



GÉANT Community Clouds

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SIG CISS 28th Nov 2022

www.geant.org

Goal of the Community Cloud Task

Scaling up the national cloud offers to the community clouds

- **Aggregate and scale up capable national service offerings to a pan-European level.**
- **Connect commercial and community service offerings to the GÉANT and NRENs' infrastructures**
- **Explore and when deemed feasible, provide multi-cloud management capabilities, to manage workloads and move these between multiple providers, through a single interface.**

Multicloud Management System

GÉANT Multi Cloud is an integrated cloud platform for

- Provision both commercial and community cloud services
- Manage compute resources and workloads
- within a single easy-to-use self-service portal

GÉANT Multi Cloud is built on open source tools

- A self-service portal for the end-users supporting social, national and federated identity providers. .
- Built-in accounting and integrations with third-party billing systems. Support for one-time, usage-based or periodic billing models.

GÉANT Multi-Cloud - Helping NRENs manage multiple cloud providers

The GÉANT Multi-Cloud is an open source digital platform allowing agile deployment, management and monitoring of multiple cloud services, from a single user-friendly interface.

The platform enables NRENs and institutions to combine cloud services from a wide range of commercial providers with their own on-premises infrastructure, and then to easily operate resources of a variety of clouds through a central portal, accessible via login to the eduTEAMS service.

Currently in its pilot phase, the GÉANT Multi-Cloud will make the use of cloud infrastructure services easier, cheaper and safer.



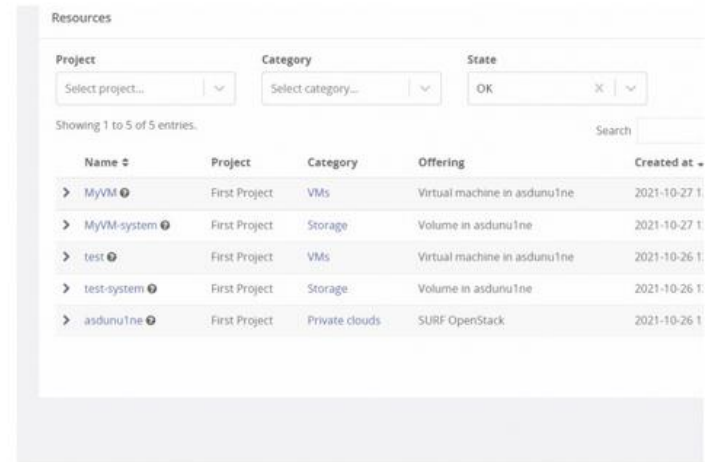
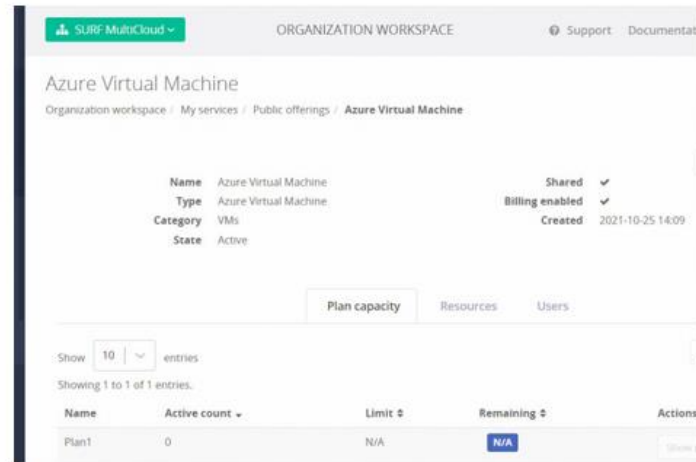
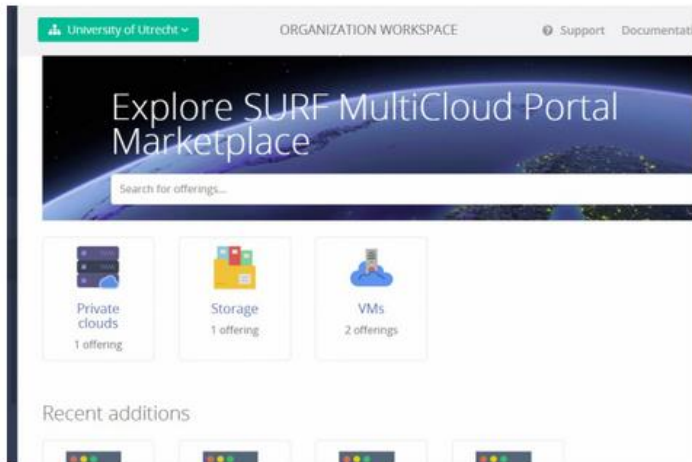
Multi Cloud Benefits

Provision resources both from private and public clouds.
OpenStack, AWS EC2 and are supported, along with many more.

Empower the users with a self-service portal for easy resource and lifecycle management and for achieving better end-to-end visibility.

- Trackable events, alerts and notifications, always available to customers for compliance and **activity monitoring**.
- Built-in predictive **cost estimating** and usage-based resource accounting helps to get clear view on finance for all sides.
- Having high precision **data from various sources** provides vital insights into the end customer's behaviour.
- Support for **ticketing** functionality and integrates with third-party Helpdesk back-ends.
- Open Source under MIT license with support for subscriptions and deployment services from the creator (OpenNode LLC).

Screenshots



Video

https://drive.google.com/file/d/1V6iWTXCJPezjH_OADLFKf59EVow7-sTj/view?usp=sharing

Description of the GÉANT Cloud Flow

GÉANT Cloud Flow (GCF) is an integrated cloud platform for

- defining and implementing compute resources & workflows
- within a single, unified and easy-to-use dashboard

GCF is an open source collection of tools

- Supporting a broad spectrum of scientific services by **containers**.
- Delivering **large scale workflow analysis across** international boundaries
- Based on technology developed by the Global Alliance for Genomics and Health (**GA4GH**) and **ELIXIR**



Working Together to Provide Hybrid Cloud Services for Research and Education

The GÉANT Community Cloud Framework is now available as a beta program.

The GÉANT Community Cloud Framework allows NRENs and institutions to aggregate their cloud infrastructures to manage them as a secure, robust and flexible integrated cloud platform for use by NRENs and their institutions. The platform allows researchers to define and implement compute resources and workflows within a single, unified dashboard. www.geant.org/wp-content/uploads/2020/10/community-clouds-scaled.jpg

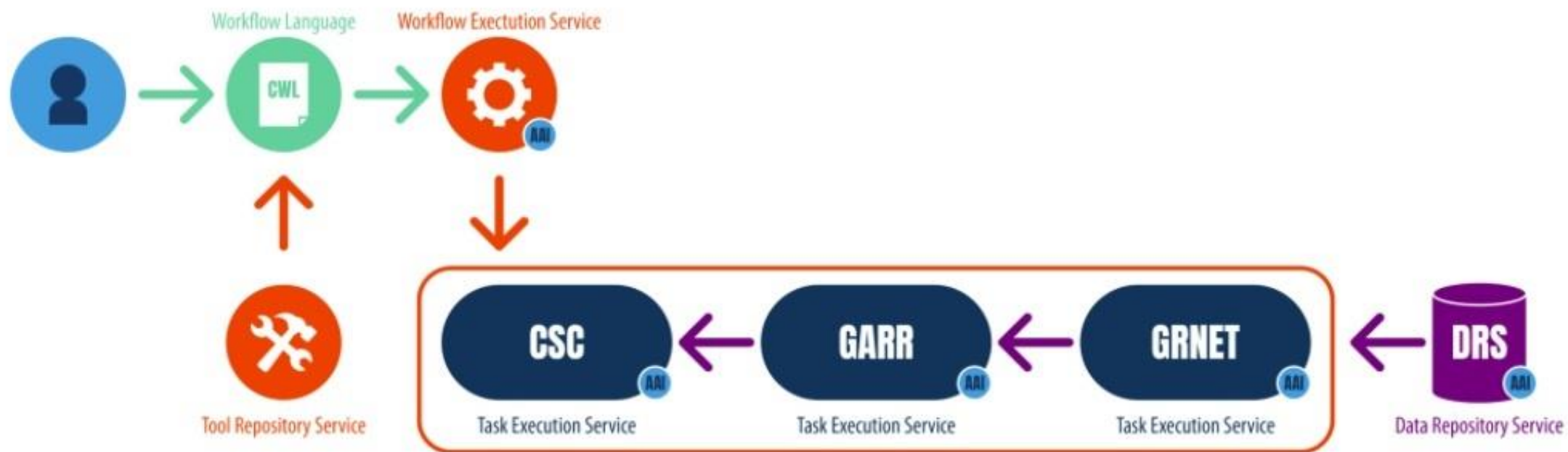
Benefits

Delivering **large scale workflow analysis** across international boundaries

Containers are the future carrier of reusable scientific software contents

- The **user-friendly web interface** – no need for programming skills.
- Importing the **CWL document** profits from **publicly available workflows and tools**.
- Input for **large sample batches** specified by a simple HTML form or spreadsheet.
- Fully compatible with the standard (**GA4GH WES**).
- **Input abstraction model** enables implementation of **additional workflow languages**.

Architecture



Cloud Flow Execution

Run software page

It provides a list of available software images that are ready to be executed. Also it supports uploading new containerised software images. The following screenshot provides an overview of the interface along with brief descriptions of the most important provided functionalities:

The screenshot displays the 'Run software' page interface. At the top, there are three buttons: '+ New image' (labeled 1), '+ Existing image' (labeled 2), and '+ Image Request' (labeled 3). On the right side, there is a 'Working Project' dropdown menu (labeled 8) showing 'test_loukas_kavouras_order', 'Remaining Jobs: 100', and a link 'Create new project in EG-CI' (labeled 9). Below these are columns for 'Software Name' (labeled 4), 'Version' (labeled 5), 'Image' (labeled 6), and 'Uploader' (labeled 7). A table lists two software images: 'Augur' (version 'translate', image 'dockerHub: nextstrain/base', uploader 'kostis_zagganas', labeled 10) and 'BUFET' (version 'diploma', image 'localImage: bufet-diploma:latest', uploader 'kostis_zagganas'). Each row has 'Run', 'Edit', and 'Delete' buttons.

1. This button initiates the process with which a user can add a new software image.
2. This button initiates the process with which a user can add a software with an existing image .
3. Button to request a new image .
4. The name of the software.
5. The user can select which version of the software they want to execute. Currently, all image versions are grouped according to the user who uploaded them (if their visibility status has been set to “public”).

Cloud Flow Pilots

ACADEMIC: PLAS Project

- The PLAS (Platform as a Service) pilot has received support through the GÉANT Innovation Programme. The proposal was submitted by the National Inter-University Consortium for Telecommunications (CNIT) [CNIT], a non-profit consortium established in 1995, bringing together 38 public Italian universities to perform research.
- The Principal Investigator (PI) is Prof. Andrea Detti, University of Rome Tor Vergata. The GÉANT Cloud Flow (GCF) platform allows the running of large-scale workflows consisting of tasks. Tasks are typically embedded in Docker container images, and GCF deploys these containers to the most convenient GÉANT site offering a container platform. The project goal is to extend GCF's services with open-source software so that a user can not only run containerised tasks, but also platformed tasks, i.e., tasks running within overlay platforms to leverage better the underlying cloud resources and make the workflow faster.

Automation and Digitalisation for Industry

- The GÉANT Cloud Flow (GCF) platform was deployed as a pilot in the lightweight run-time digital twins installation segment [LRDTI] of the Arrowhead Tools project [Arrowhead Tools], based on machine-learning technology trained with simulation and measurement data in collaboration with ABB.

Sports Analytics

- Digital services are becoming more common with sensors and continuous input also in the field of sports, with increasing interest in using digital devices during training and exercises. However, winter sports and climate conditions present their own challenges with regard to utilising these technologies. GÉANT Cloud Flow is utilised for sports analytics in a research project headed by the Faculty of Sport and Health Sciences at the University of Jyväskylä (JyU),

Process Optimisation in the Steel Industry

- Choosing the right stainless steel is the key to maximising performance and optimising solutions in any industry. GÉANT Cloud Flow (GCF) is utilised in a pilot with the Outokumpu Corporation [Outokumpu] focusing on predicting dimensional change in steel production.

Future WORK

- GÉANT funding for the GÉANT Cloud Flow and GÉANT Multi-Cloud platforms will cease with the end of GN4-3, but the software will continue to be available for configuration and download from their respective repositories
- Work on the underlying frameworks, i.e., CWL-WES and Waldur, is expected to continue in other Commission-funded projects such as ELIXIR [ELIXIR] (for GCF's CWL-WES) and in EOSC and EuroHPC (for GMC's Waldur).
- In addition, the SURF Research Cloud service will work with Waldur on common multi-cloud implementation strategies for providing compute to data capabilities to researchers who are working together from different institutions. The SURF Research Cloud will become open source and community-driven. It already supports an AAI that works with eduTEAMS (SURF Research Access Management) and can provide multi-cloud billing functions to community and public clouds based on OCRE contracts. Containerised and job-based workflow support and connections to EOSC and EuroHPC still require work in 2022.

Development Team

NRENs in the GN4-3 Project Community Clouds Team



- <https://clouds.geant.org/geant-multi-cloud/>
- Documentation at: <https://wiki.geant.org/pages/viewpage.action?pageId=262897773/>
- Download at: <https://github.com/geant-multicloud>



Thank you

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As part of the GÉANT 2020 Framework Partnership Agreement (FPA),
the project receives funding from the European Union's Horizon 2020
research and innovation programme under Grant Agreement No.
856726 (GN4-3).