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A Cloud oriented platform to exploit ANSYS application

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Cloud computing technologies are becoming increasingly important to provide a variety of services able to serve different communities' needs. This is the case of the DARE project (Digital Lifelong Prevention), a four-year initiative, co-financed by the Italian Ministry of University and Research as part of the National Plan of Complementary Investments to the PNRR. The project aims to develop prevention and digital health in Italy through the complete valorization of the health data chain, including data relevant to health. Within DARE, INFN the Italian National Institute for Nuclear Physics (INFN) is leading the technology scouting and integration.

In particular, we present the activities aimed at using ANSYS software, moving from a local batch solution to a cloud-enabled platform. As a result, we deployed a microservices-based environment using the solutions and services made available within INFN Cloud, the Cloud infrastructure of INFN, adopting consolidated technologies like Kubernetes and CEPH and integrating services like Nextflow to improve the interoperability of the presented solution.

In such respect, Kubernetes offers a dynamic and adaptable system for launching and overseeing containerized applications, making it an excellent option for handling intricate workloads within the Cloud environment. CEPH offers a distributed storage environment and the possibility to provide persistent storage for Kubernetes as well as Object storage that can be made available to services and users to store their outcome and analyze their data. Similarly, Nextflow, a tool for managing workflows, was selected for its ability to seamlessly incorporate different software packages and systems for environment management. Additionally, it streamlines the process of creating and implementing computational pipelines that handle large amounts of data.

The objective of the current activity is to identify benefits and explore potential enhancements through the use of a cloud-based approach. Additionally, due to handling patient information and being subject to GDPR regulations, the workflow must be carried out within a secure infrastructure. Having worked on projects involving personal data at CNAF, we have acquired experience in the security sector, as well as in hardening tools like RKE2+CIS, and infrastructures such as EPIC. Ultimately, our goal is to integrate these workflows into a microservices-based environment within a secure Cloud infrastructure, with the intention of easily reproducing this process for future collaborations in the biomedical field.

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