



**Data
Schools**

Computational Infrastructures: Cloud oriented Services

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Training Goals

Cloud Services for the public

- Google Cloud platform
- AWS

Cloud Services for the scientific communities

- INFN Cloud
- EGI federated cloud

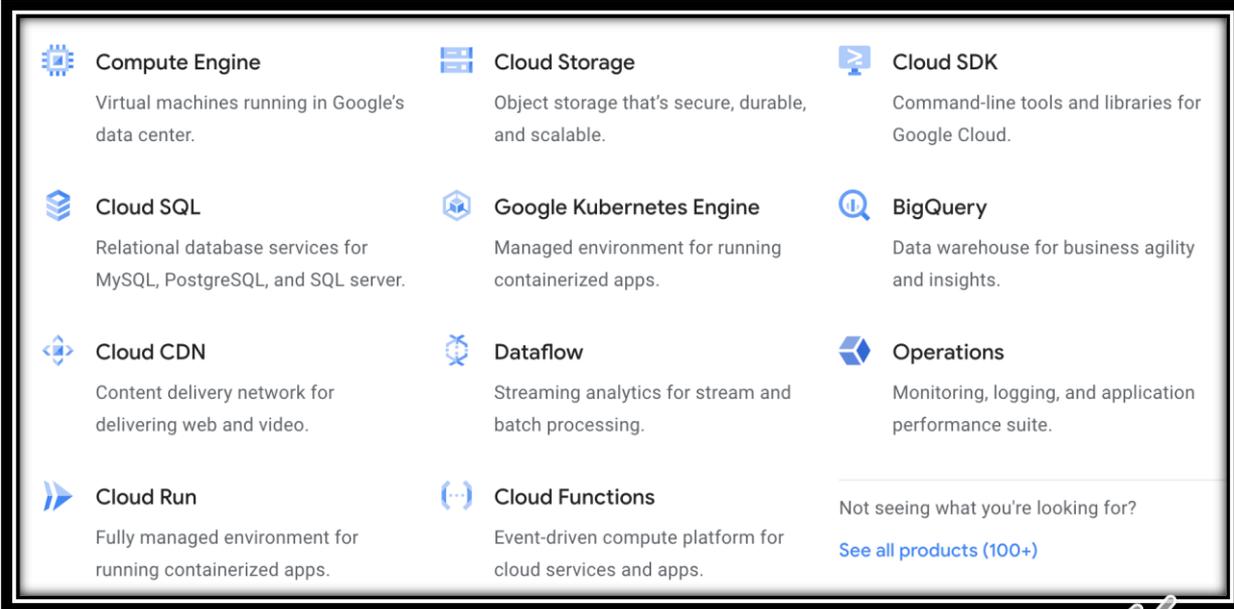
Google Cloud Platform



- **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.

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



A screenshot of the Google Cloud Platform products page, showing a grid of service cards. Each card includes an icon, the service name, and a brief description. The services listed are: 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), and Cloud Functions (Event-driven compute platform for cloud services and apps). At the bottom right of the screenshot, there is a search bar with the text 'Not seeing what you're looking for?' and a link 'See all products (100+)'. The entire screenshot is enclosed in a thick black border.

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

AWS



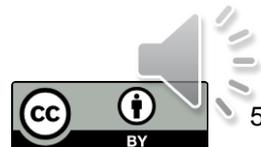
Amazon Web Services (AWS) provides on-demand cloud computing platforms and APIs

- 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**

Source: https://en.wikipedia.org/wiki/Amazon_Web_Services#cite_note-techradar-11



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

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.

The Dashboard



Istituto Nazionale di Fisica Nucleare

Welcome to **infn-cc**

Sign in with your infn-cc credentials

Sign in

[Forgot your password?](#)

Or sign in with

Your institutional account

Not a member?

Register a new account

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

The screenshot shows the 'Run docker' configuration page. It includes a description, input fields for 'num_cpus' (set to 2), 'mem_size' (set to 1 GB), 'docker_image', 'shards', 'docker_tag', 'latest', 'docker_options', and 'docker_command'. There are 'Submit' and 'Cancel' buttons at the bottom.

The screenshot shows the main dashboard with a navigation bar and several service tiles:

- Elasticsearch and Kibana (kibana, elastic)
- Kubernetes cluster
- Run docker
- Working Station for Machine Learning INFN (ML_INFN) (m l, INFN)
- Jupyter with persistence for Notebooks (jupyter, amazon)
- Virtual machine with encrypted volume
- Data processing Cluster - HTCondor+CVMFS+NFS (HTCondor)
- RStudio (R Studio)
- Apache Mesos cluster (Apache MESOS)
- Virtual machine
- Docker-compose
- Spark + Jupyter cluster (Spark)

Access to the Cloud services through a common dashboard, with different views depending on the users / user groups.

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.



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

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



Cloud providers



Resource centres (delivering HTC)

EGI Service Catalogue

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

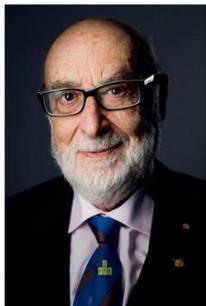


<https://www.egi.eu/services/>

Distributed scientific computing enables scientific discoveries...

1700 open access publications / year

The Nobel Prize in Physics 2013



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François Englert
Prize share: 1/2

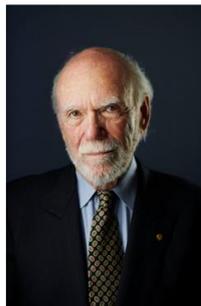


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Peter W. Higgs
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The Nobel Prize in Physics 2017



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LHC Collaboration

LIGO-VIRGO Collaboration

<https://www.egi.eu/use-cases/>

Information and Material

- https://en.wikipedia.org/wiki/Amazon_Web_Services#cite_note-techradar-11
- <https://cloud.google.com/solutions>
- www.cloud.infn.it
- <https://www.egi.eu/services/>
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Data Schools

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