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AI_INFN & CREST: towards a Geo-Distributed Platform for Machine Learning across the INFN Federation

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The National Institute for Nuclear Physics (INFN) is a distributed research institute whose computing resources span its federation. Through the AI_INFN initiative and national projects such as TeRABIT and ICSC, INFN has built a large-scale infrastructure for Machine Learning, combining GPU clusters, HPC systems, FPGA nodes and high-performance storage. It serves a growing community applying ML to physics research, with a focus on scalability, open science and emerging paradigms such as quantum computing.
Building on the architecture developed at the CNAF Tier-1 site, which optimized hardware orchestration and the user experience for interactive and batch workloads, the ReCaS-Bari site within the INFN Cloud federation has been selected for platform replication and functional extension. This deployment proves the design replicable across data centres and serves as a testbed for frontier features, including workload offloading to the Leonardo supercomputer and other HPC centres, already validated from CNAF with Argo Workflows dispatching pods through interLink. Establishing ReCaS-Bari as an alternative to the CNAF instance lays the foundation for cross-site federation and a geo-distributed AI computing infrastructure within INFN. Multi-tenant storage and POSIX object-storage access are in production, while offloading from ReCaS-Bari and Kubernetes accounting are under development, on a backbone open to computing centres, research groups and scientists across disciplines.

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