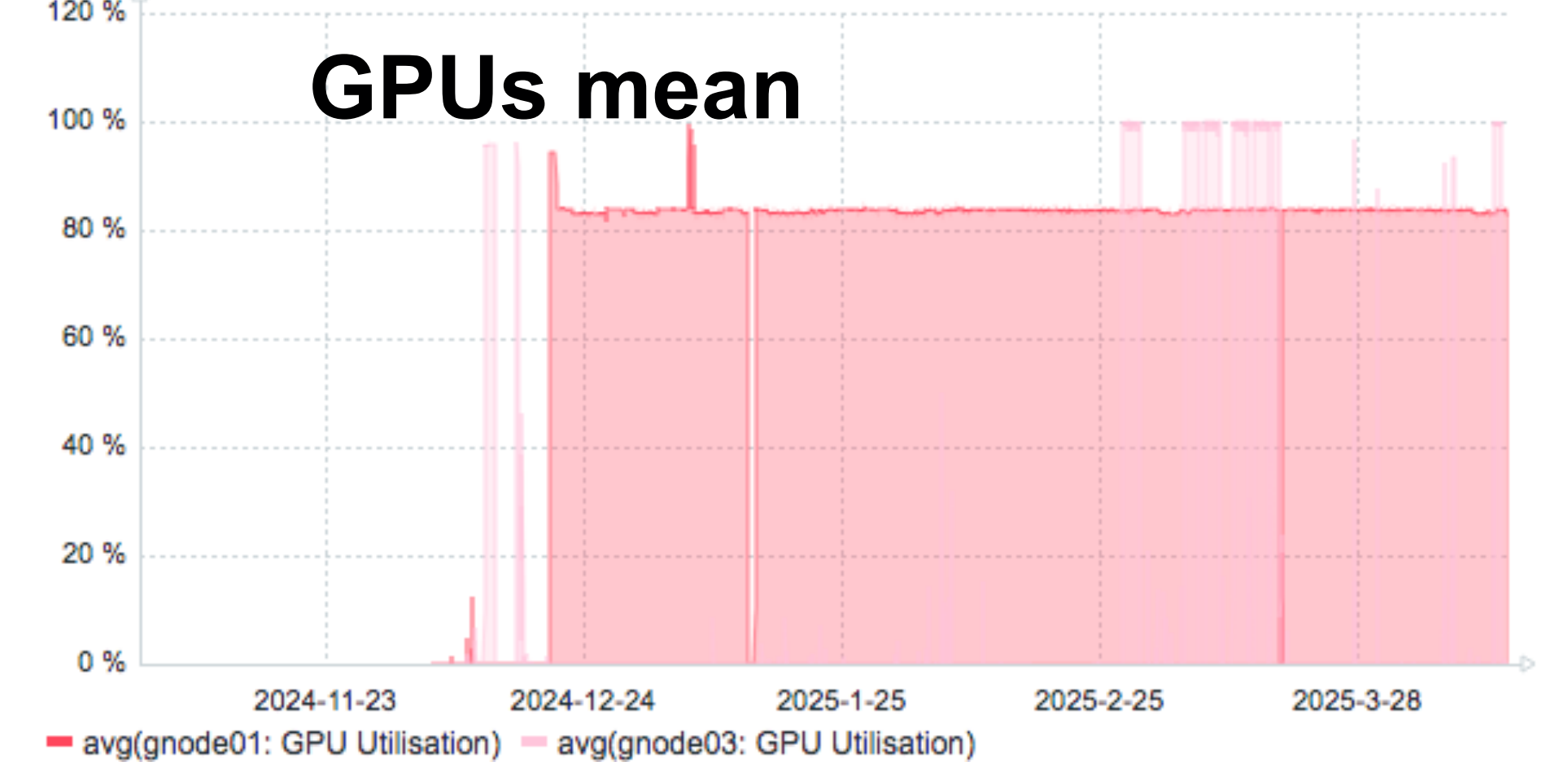
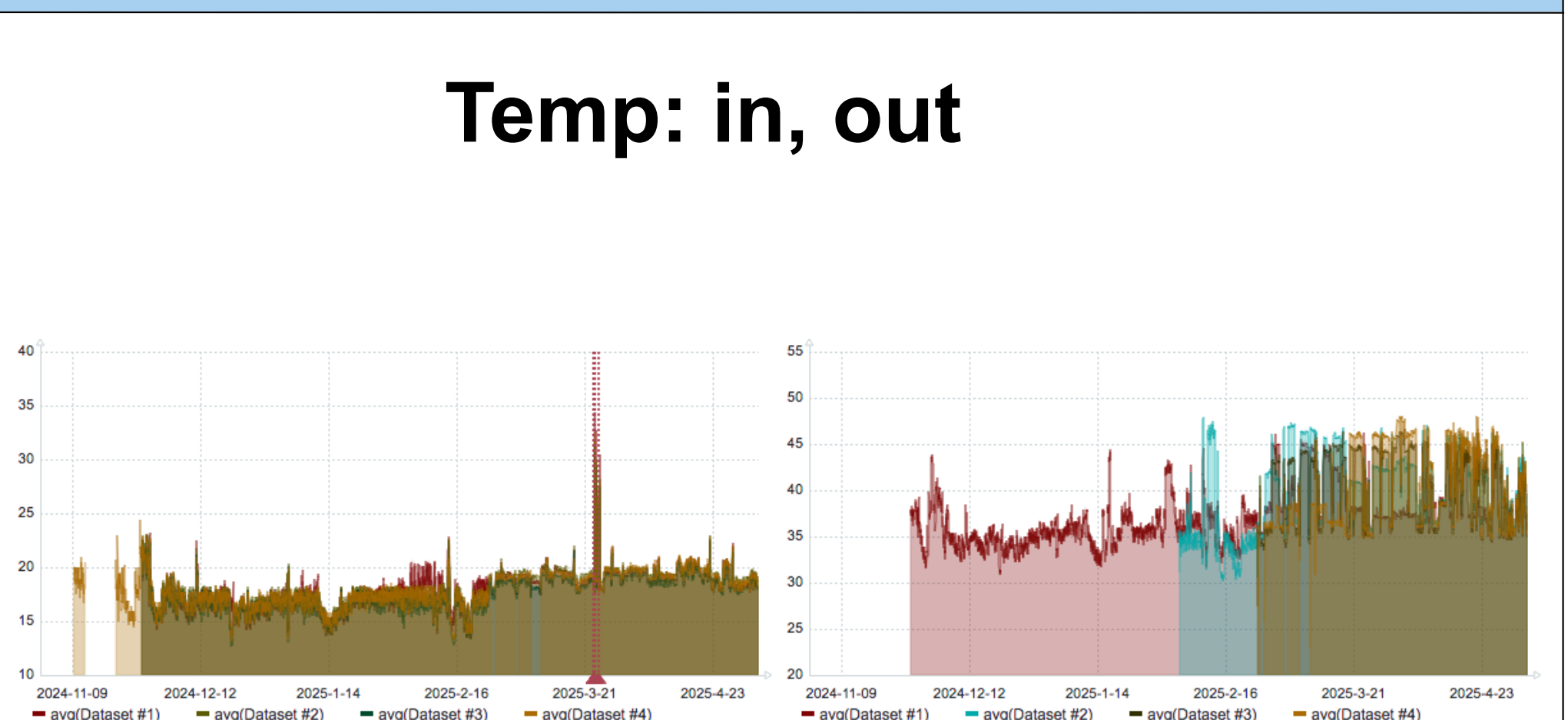
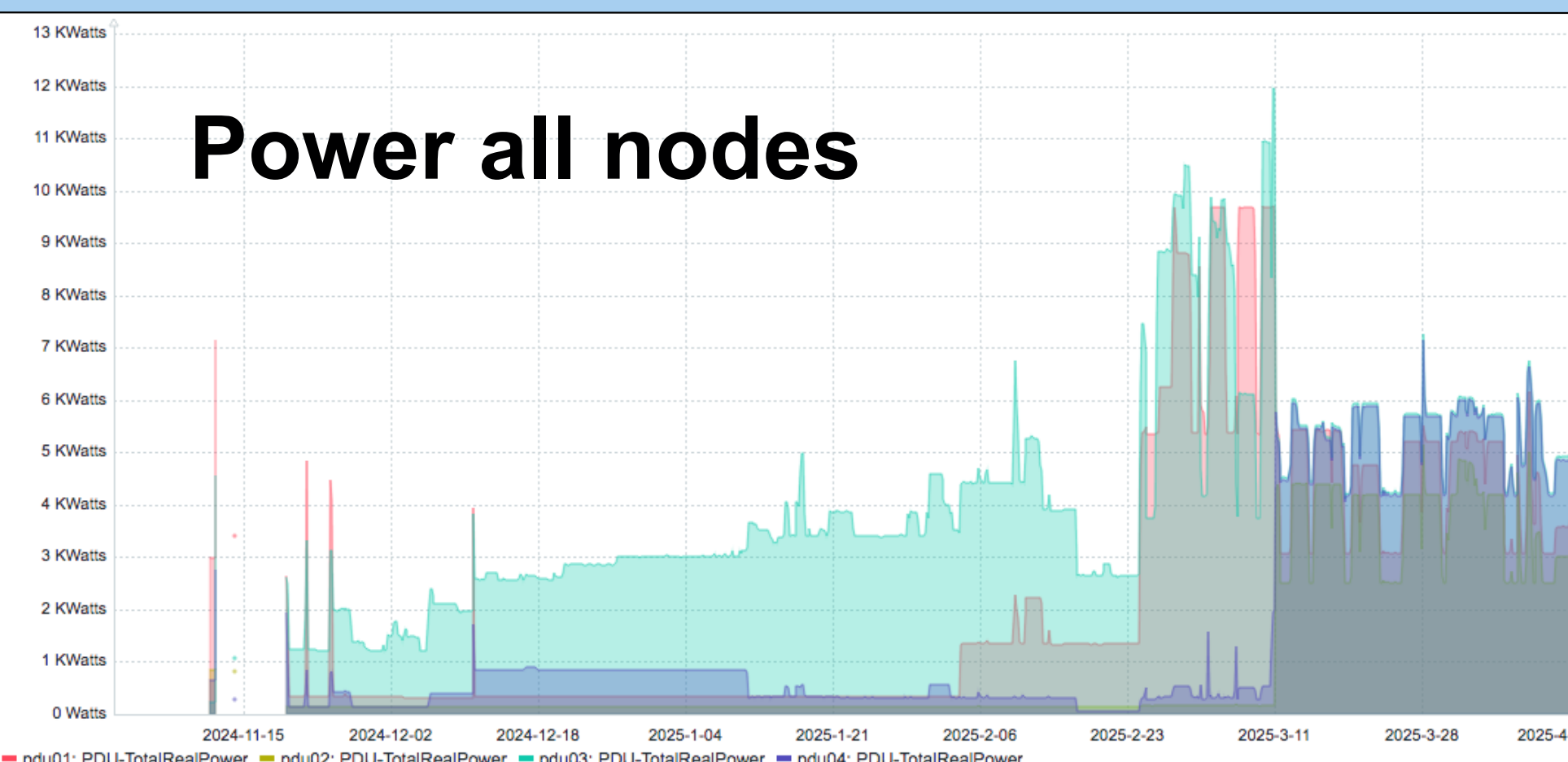
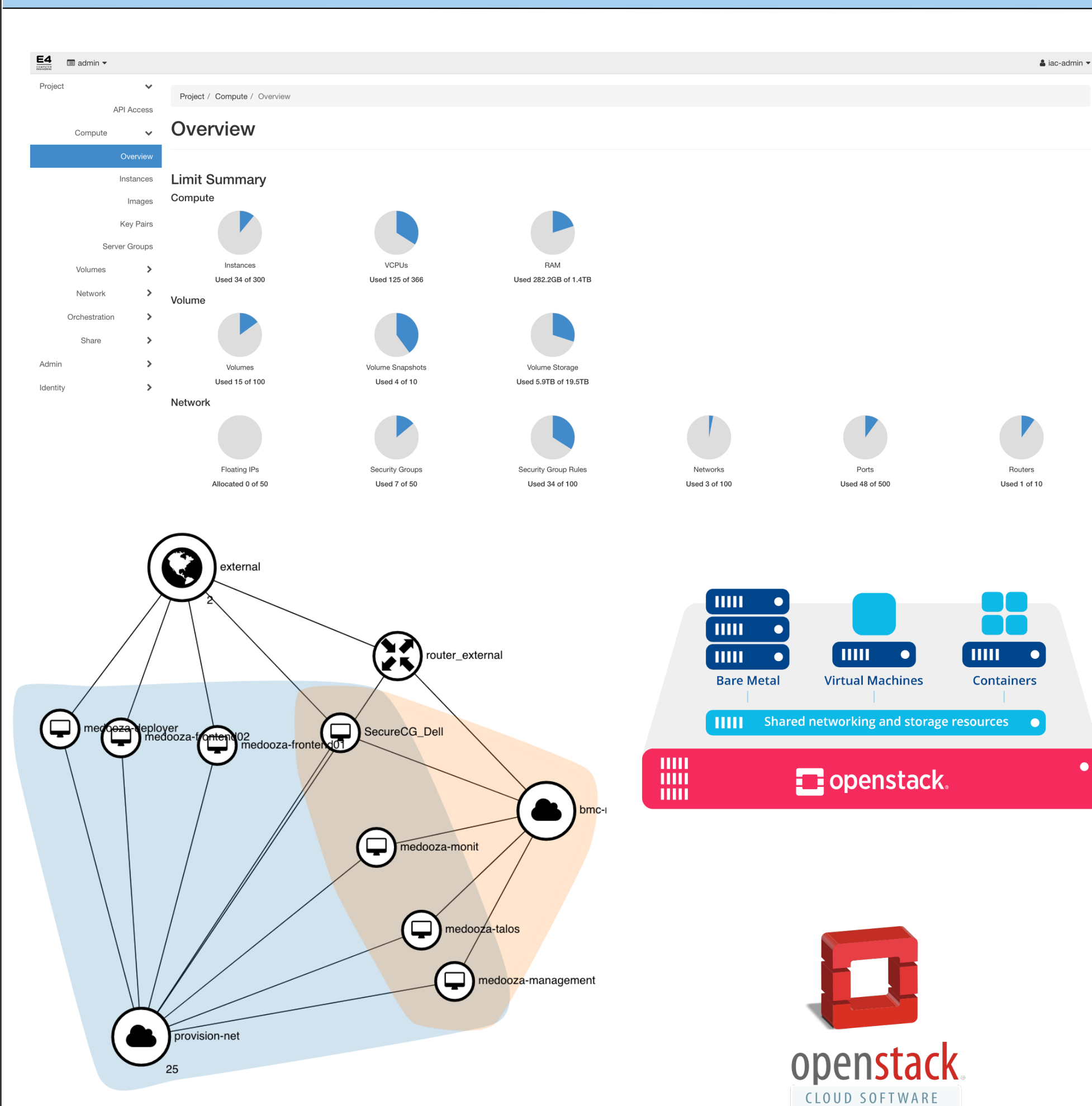


Realization of the contention island and the nodes



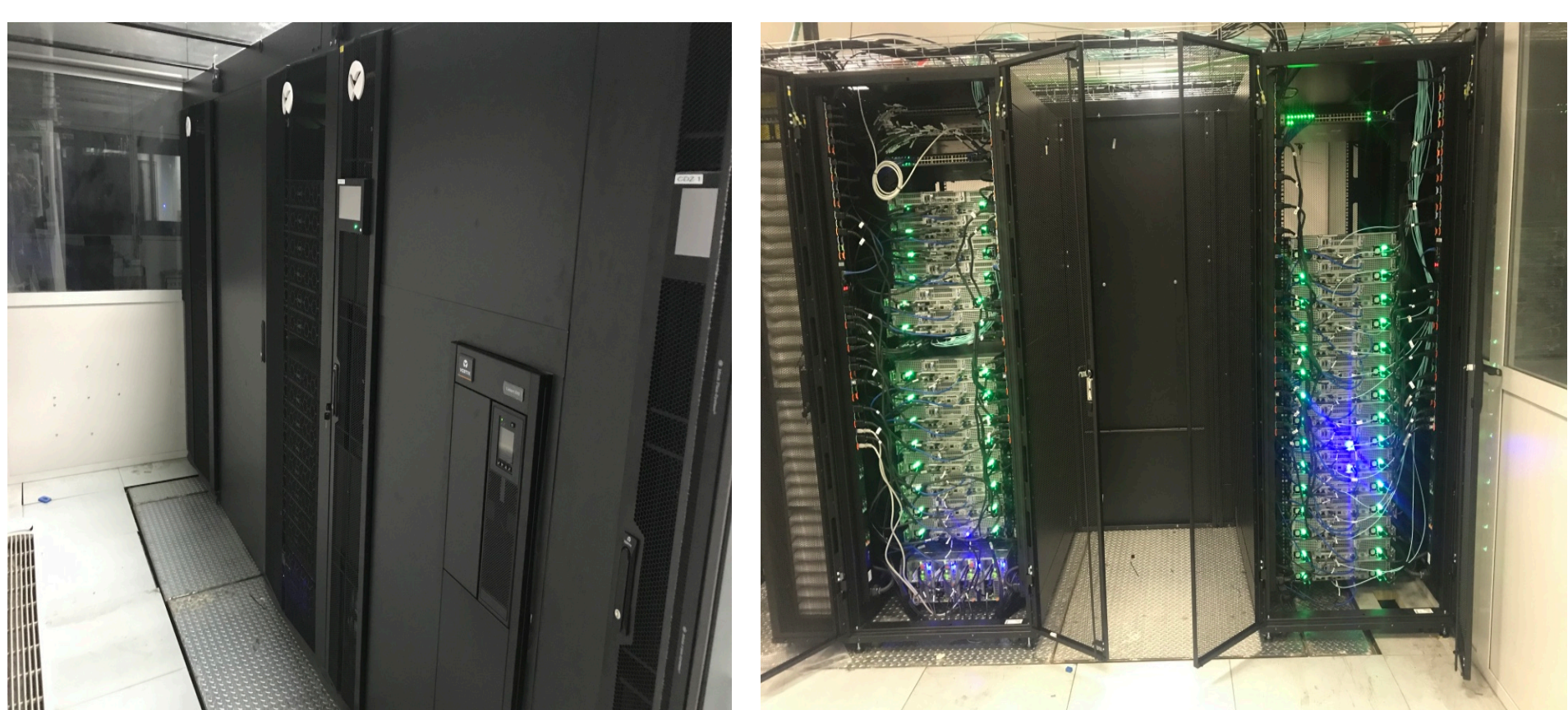
Cluster management and topology

Monitoring: power, temperature, GPU and CPU use

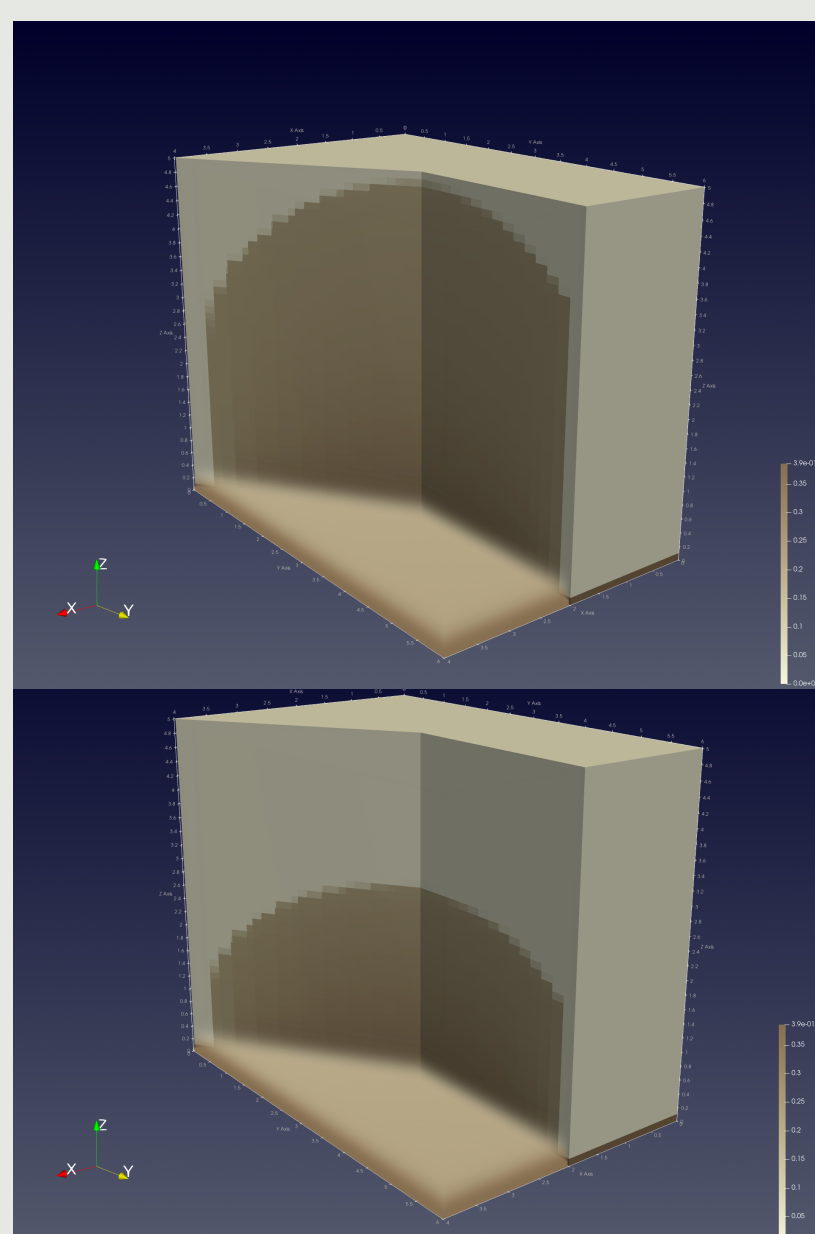


Cluster final layout

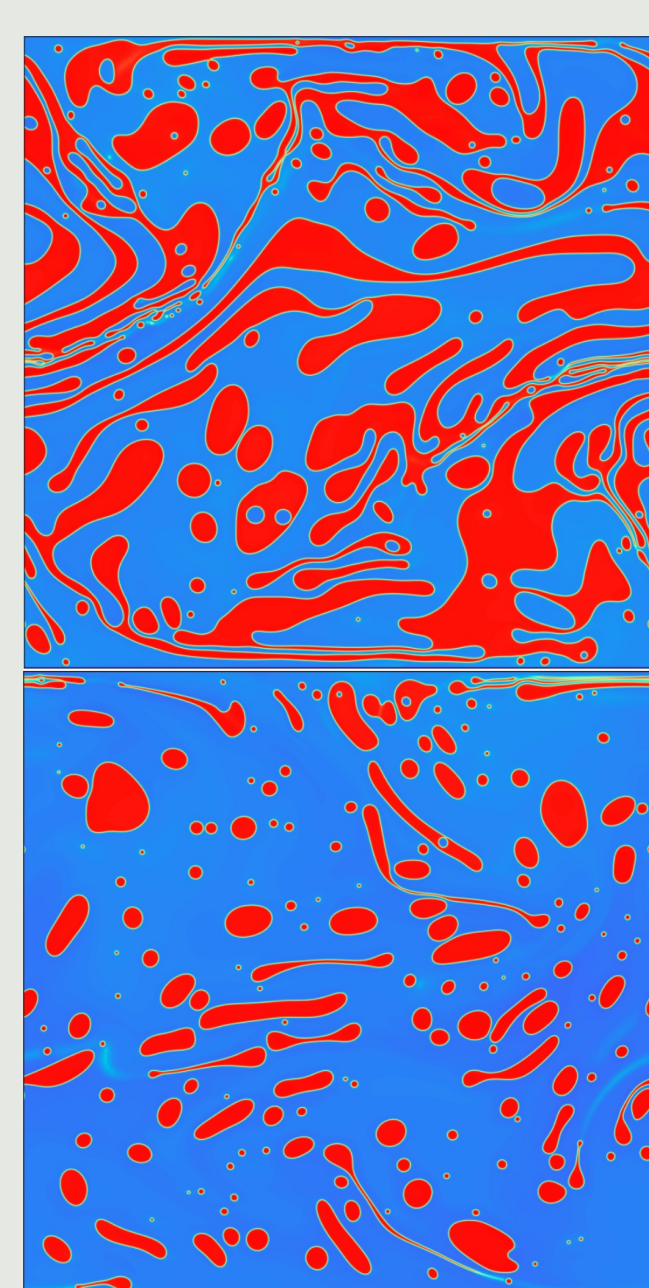
Some simulations



E. Onofri and G. Bretti, StoneVerse: Models and Methods in Cultural Heritage, 2025



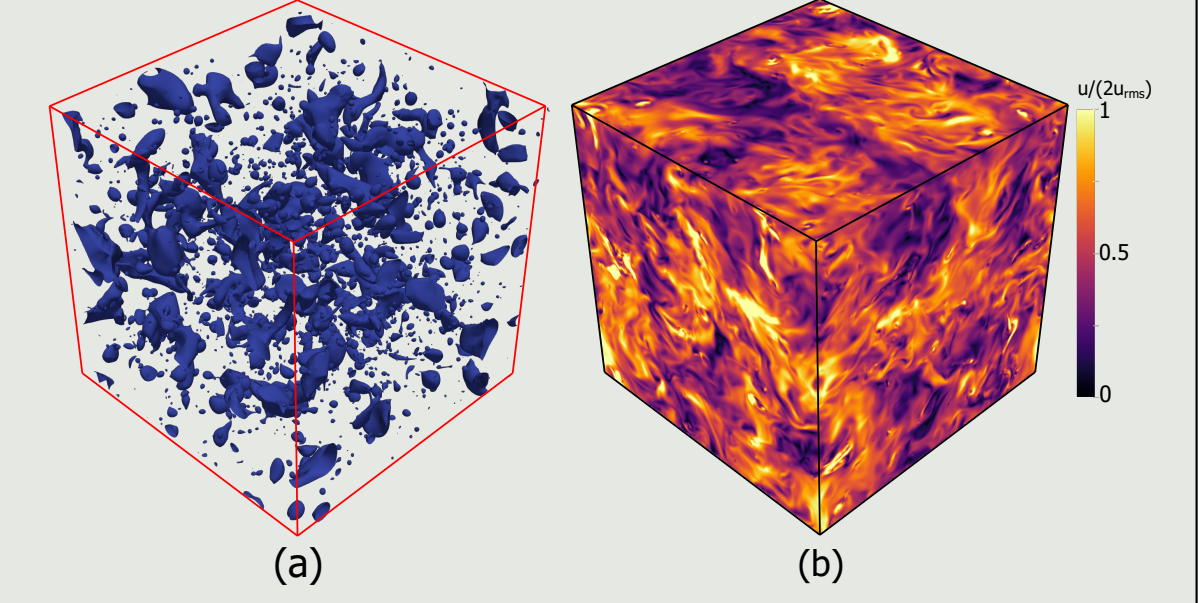
F. Pelusi, M. Bernaschi et al., Oil Droplets dispersed in Water, 2025



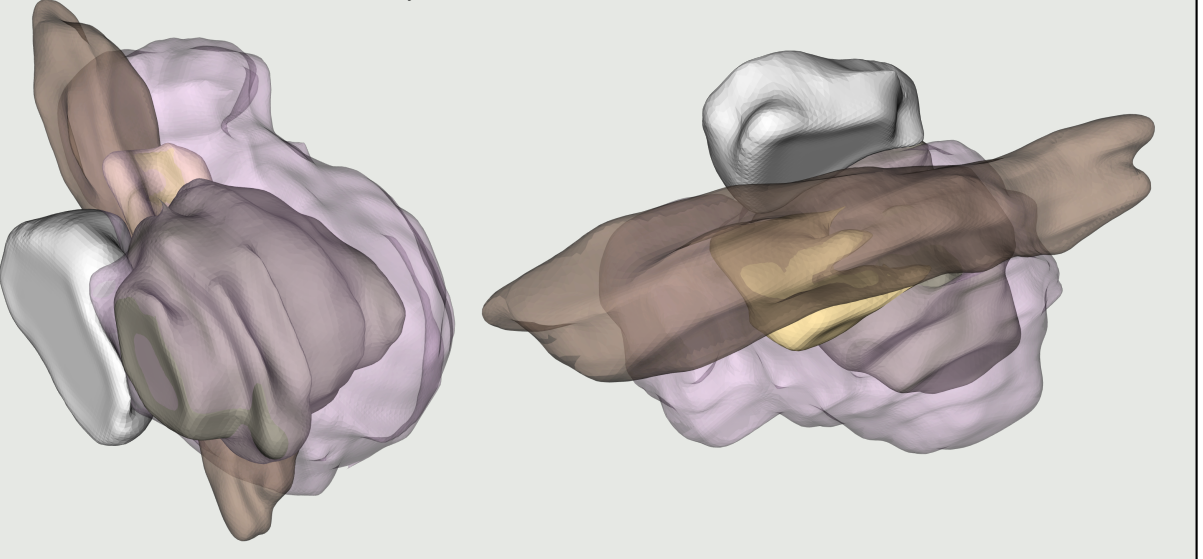
P. D'Ambra et al., Wind Flow Simulation, 2024



M. Lauricella et al., Turbulent Emulsion. Bubble field on panel (a) and Velocity field (b), 2025



M. Pedone, M. Marziali et al., Pelvis MRI scan 3D Print and Visualization, 2025



Performance	Theoretical global (peak)
AI/ML (FP16)	~1.06 PFLOPS
Scientific Computing (FP64)	~140 TFLOPS
Mixed Precision (FP32/TF32 Tensor.float Pytorch)	~550-600 TFLOPS

With the partner support

