

BOLOGNA TECHNOPOLE



Castel Guelfo
di Bologna
November 2024

ABOUT US

CINECA

Cineca stands as one of Italy's **largest computing centers** and is globally recognized for its leadership in **High Performance Computing (HPC)**.

Simultaneously, Cineca serves as a crucial provider of solutions and **services** for universities, research centers, the Ministry of Education, the Ministry of University and Research, and other institutions.

Bologna headquarter



NOT-FOR-PROFIT CONSORTIUM

Since 1969 Cineca supports the
Italian Academic System



118 MEMBERS

2 Ministries, 70 Universities,
46 Academic and Research Institutions



5 OFFICES

Bologna, Milan, Rome, Naples, Chieti



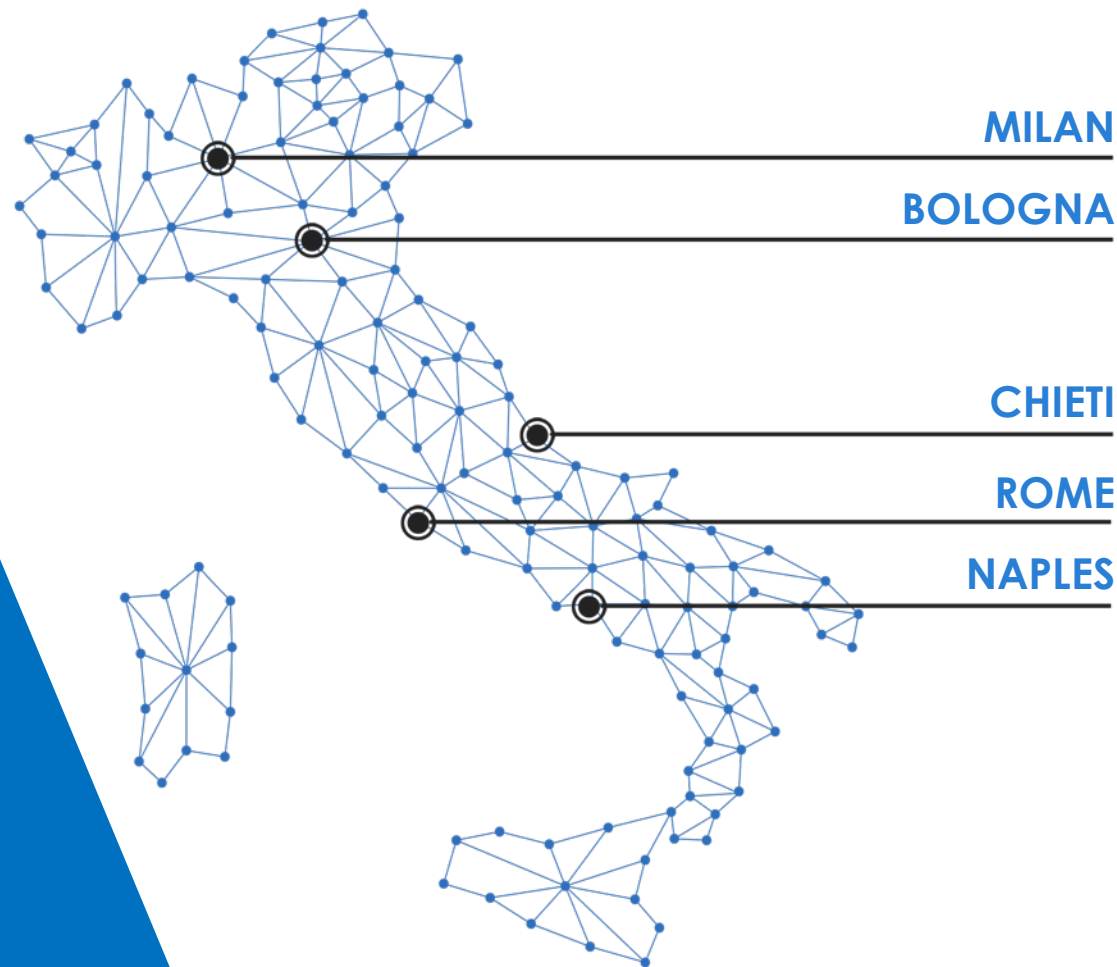
≈ 1100

Employees



≈ 130 MLN €

Yearly Revenue in 2021



LEONARDO AT THE TECHNOPOLE



LEONARDO AT THE TECHNOPOLE

Leonardo is hosted in the new **Cineca datacenter**, located in the Bologna **Technopole**.

Besides Leonardo, the Technopole also houses the supercomputer of the **European Centre for Medium-term Weather Forecasts** (ECMWF) and in a second stage the Tier-1 system of the **INFN** for processing data produced by the Large Hadron Collider (LHC) experiment at CERN.



AN ITALIAN DATA VALLEY



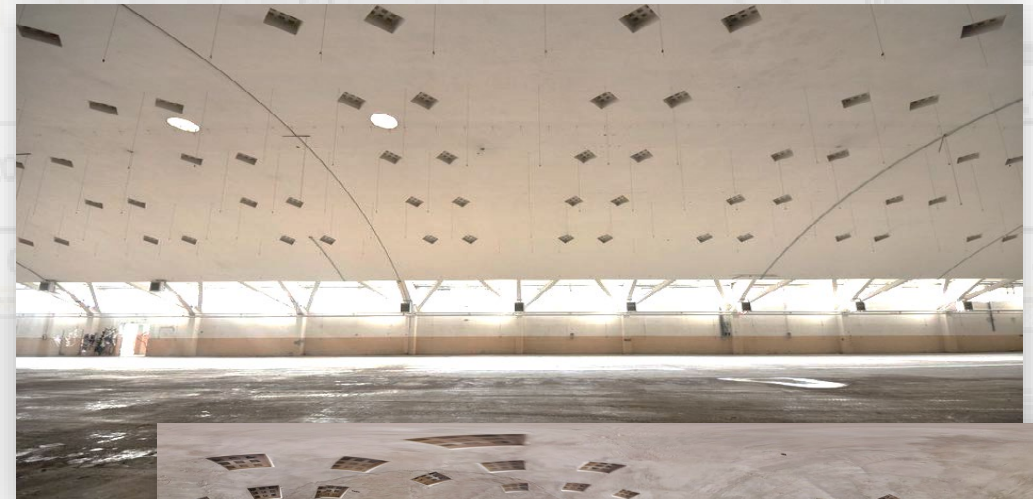
Bologna Technopole was conceived by **Emilia Romagna Region** and **MUR** that established a collaboration in order to promote and develop the project to a national and international level. Therefore, by virtue of hosting **ECMWF**, **CINECA** and **INFN** data centers, Bologna Technopole raises to **become one of the main European hubs for computing and data processing**.

HISTORY AND TRANSFORMATION OF THE BUILDING

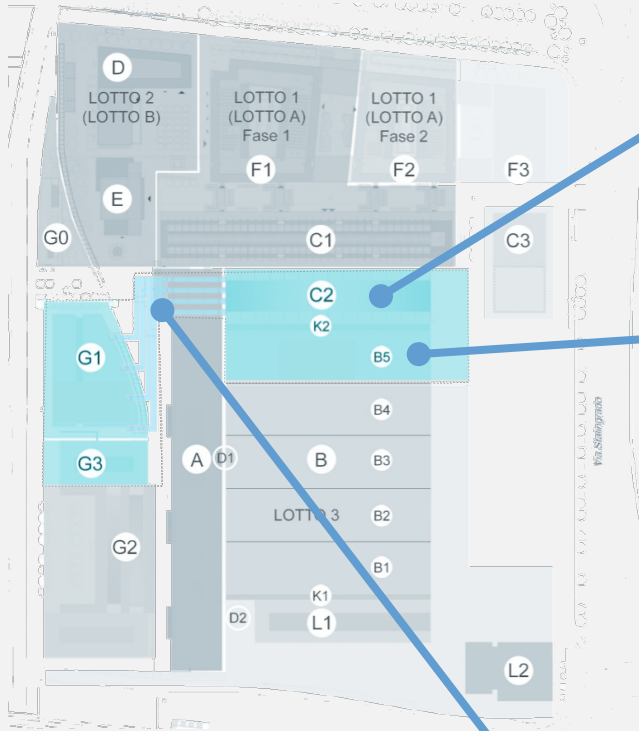
The complex of the **Ex – Manifattura Tabacchi** of Bologna, built in **1952** on a project by **Eng. Pier Luigi Nervi** is the home of the new Technopole, a center of innovation and experimentation for industrial research and technology transfer.

Symbol of the reconstruction of the city after the World War II, the building is part of the **Italian cultural heritage**, and the **redevelopment** project is characterized by **respect** for the architecture designed by Nervi.

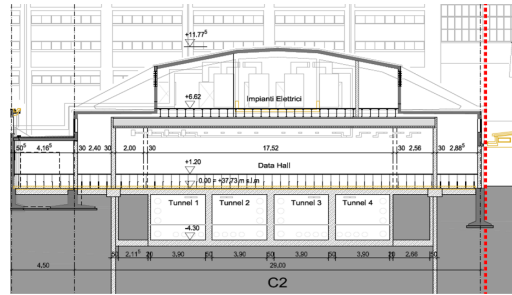
The project to transform the area into a **large scientific center of excellence in supercomputing** brings together, in about 100,000 square meters, research activities and infrastructures with high computing performance, among the most powerful in the world.



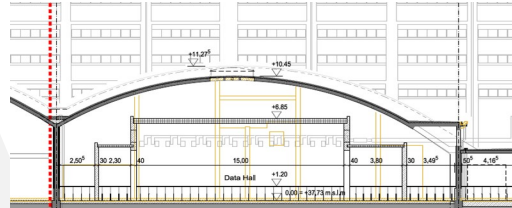
TECNOPOLO



C2 Barrel



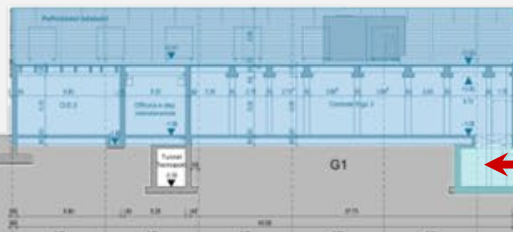
B5 Barrel - INFN Data center



- 10 MW of IT load
- 1240 m² of computing room floor space
- 900 m² of ancillary space
- A direct **liquid cooling capacity** of **8MW**: inlet 37° - outlet 47°

CINECA / INFN

Technological center G1

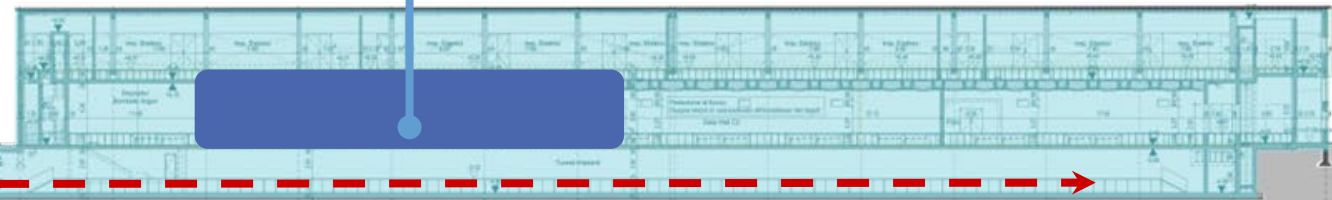


Technological tunnels



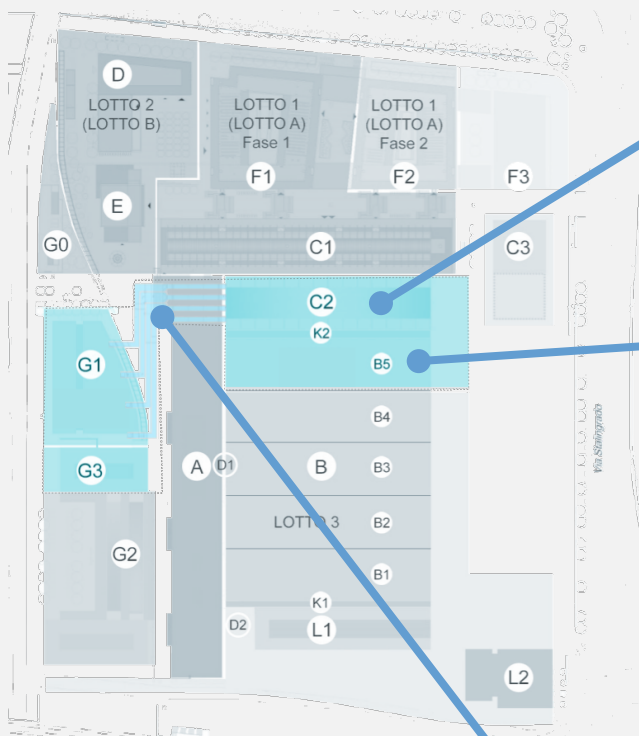
Data Hall Leonardo

C2 Barrel



MEP connections

TECNOPOLO

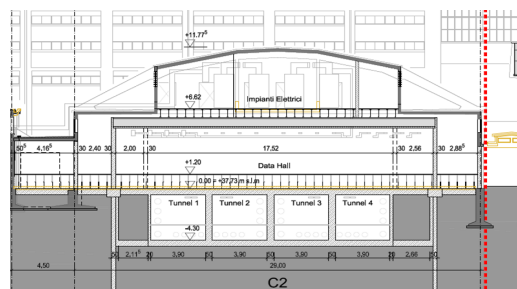


CINECA / INFN

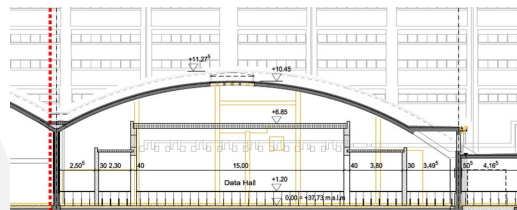
Technological center G1



C2 Barrel



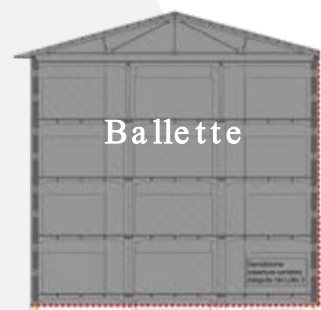
B5 Barrel - INFN Data center



Data Hall Leonardo



Leonardo's room is made of reinforced concrete and can be traced back to a **32x23 m** rectangle. It was designed to **ensure maximum resistance to seismic events (class 4)** and to maintain **mechanical strength** under the action of fire is REI 240 (240 min)



Ballete

Technological tunnels

Data Hall Leonardo

C2 Barrel



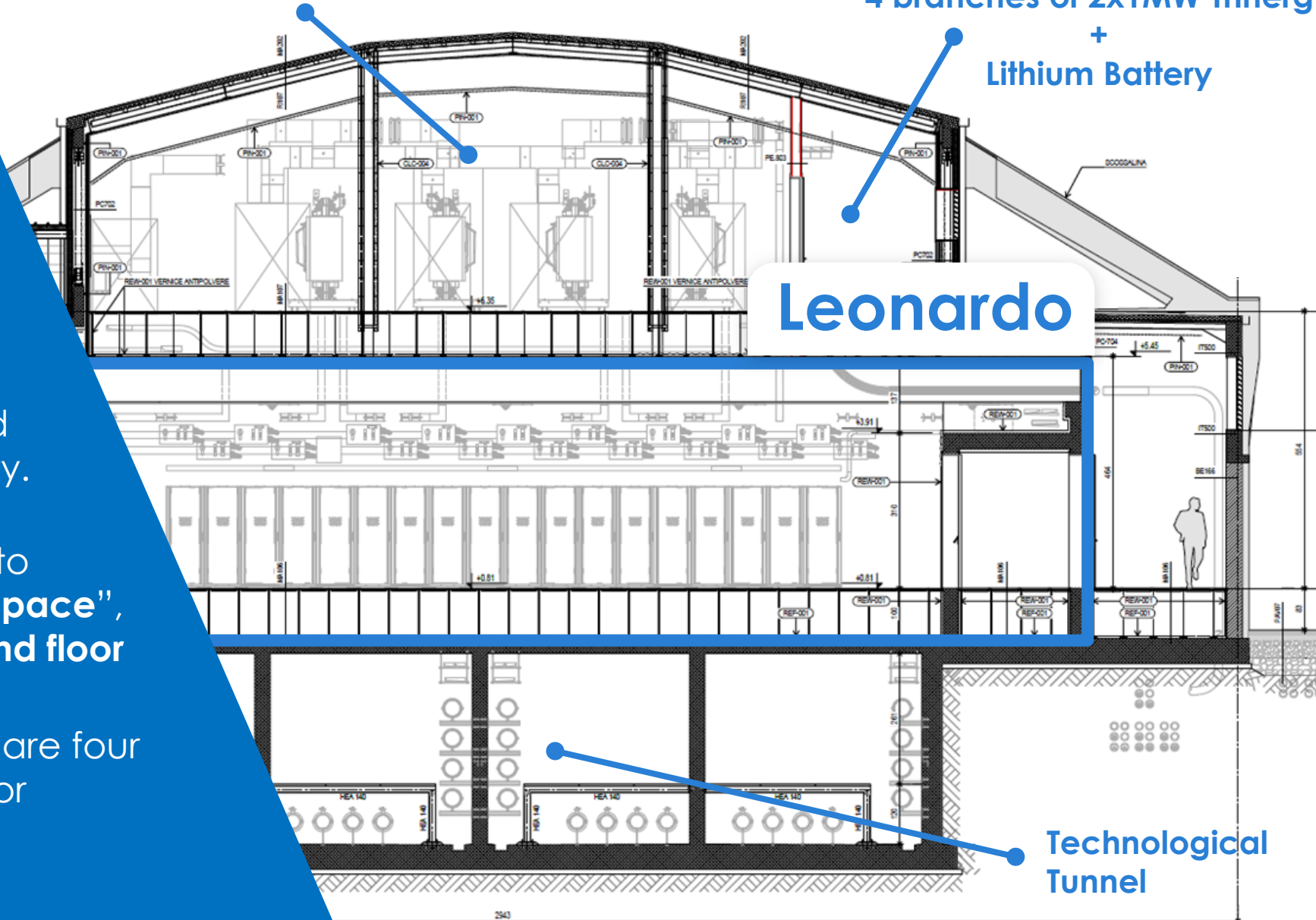
MEP connections

C2 Section

- on the **first floor** there are the four power stations dedicated to the transformation and distribution of electricity.
- the space dedicated to Leonardo, the “**white space**”, is located on the **ground floor**
- in the **basement** there are four independent **tunnels** for cooling

Electrical Infrastructure
transformation MV/LV

Vertiv UPS System
4 branches of 2x1MW Trinergy
+
Lithium Battery



The image features a cityscape at dusk or dawn, with a dark blue diagonal overlay on the left side. The sky is a mix of deep blue and purple, with a low sun or moon creating a soft glow. The city buildings are silhouetted against the sky. Overlaid on the city are several glowing, curved lines in various colors (red, blue, purple, yellow) that suggest a network or data flow. The text 'LEONARDO TECHNICAL INFO' is centered in white, bold, sans-serif font.

LEONARDO TECHNICAL INFO

LEONARDO HPC SYSTEM

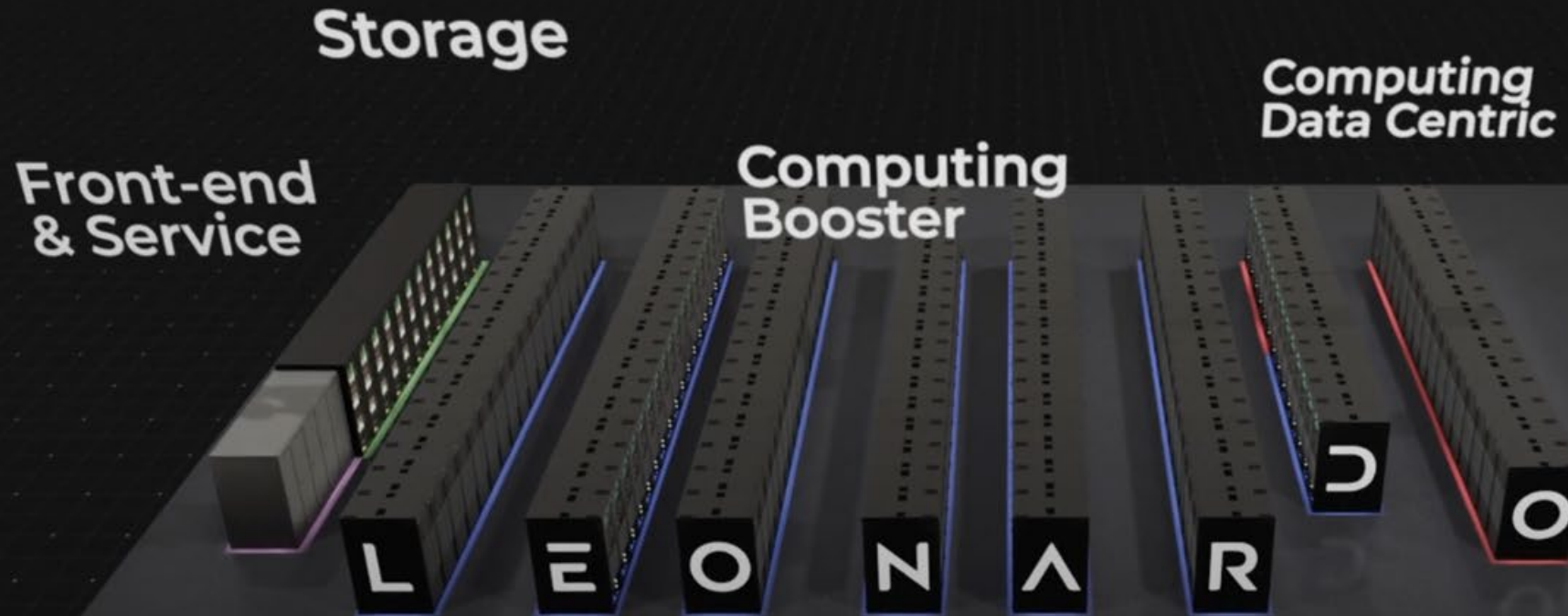
- Leonardo is a step forward towards providing exascale computing capabilities to researchers across Italy and Europe. Leonardo aims at maximum performance and can be classified as a **top tier supercomputing system in Europe**.
- The system combines the most advanced computing components to be able to address even the most complex computational workflows, possibly involving **HPC, AI, high-throughput, and visualization applications**.
- Leonardo system is capable of nearly **250 PFlops** and equipped with over **100 PB** of storage capacity.



LEONARDO HPC SYSTEM



[Leonardo System Design](#)



Leonardo Supercomputer: Key Features



Booster Module

- 1 x CPU Intel Xeon 8358 **32 cores**, 2,6 GHz booster
- **512 (8 x 64) GB RAM** DDR4 3200 MHz
- **4 X Nvidia** custom Ampere **GPU** 64GB HBM2
- **2 x NVidia HDR 2x100 Gb/s** cards



High-Performance Storage

DDN Exascaler-based storage system with fast and capacity tiers for efficient data access.



Visualization Nodes

Dedicated nodes for high-performance visualization tasks.



Energy Efficiency

Bull Energy Optimizer and **Bull Dynamic Power Optimizer** for dynamic power management.



Advanced Interconnect

Nvidia Mellanox network with **Dragonfly+** topology for high-speed, low-latency communication.



Data Centric Module

- **2x Intel Sapphire Rapids**, **56 cores**, 4.8 GHz
- **512 (16 x 32) GB RAM** DDR5 4800 MHz
- **3xNvidia HDR cards** **1x100Gb/s** cards
- **8 TB NVM**

SUSTAINABILITY

- **Sustainability as a core principle:** Environmental impact considered throughout the project.
- **Advanced cooling system:** Utilizes warm water cooling and adiabatic drycoolers for energy efficiency.
- **Reduced energy consumption:** Avoids traditional refrigeration cycles, leading to lower energy usage.
- **Efficient air conditioning:** Closed-circuit piping system for optimal temperature control.
- **Innovative approach:** State-of-the-art cooling technology demonstrated in a dedicated video.

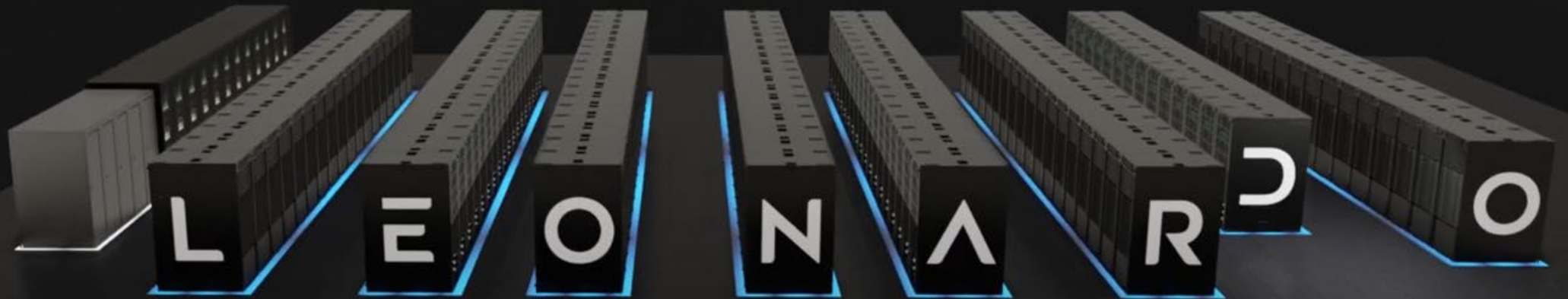


LEONARDO COOLING SYSTEM



Air Cooled

Water Cooled





CINECA

Thank you

