

A graphic element for the MISTRAL logo, consisting of a white, wavy line that transitions into a series of white dots forming a curved path.

**MISTRAL**  
Meteo Italian Supercomputing Portal

16 Settembre 2021

## **METEO-HUB: Formazione per i Centri funzionali regionali e servizi ARPA settore meteo**

Michele Bottazzi  
Gian Franco Marras

- Servizio parte dal settembre del 1993;
- ...
- **2007**: COSMO-I7(ope e tst), COSMO-I2 (RUN 00, senza assimilazione), Med-Ita-RE
- **2008**: BCX, CLX, SP5
- **2009 - 2015**: Protezione Civile (3+2), COSMO-I7, COSMO-I2, Med-Ita-RE, test operativi
- **2015**: COSMO-I7, COSMO-I2, Med-Ita-RE, test operativi
- **2016**: COSMO-5M, COSMO-2I, Med-Ita-RE, LAMI-ENDA, LAMI-ENS, AQ
- **2018**: COSMO-5M, COSMO-2I, Med-Ita-RE, LAMI-ENDA, LAMI-ENS, AQ, CLOUD
- **2020**: COSMO-5M, COSMO-2I, Med-Ita-RE, LAMI-ENDA, LAMI-ENS, METEOHUB
- **2021**: ...



# Catene Operative

Catena operativa	Risoluzione	Area	Corse giornaliere	Previsioni
Cosmo-5M	5 Km	Mediterraneo	2R/D	-18h +72h
Cosmo-2I	2.2 Km	Italia	2R/D	+48h
SWAN-MED-ITA-RE		Stato del Mare Mediterraneo, Italia + 5 aree geografiche	1R/D	-24h +72h
LAMI-ENDA	2.2 Km	Italia	8R/D	+18h
LAMI-ENS	2.2 Km	Italia	40R/D	+48h
IFF	2.2 Km	Italia	1R/D	+240h

# Catene Operative

Catena operativa	Risorse di calcolo	Storage	Archivio
Cosmo-5M	<ul style="list-style-type: none"> <li>• Meucci: 39 nodi (12.3Mcore h/Y)</li> <li>• Galileo: 30 nodi (9.5M core h/Y)</li> <li>• G100: 20 nodi (8.4M cors h/Y)</li> </ul>	<ul style="list-style-type: none"> <li>• Meucci: 0.5 TB/D</li> <li>• Galileo: 0.5 TB/D</li> <li>• Galileo: 1.0 TB/D</li> </ul>	<ul style="list-style-type: none"> <li>• Meucci: 40TB/Y</li> <li>• Galileo: 40TB/Y</li> <li>• G100: 40TB/Y</li> </ul>
Cosmo-2I			
SWAN-MED-ITA-RE			
LAMI-ENDA	<ul style="list-style-type: none"> <li>• Galileo: 95 nodi</li> <li>• Meucci: 61 nodi</li> <li>• G100 ~ 75 nodi</li> </ul>	<ul style="list-style-type: none"> <li>• Meucci: 160GB/D</li> <li>• G100: 20GB/D</li> </ul>	
LAMI-ENS			
IFF		<ul style="list-style-type: none"> <li>• G100: 6GB/D</li> </ul>	2TB/Y

# Altre catene operative

Catena Operativa	Sistema	Risorse di calcolo	Corse
CIMA - WRF	G100	36 nodi	1R/D
CMCC – Seasonal climate forecast	SKL	199 Nodi	1R/M
OGS – Copernicus: marine environment monitoring service	<ul style="list-style-type: none"> <li>• G100</li> <li>• Meucci</li> </ul>	<ul style="list-style-type: none"> <li>• 10 Nodi</li> <li>• 10 Nodi</li> </ul>	<ul style="list-style-type: none"> <li>• 2R/D + 1R/W</li> <li>• 1R/D</li> </ul>
ARPAP - Qualità dell'aria	G100	4 Nodi	1R/D

# Stato attuale del Cloud

## Usage

Displaying 8 items

Instance Name	VCPUs
meteo-hub-dev	8
mistral-deda-prod	4
meteo-hub-maps	8
meteo-hub-prod	8
mistral-cat	2
vm-tampone	1
mistral-arpap	2
mistral-deda-dev	4

## Limit Summary

### Compute



Instances  
Used 8 of 10



VCPUs  
Used 37 of 38



RAM  
Used 111GB of 114GB

### Volume



Volumes  
Used 10 of 10



Volume Snapshots  
Used 1 of 10



Volume Storage  
Used 715GB of 715GB

### Network



Floating IPs  
Allocated 8 of 8



Security Groups  
Used 12 of 15



Security Group Rules  
Used 39 of 70



Networks  
Used 1 of 2

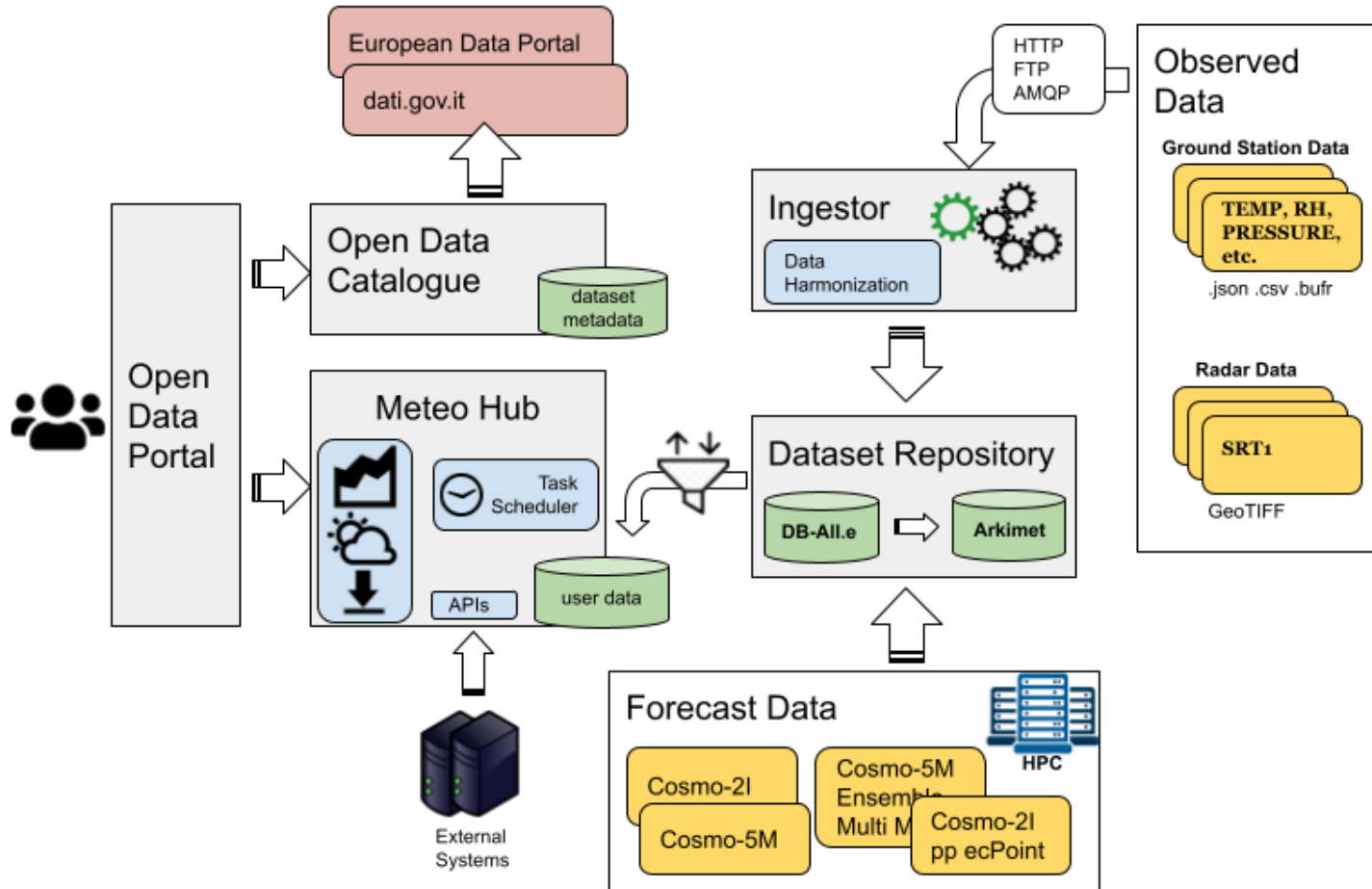


Ports  
Used 19 of 50



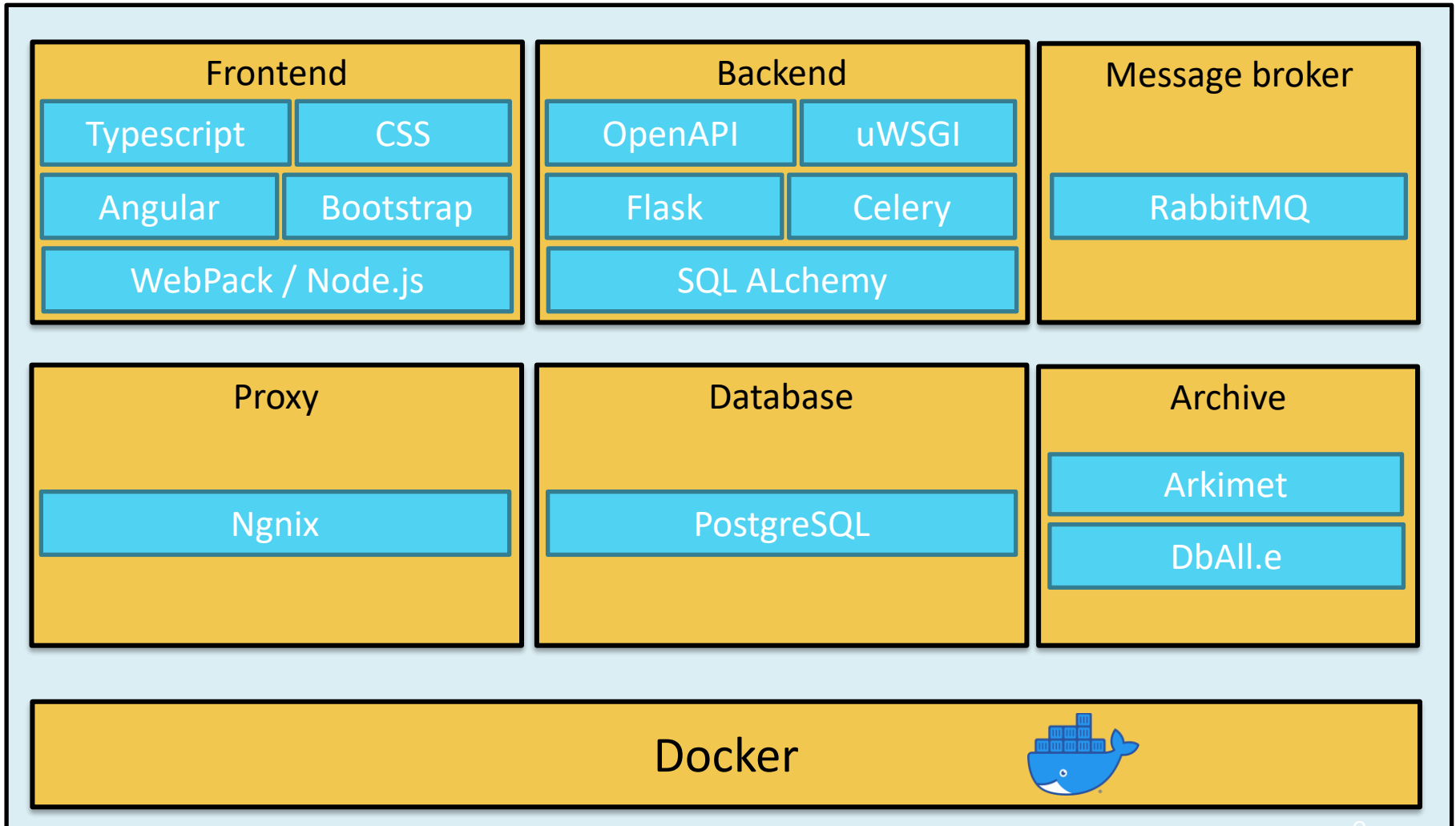
Routers  
Used 1 of 2

# MISTRAL Architecture

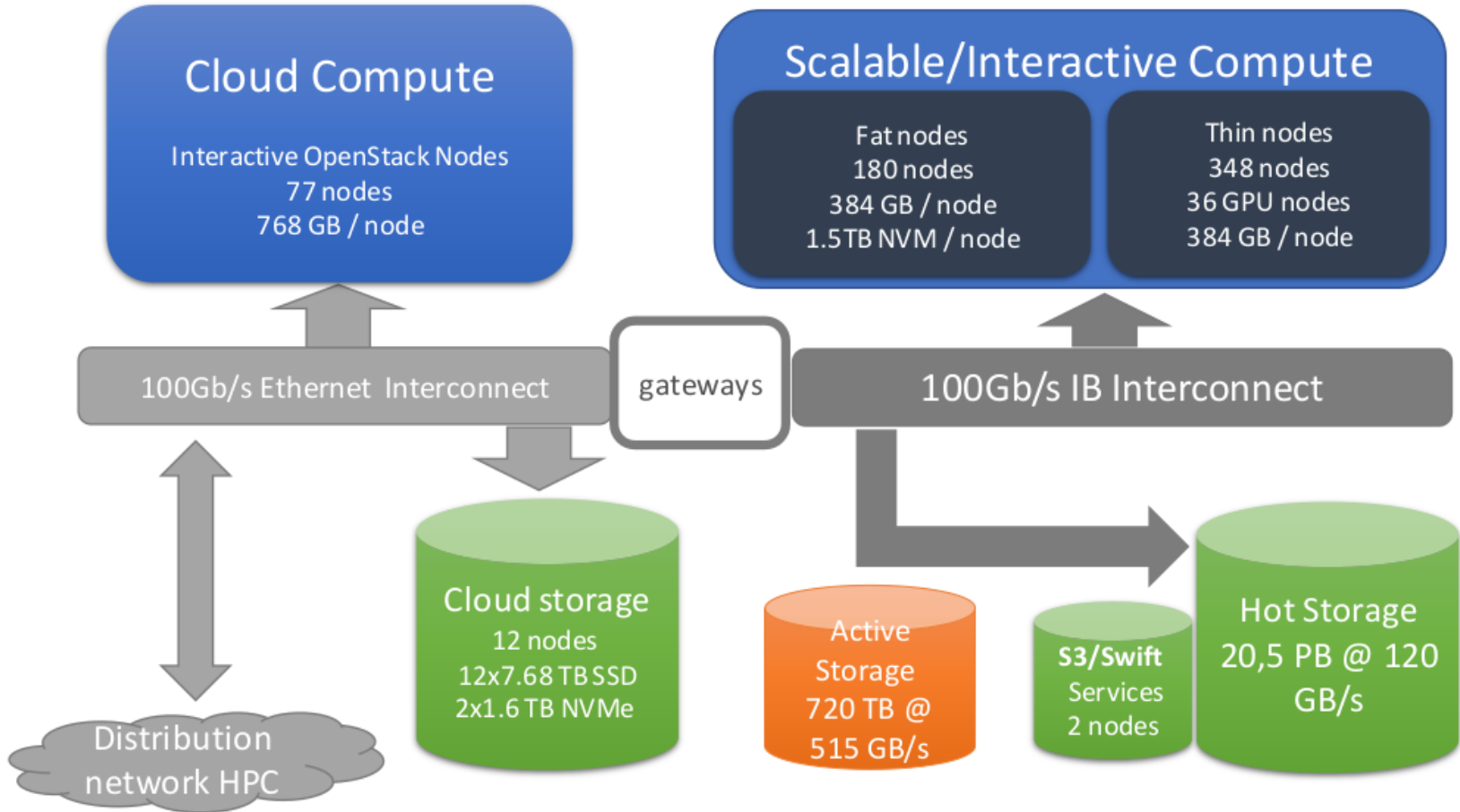




# Technology Stack



# New HPC system: Galileo100



- **Scalable Compute:**
  - 564 computing server
- **Cloud compute:**
  - 77 computing server OpenStack

Architecture	Cores per CPU	CPUs per node	Tot. n of cores	Freq.	Freq. max	Instr. Per Cicle
Xeon 8260 CascadeLake	24	2	48	2.4 GHz	3.90 GHz	4 x AVX-512

## 348 standard server

- 2x CPU 8260 Intel CascadeLake, 24 core, 2.4 GHz
- 384 GB RAM DDR4
- 2933MT/s
- 480 GB SSD

## 180 Data processing server

- 2x CPU 8260 Intel CascadeLake, 24 core, 2.4 GHz
- 384 GB RAM DDR4 2933MT/s
- 2 TB SSD
- 1.5 TB Intel Optane

## 36 GPU server

- 2x CPU 8260 Intel CascadeLake, 24 core, 2.4 GHz
- 384 GB RAM DDR4 2933MT/s
- 2 TB SSD
- 2x NVIDIA V100

## Storage and internal network:

- 20,5 PB active storage (LUSTRE);
- 5 PB di fast storage;
- Switch Infiniband 100 Gbs;

## **77 standard server OpenStack**

- **2x CPU 8260 Intel CascadeLake, 24 cores, 2.4 GHz;**
- **768 GB RAM DDR4 2933MT/s;**
- **2 TB SSD;**

## **Storage and internal network:**

- 1 PB CEPH storage dedicate High Performance (full NVMe/SSD)
- Switch Ethernet 100 Gbs;

## **Ore di calcolo:**

- 200K ore giornaliere per catene operative arpa;

## **Dati prodotti:**

- ~1.5 Tb dati scratch prodotti Forecast Arpae (COSMO 5, COSMO 2 e IFF)

## **Mappe statiche: generate con 144 cores (2+1 nodi G100)**

- ~20 mila al giorno immagini statiche create per COSMO
- ~10 mila al giorno create per IFF

## **Tiles: generate con 288 cores (4+2 nodi G100)**

- ~ 3 milioni di tiles create per mappe dinamiche

## **Dati osservati:**

- 2351 stazioni ~ >250K dati orari e suborari