Newsletter Focus

THE NEW CNAF DATA CENTER AT THE BOLOGNA TECHNOPOLE

CNAF is INFN's National Centre dedicated to research and development in the field of computing and telematics and the management of related services for the Institute's research activities. On May 10, 2024, the new CNAF data centre at the Technopole at the former Manifattura Tabacchi in Bologna, Italy, is being inaugurated. Known as Tier1, the CNAF data centre is INFN's most important one: it provides computing and storage resources and services to more than 40 scientific collaborations in which INFN participates. Tier1 is one of 10 centres around the world in the Worldwide LHC Computing Grid (WLCG) for management and analysis of data produced by experiments at CERN's Large Hadron Collider accelerator. Tier1 currently provides approx. 60,000 cores organised in a computing farm, 150 PBytes of fast storage capacity (online to disk), and a long-term storage system (on tape) of approx. 150 PBytes. Tier1 is interconnected to other INFN and WLCG data centres with links at multiples of 100 Gbps. It is also directly connected with CINECA (where part of the farm is installed) with an 800 Gbps link and with CERN at 400 Gbps. The percentage of resources dedicated to experiments at the LHC is approx. 70% of total resources; the remainder being used by other physics experiments at the accelerators, astroparticle physics experiments, including AMS, CTA, DarkSide, KM3NeT and EUCLID, neutrino experiments such as JUNO and Dune, and gravitational wave experiments such as Virgo. Fully integrated with Tier1, the only Italian Tier2 for the LHCb experiment is also configured. Part of CNAF's resources is also dedicated to technology transfer activities in both the medical field and for the study and conservation of the cultural heritage. Finally, since last year, the CNAF data centre has also been hosting part of the resources for National Recovery and Resilience Plan projects.

Work on the new data centre at the Technopole, which began in 2021, was completed at the end of 2023, and migration of resources from the previous data centre began at the start of 2024 and will be completed by the end of the year. The migration, which is being carried out without service interruption and is one of the main activities of CNAF in 2024, is being performed as part of the CNAF Reloaded project, which also includes evolution of the services provided by the data centre.

On the other hand, the Datacloud project is tasked with evolving INFN's IT infrastructure, in terms of both the Tier structure and the cloud, merging them into the Italian research data lake, of which CNAF will be the main INFN component. This process will not only make the overall system more efficient (from both a management and resource usage perspective), but also allow it to better meet INFN's strategic needs, considering that the cloud/data lake paradigm is emerging as the standard for the WLCG. Estimates of growth in installed resources at Tier1 envisage a steady increase of approx. 15 to 20% per year, driven primarily by the needs of experiments at the LHC. Nevertheless, it is expected that other scientific collaborations will need large amounts of computing and data storage space, also outside INFN's target scientific community.

The new data centre is contiguous with the hall in which the Leonardo supercomputer, CINECA's pre-exascale machine, has been installed, making it easy to use as an extension of CNAF's data centre computing farm. The

technological facilities, shared with the CINECA data centre, will allow resources of up to 3 MW of consumption to be housed in the INFN hall B5 during the first phase (i.e., until 2027), to be subsequently increased to 10 MW in the second phase. The INFN hall has a usable area of more than 2,000 square metres, of which 500 square metres is retained as space for possible future expansion.