Training Goals

Cloud Services for the public

- Google Cloud platform
- AWS

Cloud Services for the scientific communities

- INFN Cloud
- EGI federated cloud
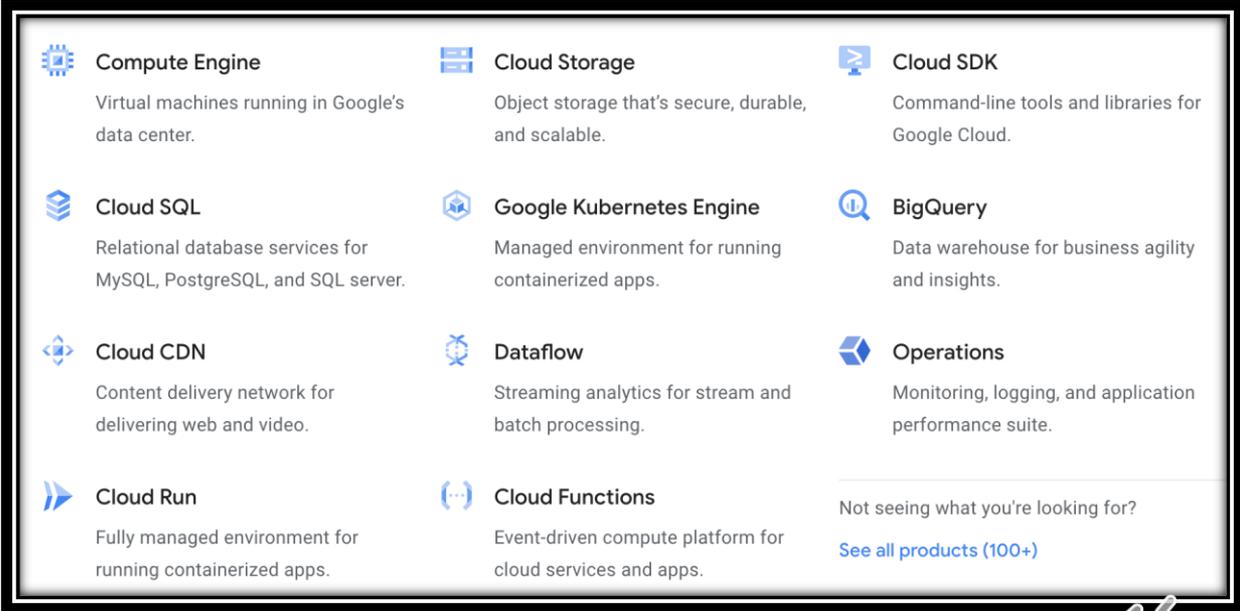
Google Cloud Platform

- **Google Cloud Platform** (**GCP**), offered by Google, is a suite of cloud computing services

- Registration requires a **credit card or bank account** details.

- Google Cloud Platform provides the following environments

  - infrastructure as a service

  - platform as a service

  - serverless computing.

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Google Cloud Platform

- Alongside a set of management tools, it provides a series of modular cloud services including

  - Compute

  - Storage & Databases

  - Networking

  - Big Data

  - Cloud AI

  - Management Tools

  - Identity & Security

  - IoT

  - API Platform

Compute Engine
Virtual machines running in Google's data center.

Cloud Storage
Object storage that's secure, durable, and scalable.

Cloud SDK
Command-line tools and libraries for Google Cloud.

Cloud SQL
Relational database services for MySQL, PostgreSQL, and SQL server.

Google Kubernetes Engine
Managed environment for running containerized apps.

BigQuery
Data warehouse for business agility and insights.

Cloud CDN
Content delivery network for delivering web and video.

Dataflow
Streaming analytics for stream and batch processing.

Operations
Monitoring, logging, and application performance suite.

Cloud Run
Fully managed environment for running containerized apps.

Cloud Functions
Event-driven compute platform for cloud services and apps.

Not seeing what you're looking for?
See all products (100+)

Source: https://cloud.google.com/products

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AWS

Amazon Web Services (**AWS**) provides on-demand cloud computing platforms and APIs

- to individuals, companies, and governments,

- provide a set of primitive abstract technical infrastructure and distributed computing building blocks and tools

AWS comprises more than 175 products and services

AWS offers its services as **pay-as-you-go basis**

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Services for research communities

- INFN Cloud

    - INFN is offering to its users a comprehensive and integrated set of Cloud services through its dedicated **INFN Cloud infrastructure**

- EGI Federated Cloud

    - a multi-national cloud system that integrates community, private and/or public clouds into a scalable computing platform for research in Europe

National Institute for Nuclear Physics

Mission

High energy physics experiments in collaboration with worldwide research centers and institutions. For the past 10 years, this mainly meant supporting the experiments @ CERN (LHC), although the scope is now widening very quickly to other communities.

State-of-the-art distributed IT technologies

- Cloud computing and related services
- Exascale distributed storage services
- Cloud-assisted and edge-enabled intelligent systems (ML and DL techniques for industrial digital twins, IoT, medicine and more…)

Currently, INFN operates:

- 9 medium size centers (Tier-2s in the LHC Computing Grid
- 1 large Tier-1 center, at CNAF (Bologna)–certified ISO-27001
- centers are connected with 10-100 Gbit/s network

Visit https://www.cnaf.infn.it/

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Cloud Services: the INFN Cloud example

- INFN is offering to its users a comprehensive and integrated set of Cloud services through its dedicated **INFN Cloud infrastructure**

- The **INFN Cloud portfolio**
  - easy to use web interface but also exploitable via command line interfaces
  - defined upon clear user requirements.
  - based on **composable, scalable, open source solutions** and can be easily extended either by the INFN Cloud support team or directly by end users.

- **Authentication and authorization** for accessing all INFN Cloud services
  - enforced through the INDIGO-IAM federated solution
  - fully compliant with European Open Science Cloud (EOSC) and industry standards.

- **Access to the INFN Cloud services is currently reserved to INFN personnel**
  - research agreements with other institutions are foreseen in the future.

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INFN Cloud Service Catalogue

Compute Services

Virtual Machine
Launch a compute node getting the IP and SSH credentials to access via ssh

Docker-compose
Run a docker compose file fetched from the specified URL

Apache Mesos cluster
Apache Mesos abstracts CPU, memory, storage, and other compute resources away from machines (physical or virtual)

Kubernetes cluster
Deploy a single master Kubernetes 1.17.0 cluster

Analytics

Elasticsearch and Kibana
Deploy a virtual machine pre-configured with the Elasticsearch search and analytics engine and with Kibana for simple visualization

Spark + Jupyter cluster
Deploy a complete Spark 3.0.1 + Jupyter Notebook on top of a Kubernetes (K8s) computing cluster

Jupyter with persistence for Notebooks
Run Jupyter on a single VM enabling Notebooks persistence

Scientific Community Customizations

Machine Learning

RStudio
RStudio is an integrated development environment (IDE) for R.

Jupyter with persistence for Notebooks
Run Jupyter on a single VM enabling Notebooks persistence

Working Station for Machine Learning INFN (ML_INFN)
Run a single VM with all the ML-INFN environment exposing both ssh access and Jupyter

Data Services

https://www.cloud.infn.it/service-catalogue/

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The Dashboard


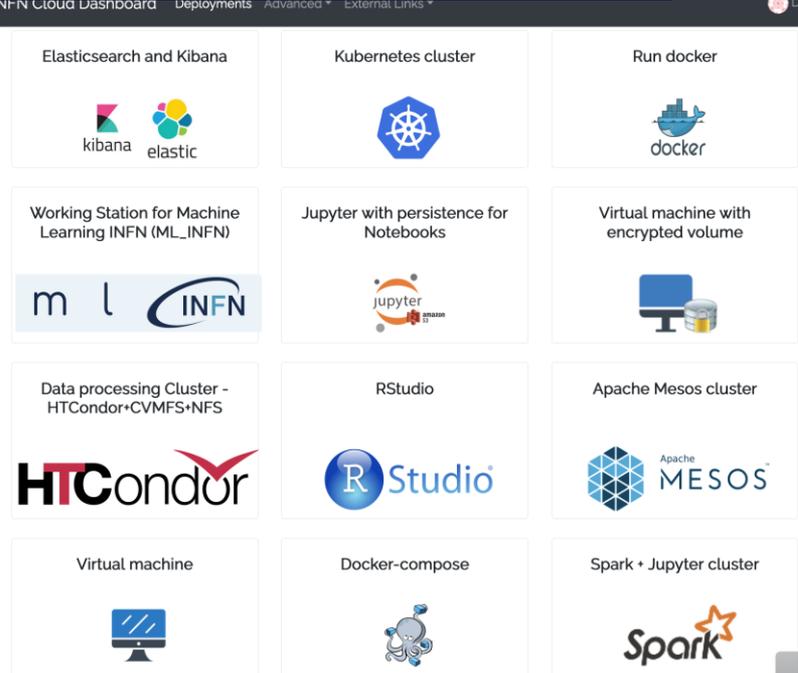Authentication *can* be enabled for::
- Local username/password
- Google accounts
- EduGAIN (e.g. University, research centers, etc.)
- Other OIDC providers

Transparent, multi-site federation for users of Cloud resources belonging to INFN and/or to other Cloud providers (private or public)

Composed, high-level services easily customizable and configurable directly by users
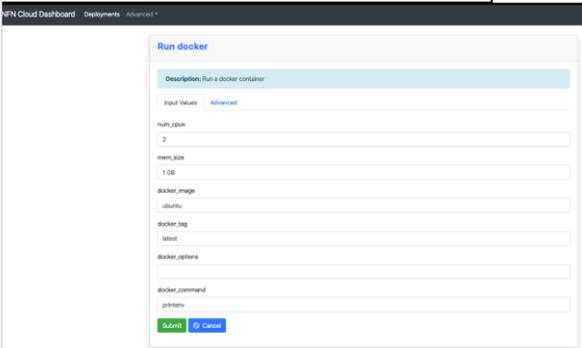
Access to the Cloud services through a common dashboard, with different views depending on the users / user groups.

Welcome to the INFN Cloud Dashboard!

Compute Services

Scientific Community Customizations

Analytics

Elasticsearch and Kibana

Kubernetes cluster

Run docker

Working Station for Machine Learning INFN (ML_INFN)

Jupyter with persistence for Notebooks

Virtual machine with encrypted volume

Data processing Cluster - HTCondor+CVMFS+NFS

RStudio

Apache Mesos cluster

Virtual machine

Docker-compose

Spark + Jupyter cluster

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EGI: Advanced computing for research

Mission

To deliver **open solutions for advanced computing and data analytics** in research and innovation, **by coordinating and provisioning an international federated infrastructure** from both the public and private sector in Europe. As an open initiative **with a global outlook**, the EGI Federation also connects service providers beyond Europe following the collaboration needs of the served communities.

The **EGI Federation** is an international e-infrastructure that provides advanced computing and data analytics for research and innovation.

EGI fully realises the **Open to the World** vision

Cloud providers

Resource centres (delivering HTC)

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EGI Service Catalogue

Data Schools

Compute

Cloud Compute
Run virtual machines on demand with complete control over computing resources

Cloud Container Compute
Run Docker containers in a lightweight virtualised environment

High-Throughput Compute
Execute thousands of computational tasks to analyse large datasets

Workload Manager
Manage computing workloads in an efficient way

Applications

Applications on Demand
Use online applications for your data & compute intensive research

Notebooks
Create interactive documents with live code, visualisations and text

Security

Check-in
Login with your own credentials

Training

FitSM Training
Learn how to manage IT services with a pragmatic and lightweight standard

ISO 27001 Training
Learn how to manage and secure information assets

Training Infrastructure
Dedicated computing and storage for training and education

Storage and Data

Online Storage
Store, share and access your files and their metadata on a global scale

Archive Storage
Back-up your data for the long term and future use in a secure environment

Data Transfer
Transfer large sets of data from one place to another

TÜV SÜD ISO 20000
Certified IT Service Management System
ISO 20000
www.tuv-sud.com/ms-cert

TÜV SÜD ISO 9001
Certified Quality Management System
ISO 9001
www.tuv-sud.com/ms-cert

https://www.egi.eu/services/

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Information and Material

- https://www.cloud.infn.it/

  - https://www.cloud.infn.it/service-catalogue/

  - https://www.cloud.infn.it/webminars/

- https://www.egi.eu/services/

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