

Computing and Network Infrastructure Service

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1 Summary

The Computing and Network Infrastructure Service of LNF is responsible for the design, operation and administration of the data transmission network, the IT infrastructure and the computing resources of the Frascati National Laboratories (LNF) and of the INFN Central Administration (AC). In addition, the Service plays a relevant role at national level by operating and supporting several strategic IT services for the INFN. In particular, the Computing and Network Infrastructure

Service manages:

- **The network infrastructure**, including the structured cabling system (copper and optical fiber), Local Area Network equipment (Layer-2 and Layer-3 switches), wireless network infrastructure, Wide Area Network connections and access routers, firewalls and systems for information-security management;
- **Storage and mass storage infrastructures**, including Storage Area Networks, Network Attached Storage systems, distributed file systems (Andrew File System), and Tivoli Storage Manager for backup and long-term archiving through magnetic tape libraries;
- **Virtualization infrastructures**, consisting of clusters of servers based on Intel processors used to provide and operate multiple virtualization environments;
- **Core network and infrastructure services**, such as Dynamic Host Configuration Protocol and Domain Name System servers, security services (log and audit collection, monitoring systems), and virtual servers supporting the national authentication and authorization infrastructure;
- **Critical IT services**, including the e-mail service (mail relays, mailbox servers, webmail, antivirus and antispam systems), database servers, web and streaming services, log servers, printing services and monitoring platforms;
- **General-purpose computing resources**, such as the Windows domain infrastructure and Linux virtual systems providing user access services (bastion hosts, interactive login services and execution environments for specific applications);
- **Web hosting services for INFN, AC and LNF**, including web servers and portals, application servers and database back-ends;
- **Disaster Recovery and data protection services** for applications and data considered critical or relevant for INFN;

- **IT security activities**, including the definition and implementation of cybersecurity strategies aimed at preventing unauthorized access to organizational assets (computers, networks and data), in compliance with current regulations and with the General Data Protection Regulation (GDPR);
- **Software development**, covering the design, implementation and maintenance of software applications supporting both local and national operational needs.

Furthermore, the Computing and Network Infrastructure Service provides technical support for:

- facilities and experiments that autonomously manage their own computing resources, in particular for the IT infrastructure based on the ATLAS computational grid and for the virtualization systems supporting the DAΦNE accelerator control systems within the Accelerators Division;
- configuration and administration of workstations and personal computers used by employees, associates, graduate and undergraduate students, guests, LNF services and INFN experiments;
- the use of shared or exported IT resources and of distributed devices and peripherals.

2 Activities developed in 2025

During 2025, the Computing and Network Infrastructure Service maintained and evolved the network, storage and virtualization infrastructures, as well as the core IT services and the scientific and administrative computing resources, both at local and national level.

The Service continued the upgrade programme of the Storage Area Network and of the backup and archiving infrastructure, increasing the available capacity both on disk and on tape.

The Computing and Network Infrastructure Service designed and deployed an object-storage infrastructure providing multiple access methods (block storage, distributed file system and S3-compatible object storage, technical note INFN-2025-03-LNF, 26/03/2025). This infrastructure was also used as a buffering and data-recovery platform for the KLOE experiment.

A Platform-as-a-Service (PaaS) cloud infrastructure was further developed to support the execution and orchestration of container-based workloads, providing several test and production environments for LNF facilities, including services for the control of experimental equipment and accelerator subsystems.

In addition, during 2025 the following major infrastructure and development activities were carried out:

- deployment of a Proxmox-based virtualization platform as a strategic replacement for the existing VMware infrastructure;
- upgrade of the campus network of the laboratories, including the extension of optical-fiber connectivity to previously uncovered buildings;
- upgrade and reconfiguration of the spanning-tree protocol in the network infrastructure in order to properly manage the continuously increasing number of VLANs;

- support to the KLOE experiment for data recovery and large-scale data transfer operations, including the restoration and migration of experimental data towards storage and processing infrastructures;
- development of software applications for site access-control management;
- development of logbook software for LNF facilities.

With the aim of training and supporting newly hired personnel within the High Performance Computing Service, the staff of the Computing and Network Infrastructure Service delivered a series of theoretical and practical sessions to enable junior staff to become autonomous in the installation, configuration and management of software-defined storage systems based on Ceph and batch job processing systems based on Slurm.

Furthermore, during 2025 the Computing and Network Infrastructure Service continued the maintenance, evolution and functional enhancement of software applications previously developed for the INFN community. In particular, the following systems, originally released in 2024, were further improved and extended:

- the workplace safety management application supporting job assignment cards and radioprotection cards;
- the system for the booking of institutional resources with approval and authorization workflows (technical note INFN-24-01 LNF, 4/3/2024).