Latest advancements in EGI operations for improved cloud federations

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Dissemination level: Public

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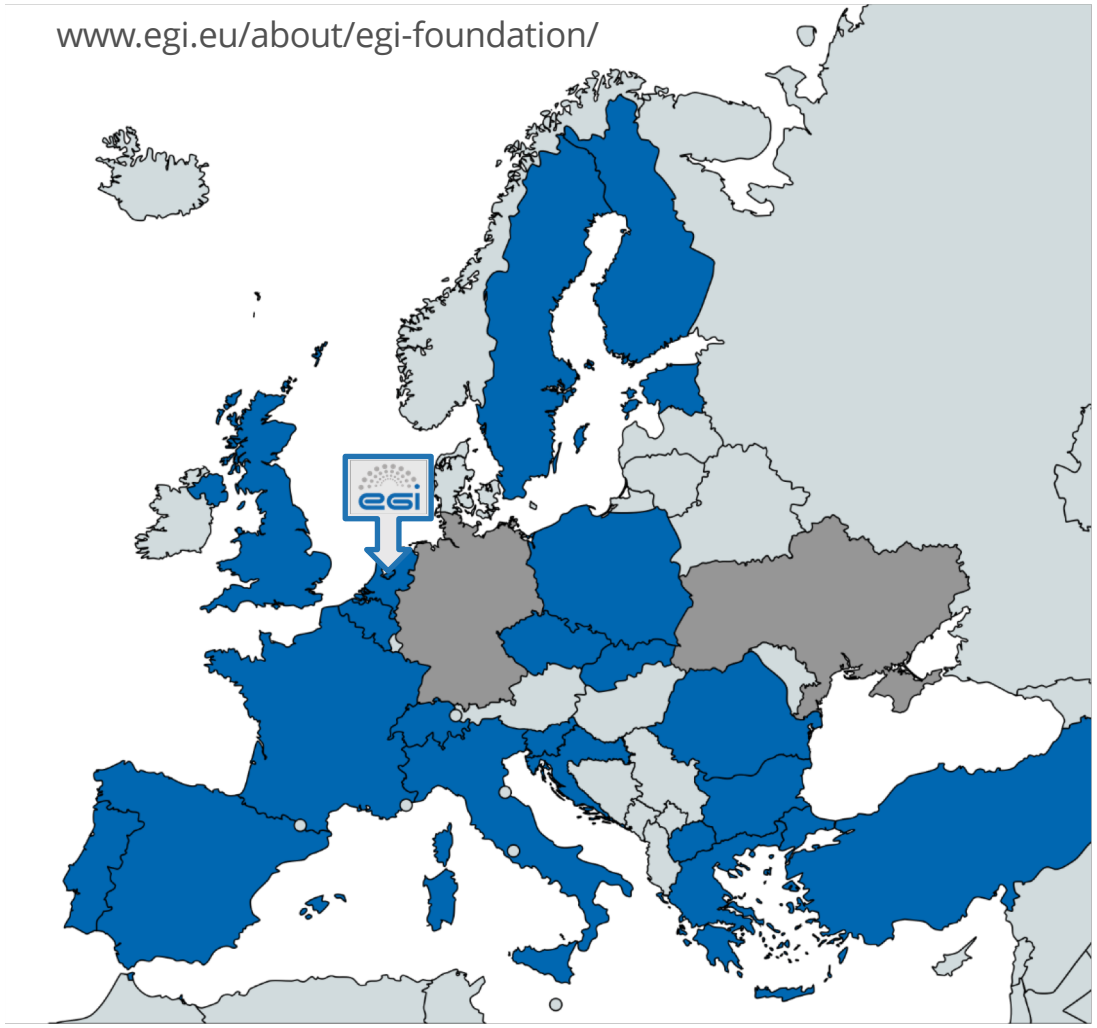
EGI and the EGI Federation

EGI's mission is to create and deliver open solutions for science and research infrastructures by federating digital capabilities, resources and expertise between communities and across national boundaries.

EGI Foundation - Participants



- 23 Countries + 1 EIRO (CERN)

Our external Service Portfolio

Compute

Cloud Compute

Run virtual machines on demand with complete control over computing resources

Cloud Container Compute BETA

Run Docker containers in a lightweight virtualised environment

High-Throughput Compute

Execute thousands of computational tasks to analyse large datasets

Workload Manager BETA

Manage computing workloads in an efficient way

Applications

Applications on Demand BETA

Use online applications for your data & compute intensive research

Notebooks BETA

Create interactive documents with live code, visualisations and text

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

Security

Check-in BETA

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

Our internal Service Portfolio

Delivered to the EGI Federation members facilitating collaboration

Coordination

Operations Coordination and Support
Coordinate activities to ensure seamless operations

Community Coordination
A joint approach to user engagement

ITSM Coordination
Ensures professional service management for EGI IT services

Technical Coordination
Progress and innovation through collaboration

Strategy and Policy Development
One federation, one vision, one strategy

Project Management and Planning
A joint approach to planning and management

Security Coordination
Enhance local security for a safer global infrastructure

Communications
Share your successes at a larger scale

Operations

Marketplace BETA
Expose your services to a broader audience

Accounting
Track and report the usage of your services

Collaboration Tools
IT tools for better coordination

Configuration Database
Manage the configuration information of federated e-infrastructure assets and their functional relations

Operational Tools
Integrate resources and operations in a federated ecosystem

Helpdesk
Your point of contact to ask for support at EGI

Service Monitoring
Monitor the performance of IT services

Validated Software and Repository
Benefit from a repository of high-quality software validated for the EGI infrastructure

Security

Check-in
Login with your own credentials

Attribute Management
Manage memberships and groups in communities and virtual organisations

Commitment to excellence

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Management Service

CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH
certifies that

EGI Foundation / EGI.eu
Science Park 140
1098 XG Amsterdam
Netherlands

has established and applies
a Quality Management System for

A management system to deliver all
services covered by the service catalogue.

An audit was performed, Report No. **707067543**.
Proof has been furnished that the requirements
according to

ISO 9001:2015

are fulfilled.
The certificate is valid from **2018-02-19** until **2020-03-06**.
Certificate Registration No.: **12 100 53643 TMS**.

Product Compliance Management
Munich, 2018-02-19

TÜV SÜD Management Service GmbH • Zertifizierungsstelle • Ridlerstraße 65 • 80339 München • Germany

MSD1-07/10

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EGI Cloud

An operations view

EGI Cloud Federation

- Multi-cloud IaaS infrastructure with Single Sign-On
- Federation features:
  - Common VM image catalogue
  - Discovery, accounting, SLO monitoring
  - Unified GUI dashboard

Cloud Compute

Cloud Container Compute **BETA**

Online Storage

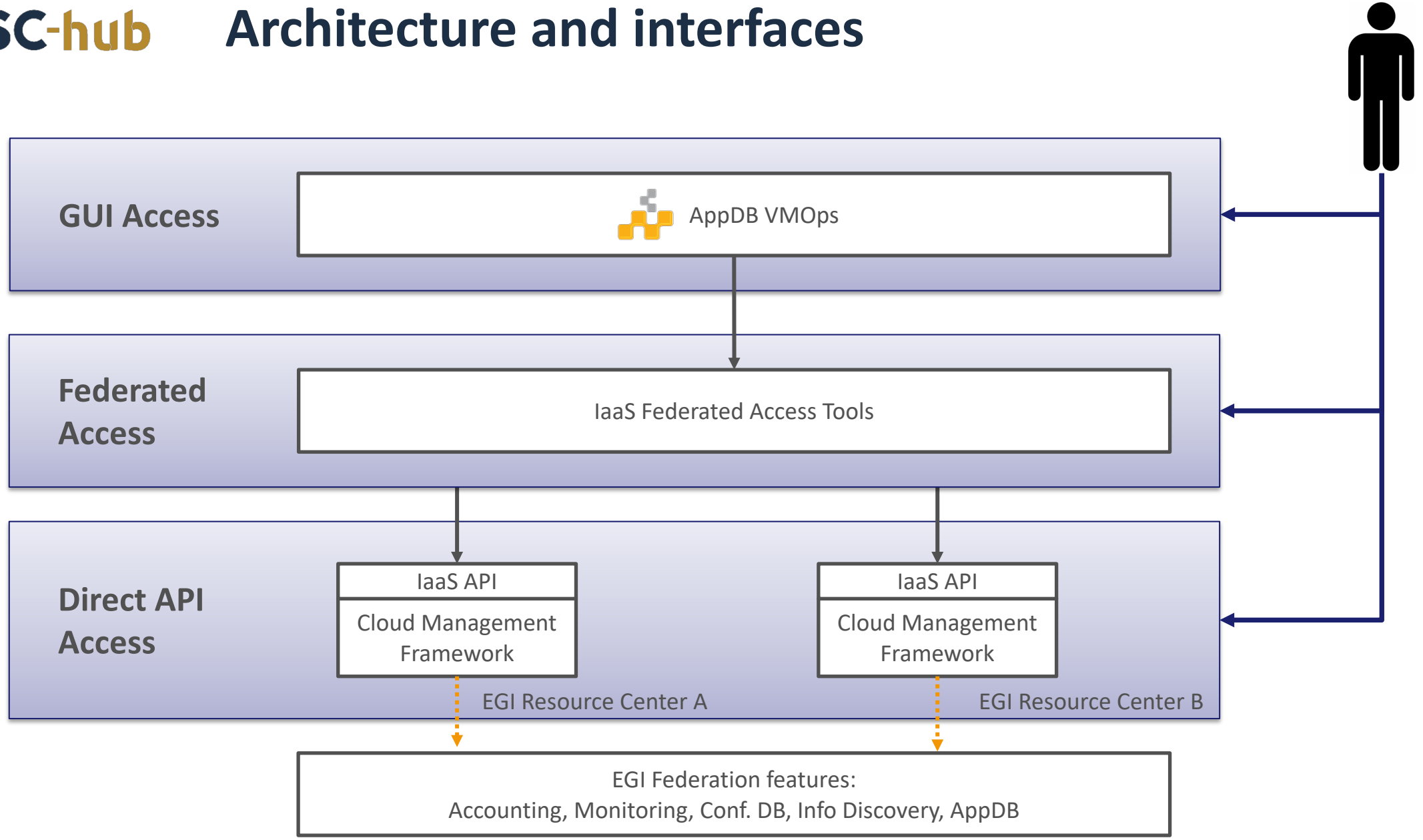
Training Infrastructure

Applications on Demand **BETA**

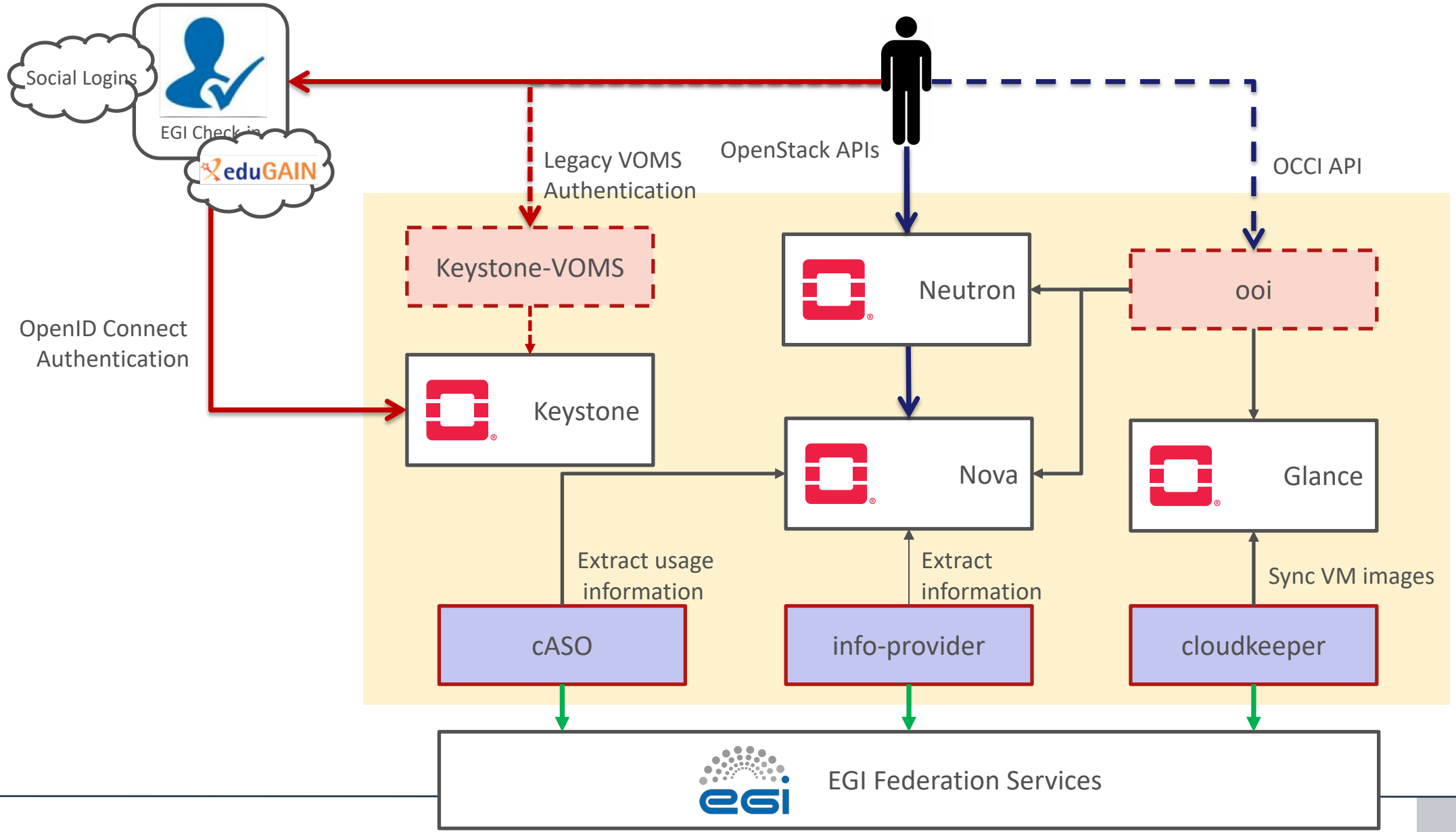
Notebooks **BETA**

The infrastructure

Architecture and interfaces



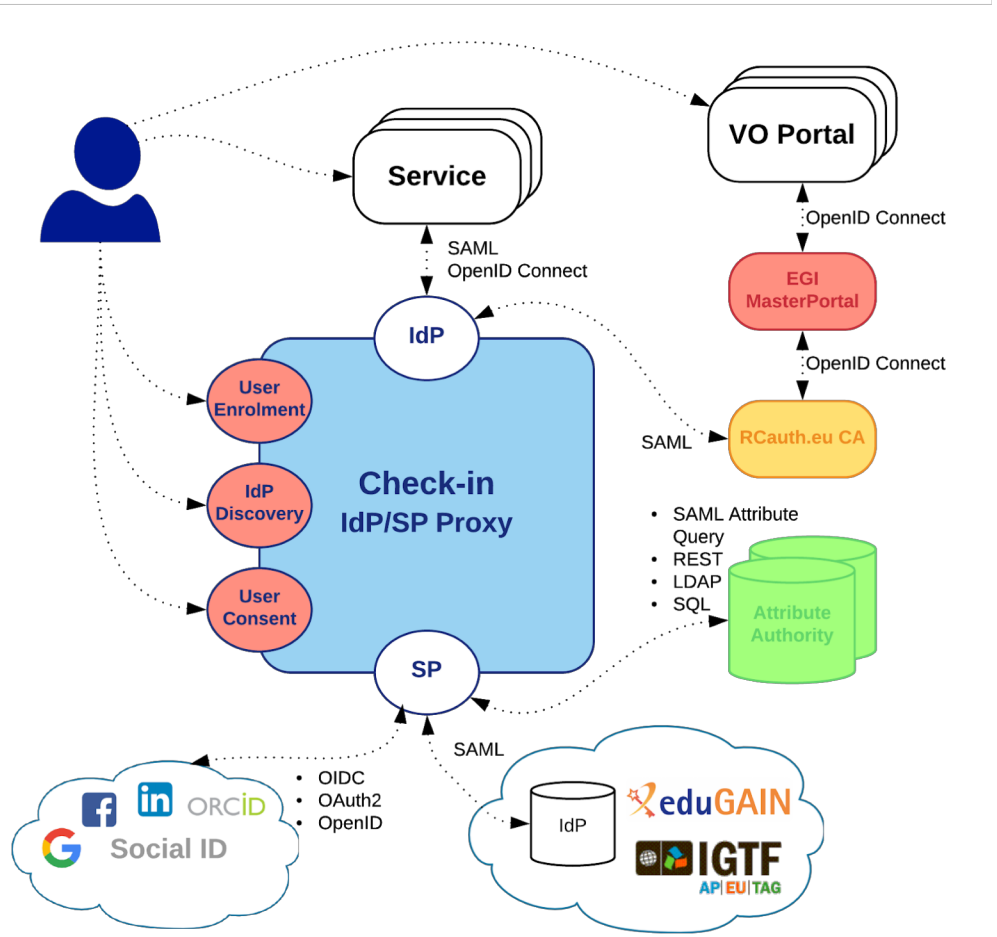
Architecture (site perspective)



AAI: Check-in

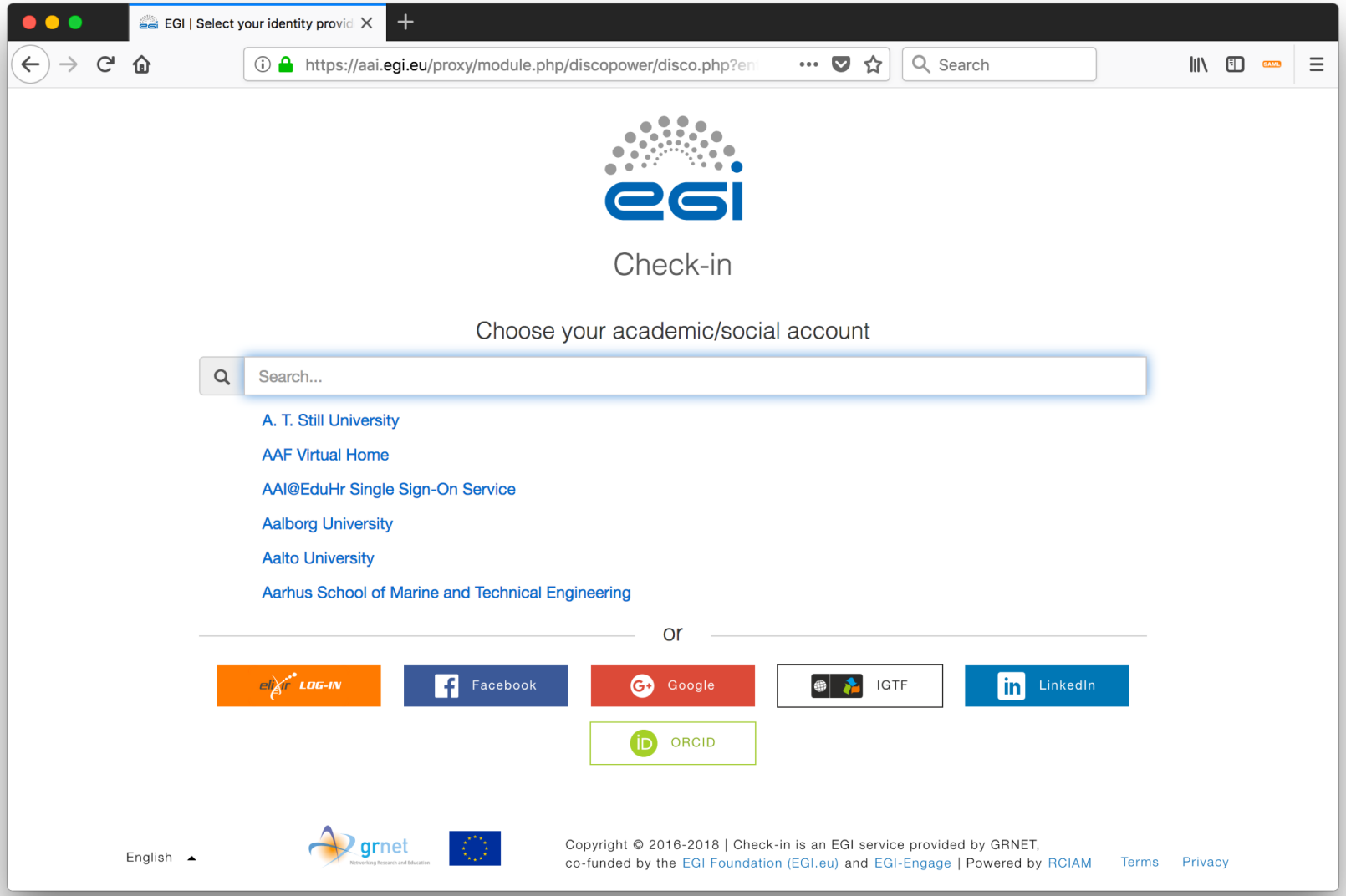
- **Identity and Access Management solution that makes it easy to secure access to services and resources**
  - Single sign-on to services through eduGAIN, social media and other institutional or community-managed identity providers
  - Only one account needed for federated access to multiple heterogeneous (web and non-web) service providers using different technologies (SAML, OpenID Connect, OAuth 2.0, X509)
  - Identity linking enables access to resources using different login credentials (institutional/social)
  - Assurance information associated to each authenticated identity
  - Aggregation and harmonisation of authorisation information (VOs/groups, roles, assurance) from multiple sources

Check-in: IdP/SP Proxy



- Implementation of the AARC blueprint architecture
- Registered in eduGAIN as an SP complying with REFEDS Research & Scholarship and Sirtfi
- All community SPs can have one statically configured IdP
- No need to run an IdP Discovery Service on each community SP
- Connected SPs get consistent/harmonised user identifiers and accompanying attribute sets from different IdPs/AAs that can be interpreted in a uniform way for authorisation purposes

Check-in: IdP Discovery

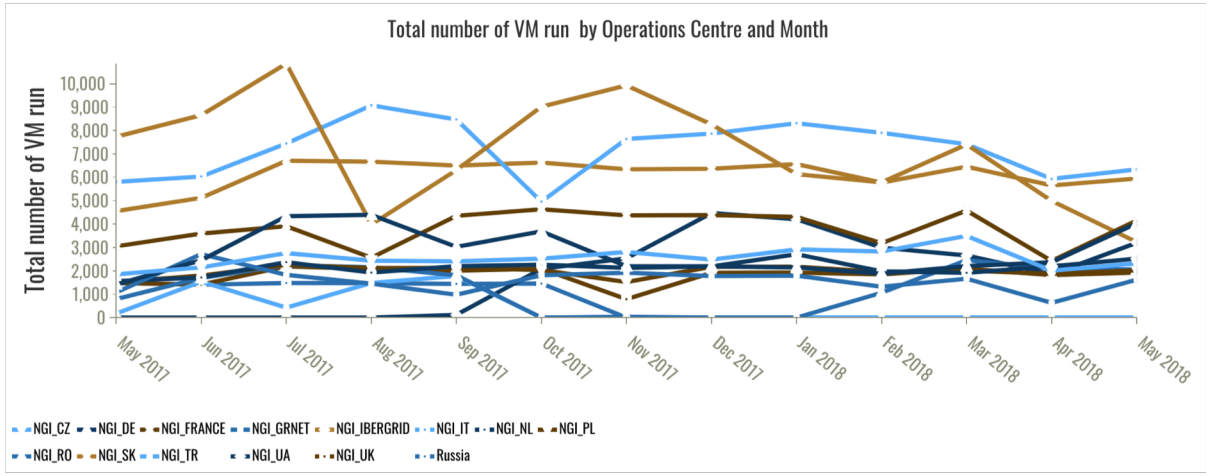


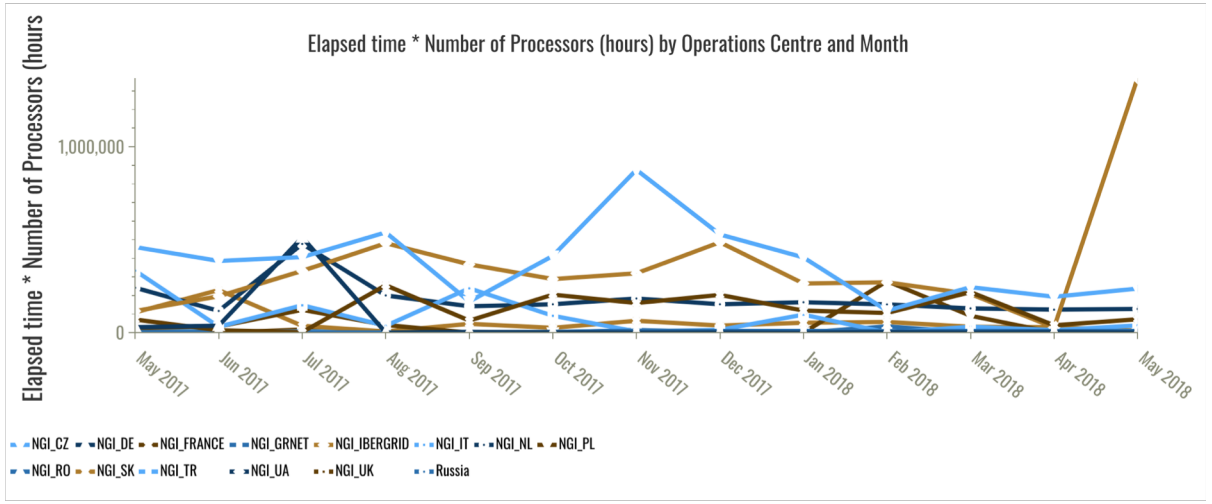
Non-web use cases & delegated access via OpenID Connect/OAuth 2.0

- Friendly UI for managing/testing OpenID Connect/OAuth 2.0 clients
- Provides overview of OpenID Connect/Oauth 2.0 services authorised to access their identity
- Allows users to see the specific permissions (e.g. read email, offline access, etc.) granted to each service
- Enables users to manage access/refresh tokens associated with each service:
  - Revoke access for individual tokens or service as a whole
  - Retrieve access/refresh tokens to be used for federated access to CLI tools/APIs
- Multipath delegation via OAuth 2.0 Token Exchange
  - Support for attenuation of rights/scopes

Accounting

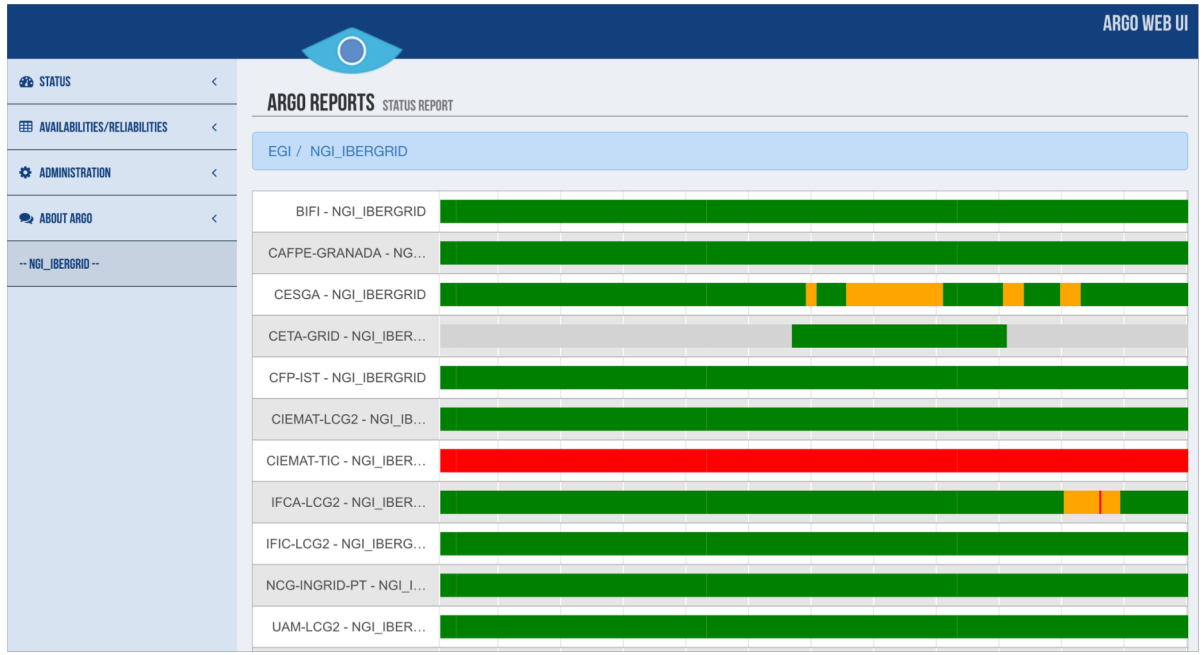
- Collect, aggregate and display usage information across the whole federation.
- Query native APIs to produce and send accounting records
- Accounting portal for visualization



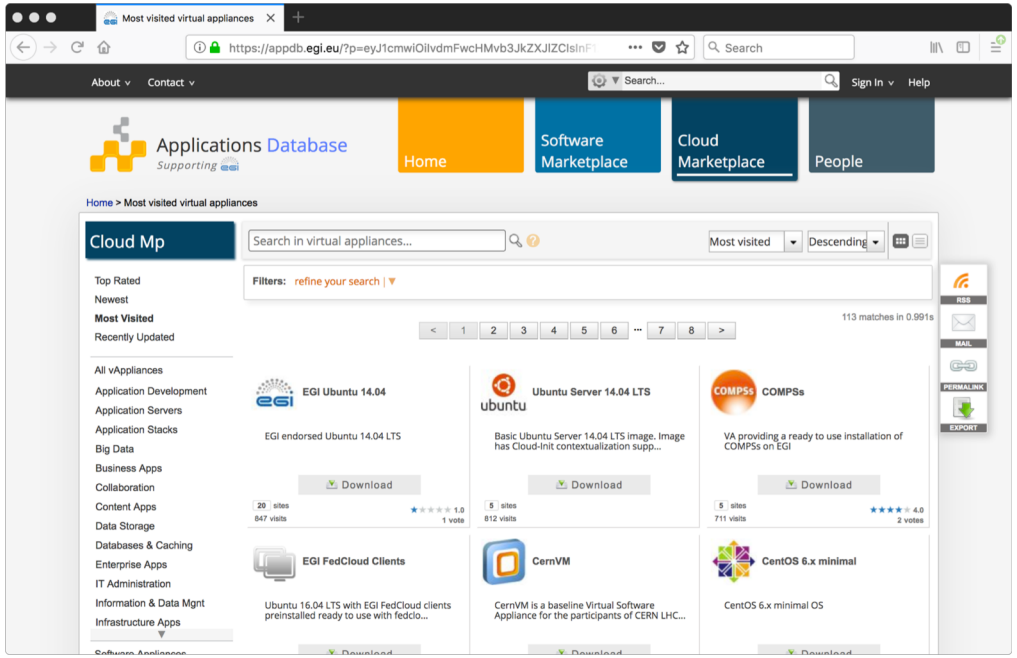


Monitoring

- Health monitoring of services
  - Automatic discovery of endpoints
- Calculates A/R metrics for SLA/OLAs
- Powered by EGI ARGO
  - https://argoeu.github.io/



AppDB – Cloud Marketplace (1)



Registry for virtual appliances (VA)

- ✓ a logical container of versioned image file & metadata bundles

Registry for software appliances (SA)

- ✓ a logical container of VA versions & contextualization scripts bundles

VA distribution medium

- ✓ distributing endorsed VAs to the resource providers/sites

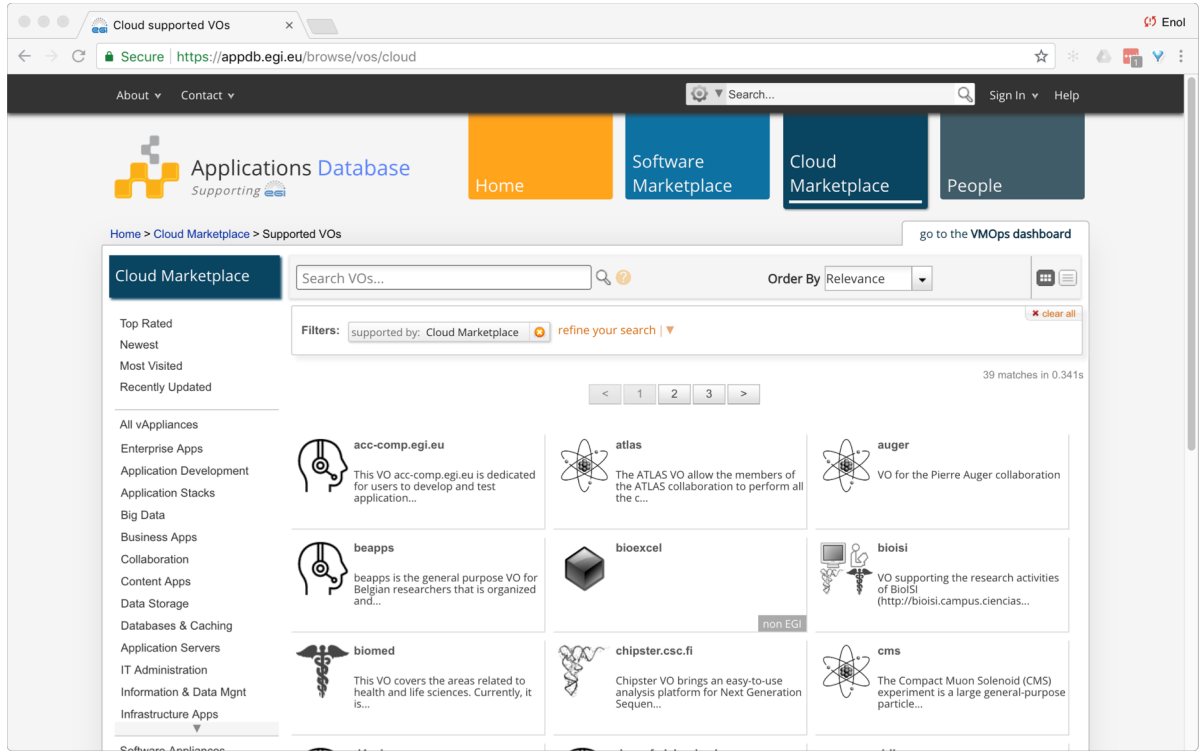
AppDB – Cloud Marketplace (2)

Resource providers catalogue

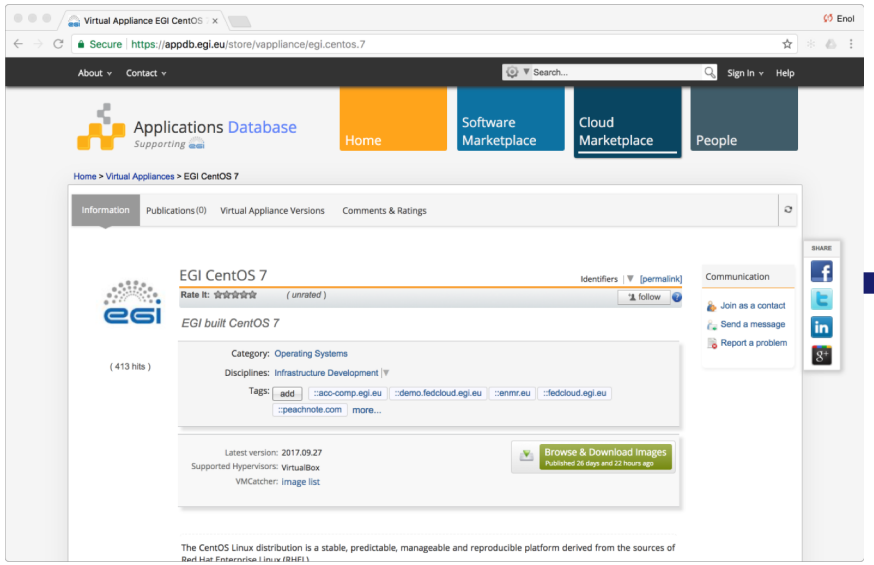
✓ list of the VAs which are available by each site/resource provider

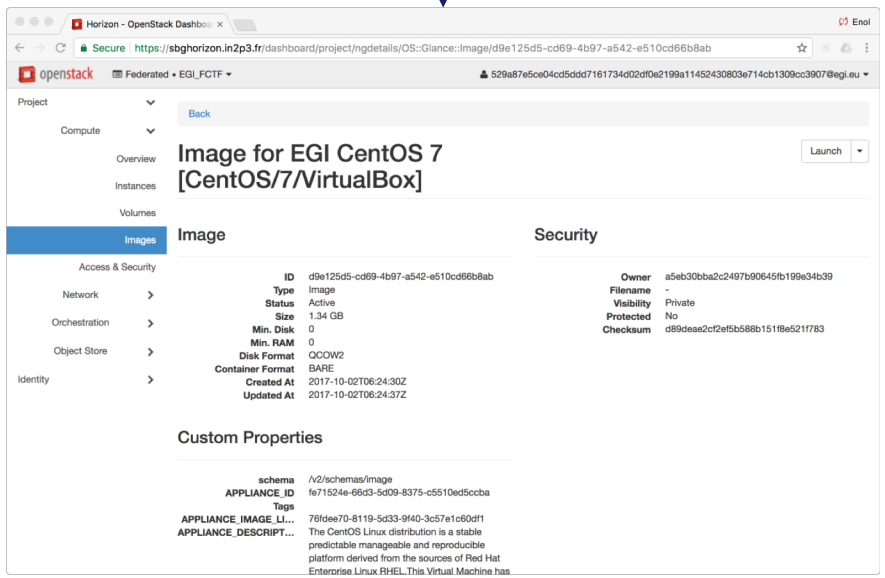
Virtual Organizations (VO) catalogue

✓ list of the VAs which are available for each VO member



CloudKeeper: AppDB integration



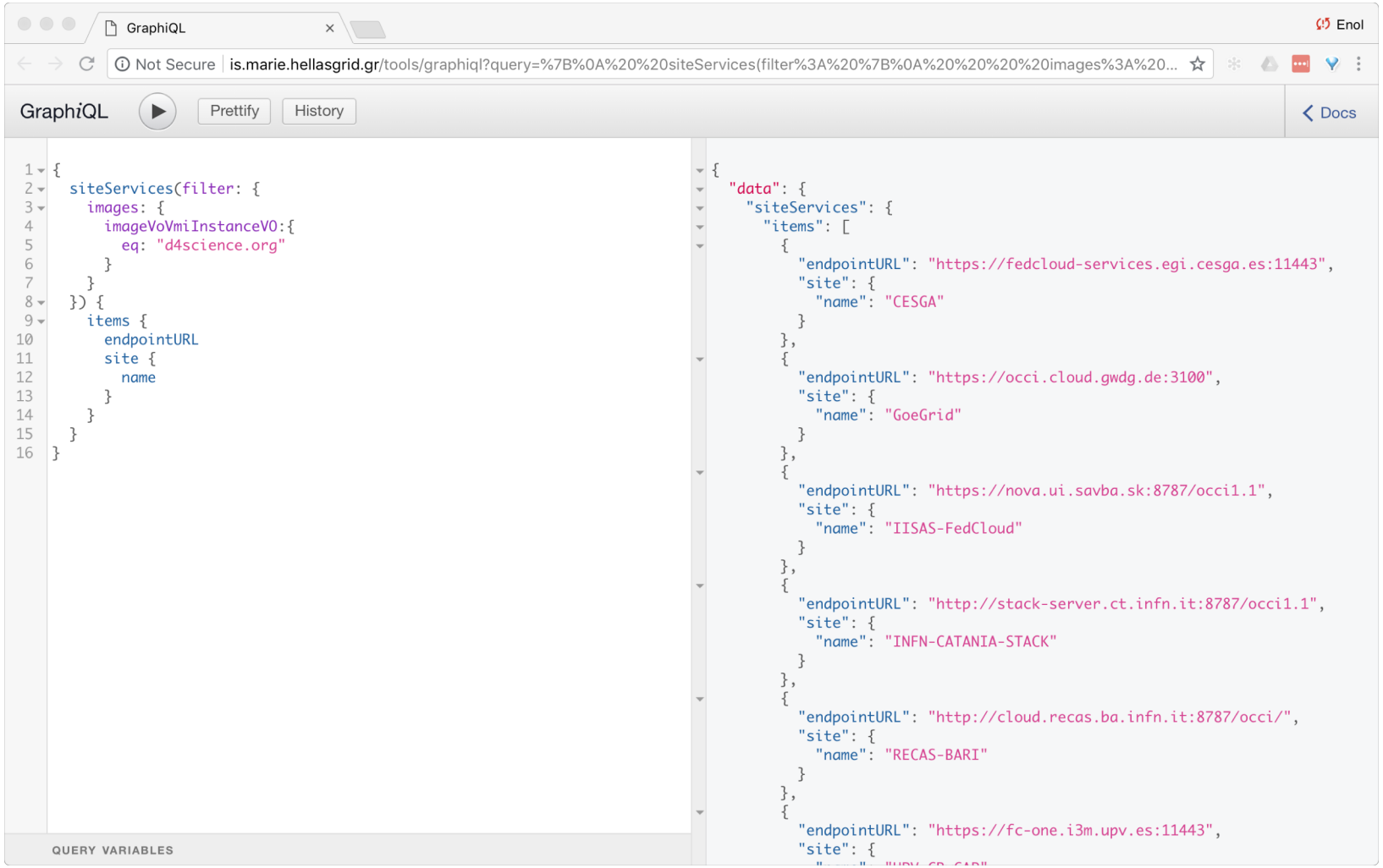


cloudkeeper ensures:

- Integrity of images
- Conversion to appropriate formats
- Correct metadata info at the cloud provider

AppDB – a GraphQL powered information system

More information at https://docs.google.com/presentation/d/19Yh3kNxl01DfcrDgQf12w-KQW5Zrd_QnYP2iGp9Kg2Y/edit?ts=5a2ab515#slide=id.p

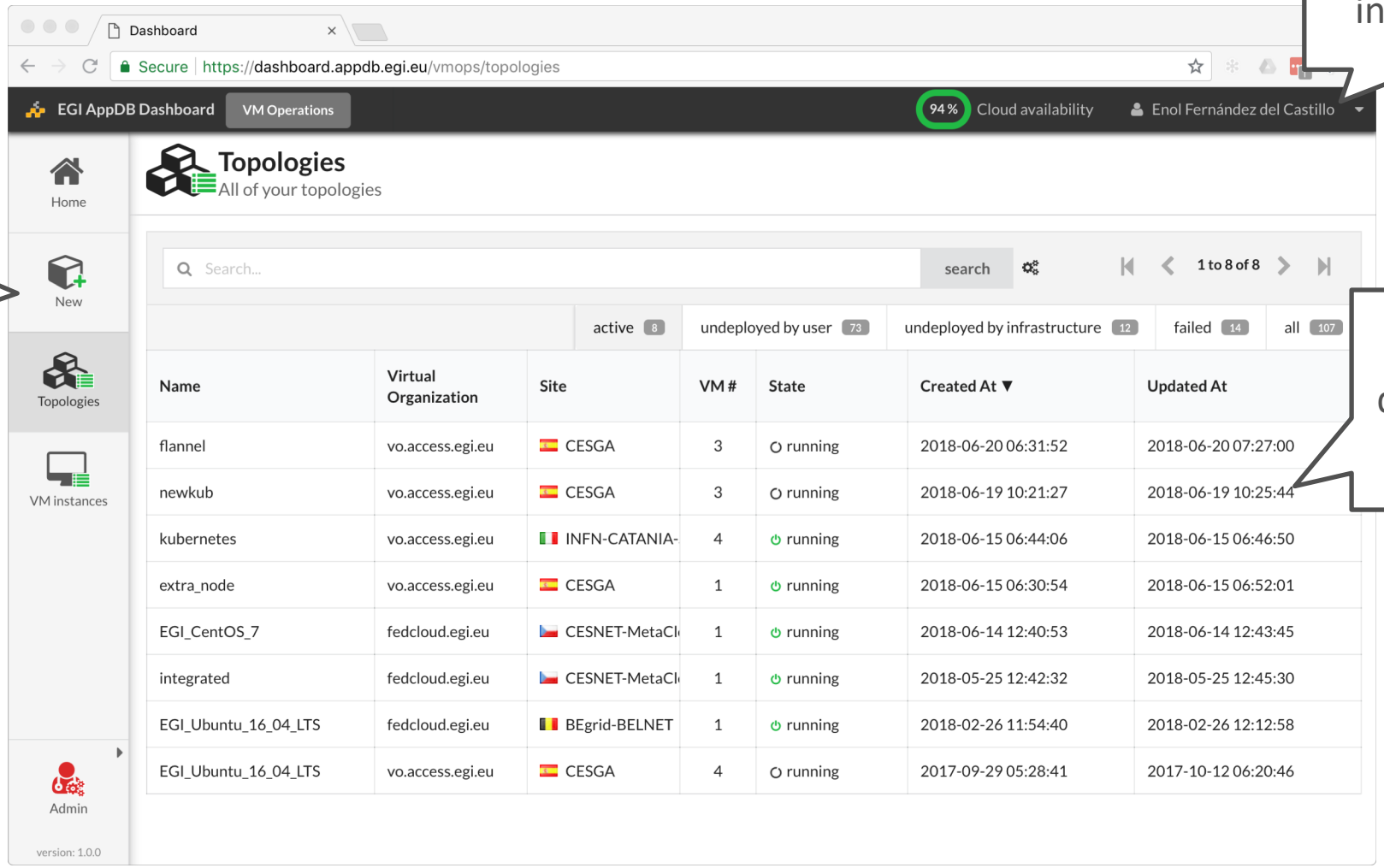


Manage VMs via AppDB VMOps

Complete Check-in integration

Wizard-like creation of VMs

Single dashboard for all providers



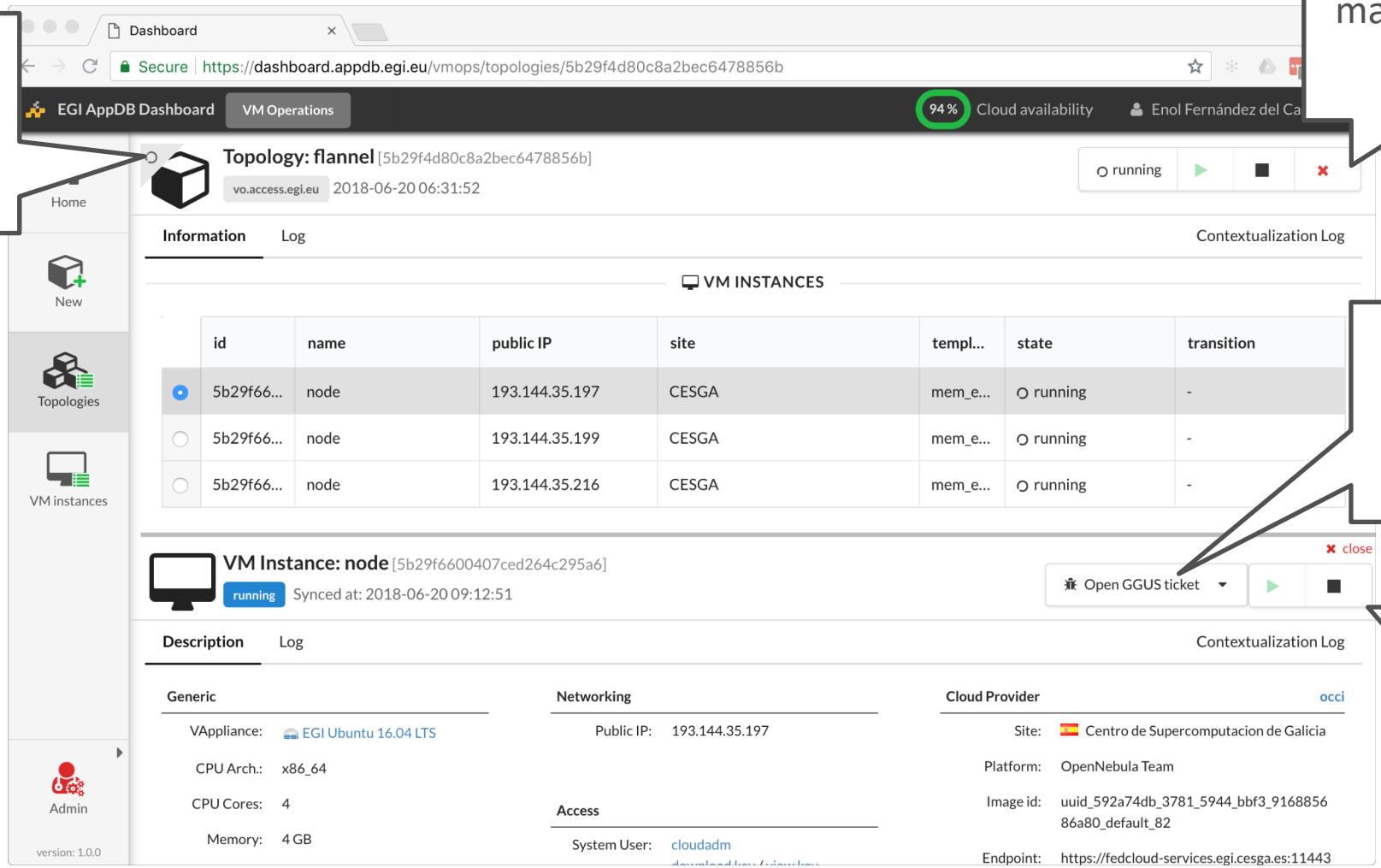
Manage VMs via AppDB VMOps

Topologies are a set of related VMs

Global management of VMs

GGUS integration

Individual management of VMs



API access: dealing with heterogeneity

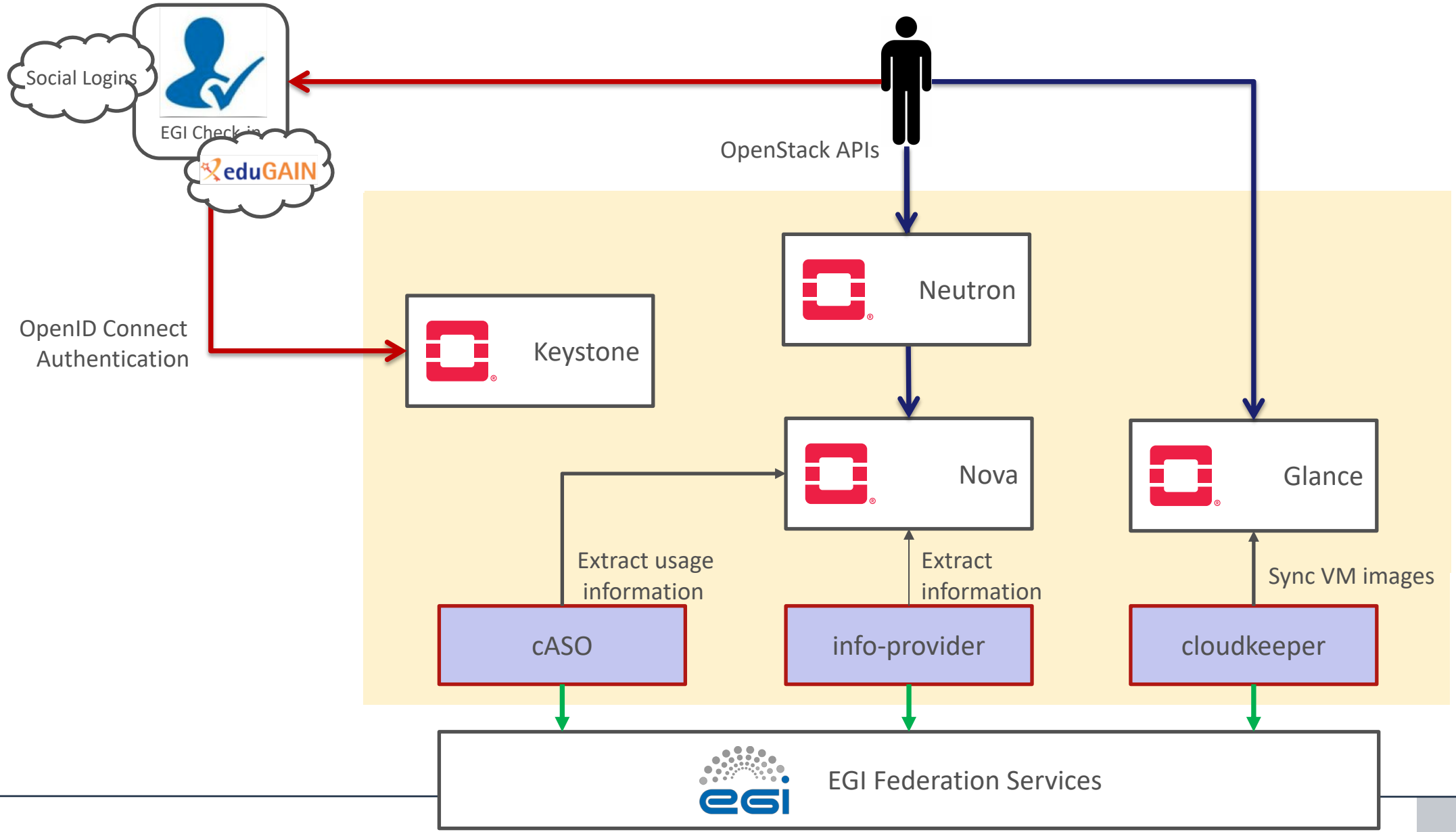
- EGI Federated Cloud no longer mandates a single API for every provider
  - OCCI still widely supported but sites are moving native APIs (mainly OpenStack!)
- Tools to deal with heterogeneity:
  - IaaS orchestration tools with support for multiple APIs:
    - Infrastructure Manager, Terraform, OCCOPUS, …
    - https://wiki.egi.eu/wiki/Federated_Cloud_IaaS_Orchestration
  - IaaS libraries with support for multiple APIs:
    - libcloud, jclouds,…
  - See guide on migrating from OCCI to IM on EGI's wiki: https://wiki.egi.eu/wiki/Federated_Cloud_OCCI_to_IM_Migration

Requirements to federate with EGI

- **Providers keep complete control on their resources**
  - Enable access to a Virtual Organisation into local projects with EGI credentials, SLA based → **Integration with EGI Check-in**
  - **Operate the set of extra components** using (OpenStack) APIs to retrieve provider information and make it available to EGI services

- **No (major) changes in operational activities**
  - Provide support through EGI channels
  - Comply with the operational and security procedures. These are based on best practices and common requirements
  - Most well-operated providers already have these activities in place, so the additional task for a site manager is to acknowledge to EGI that the task has been performed.

In progress: catch-all operations



EOSC-hub

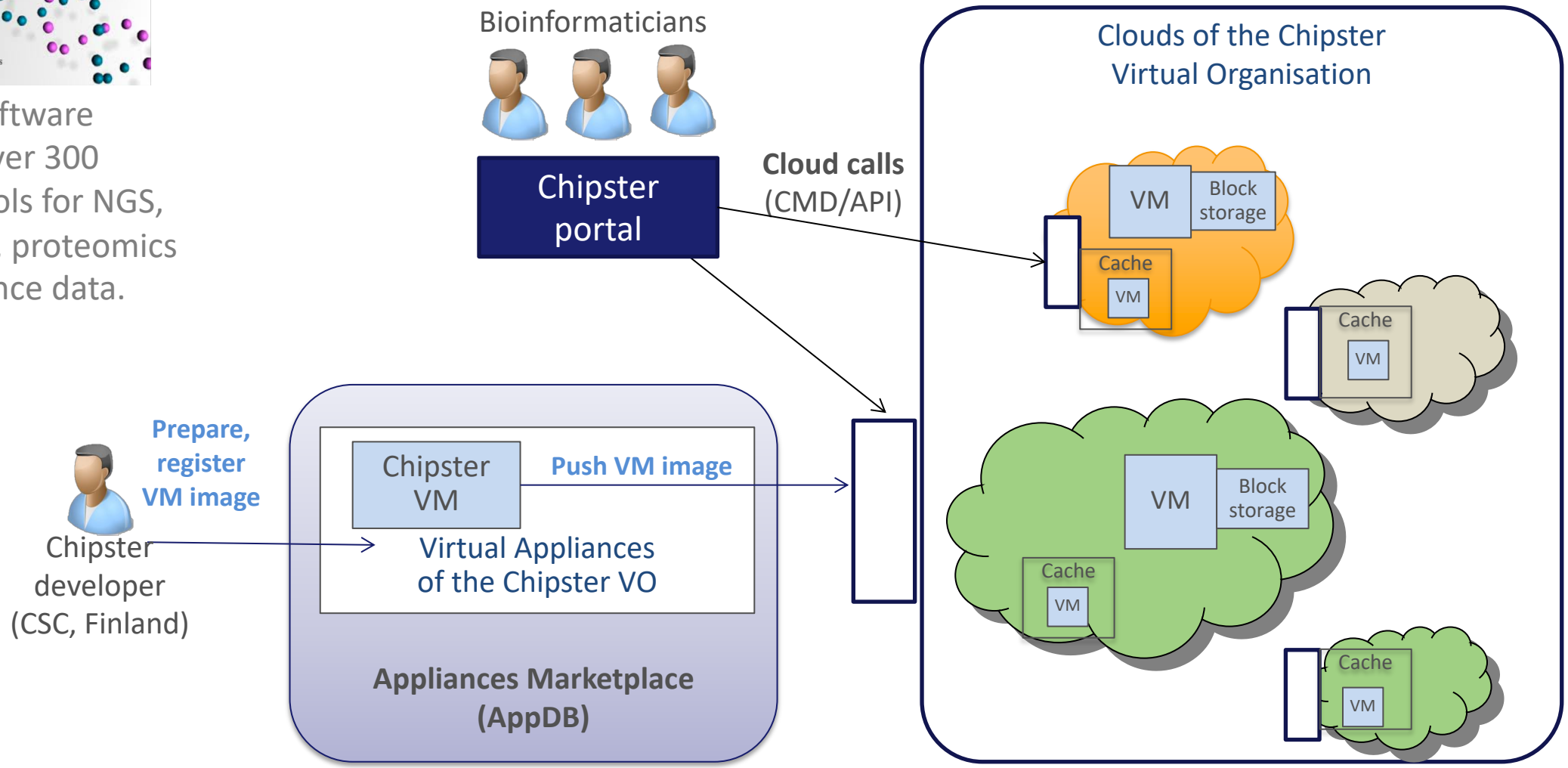
Building on top of EGI Cloud

Chipster: sharing community applications

Read more…

Chipster
Open source platform for data analysis

Analysis software contains over 300 analysis tools for NGS, microarray, proteomics and sequence data.

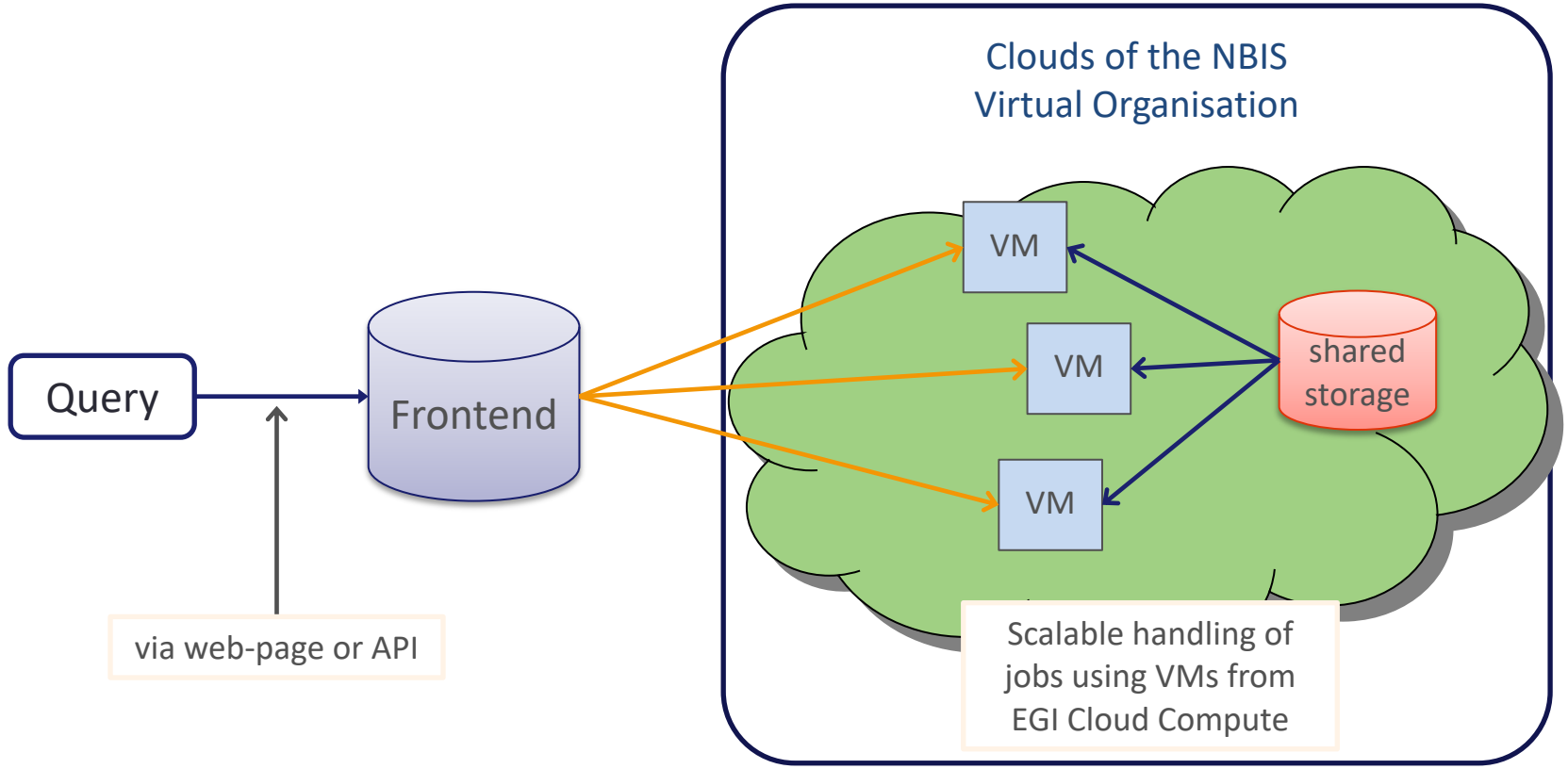


NBIS: Scalable bioinformatics web-servers powered by cloud computing

NATIONAL BIOINFORMATICS INFRASTRUCTURE SWEDEN

A distributed Swedish research infrastructure providing bioinformatics support to life science researchers.

Read more…



NBIS Servers powered by EGI:

Pcons.net
TOPCONS
SCAMPI2
ProQ3
PconsC2/PconsC3
BOCTOPUS2

GeoHazards TEP:

Read more…

geohazards tep

Cloud platform developed and operated by Terradue.
It provides a rich set of ready to use EO Data processing services for geohazards analysis and monitoring.

EGI Cloud Compute contributes resources to run near real-time processing of satellite data acquisitions.

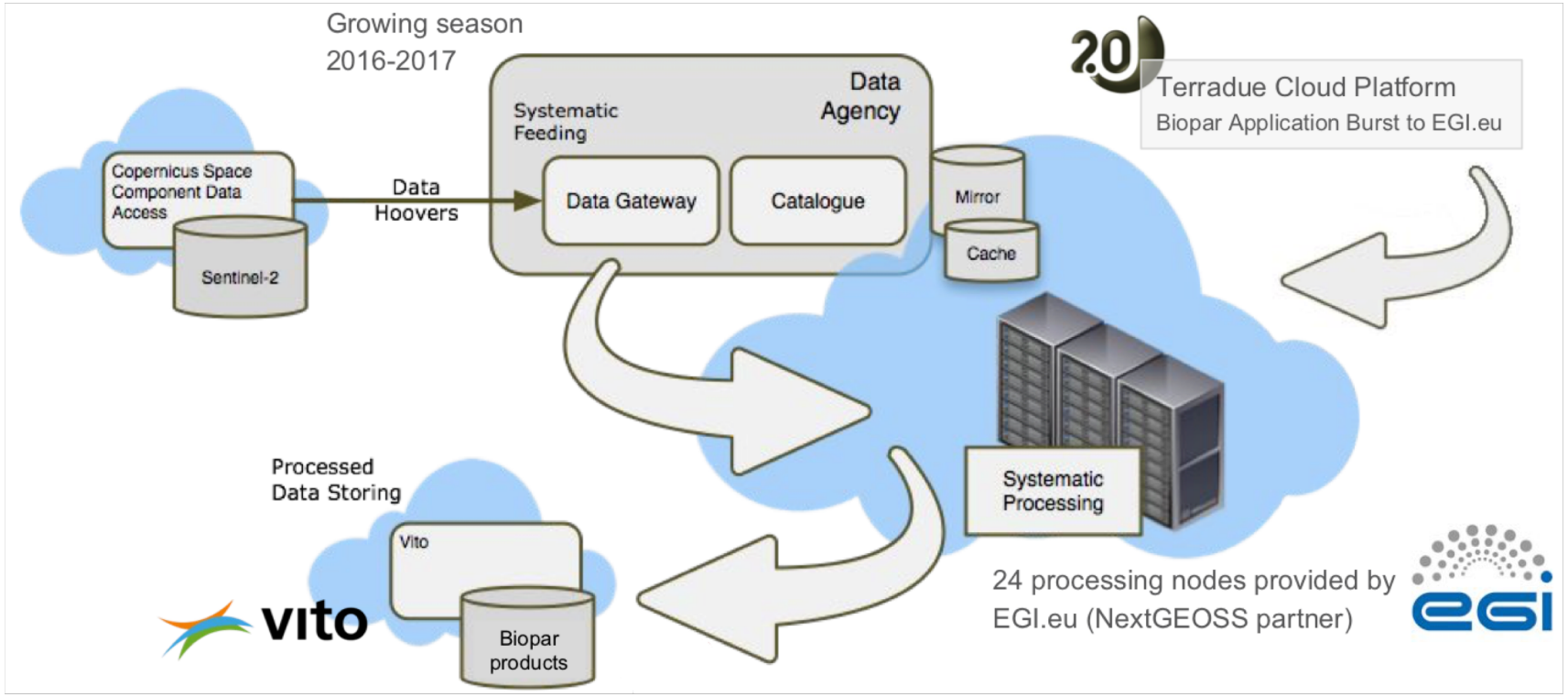
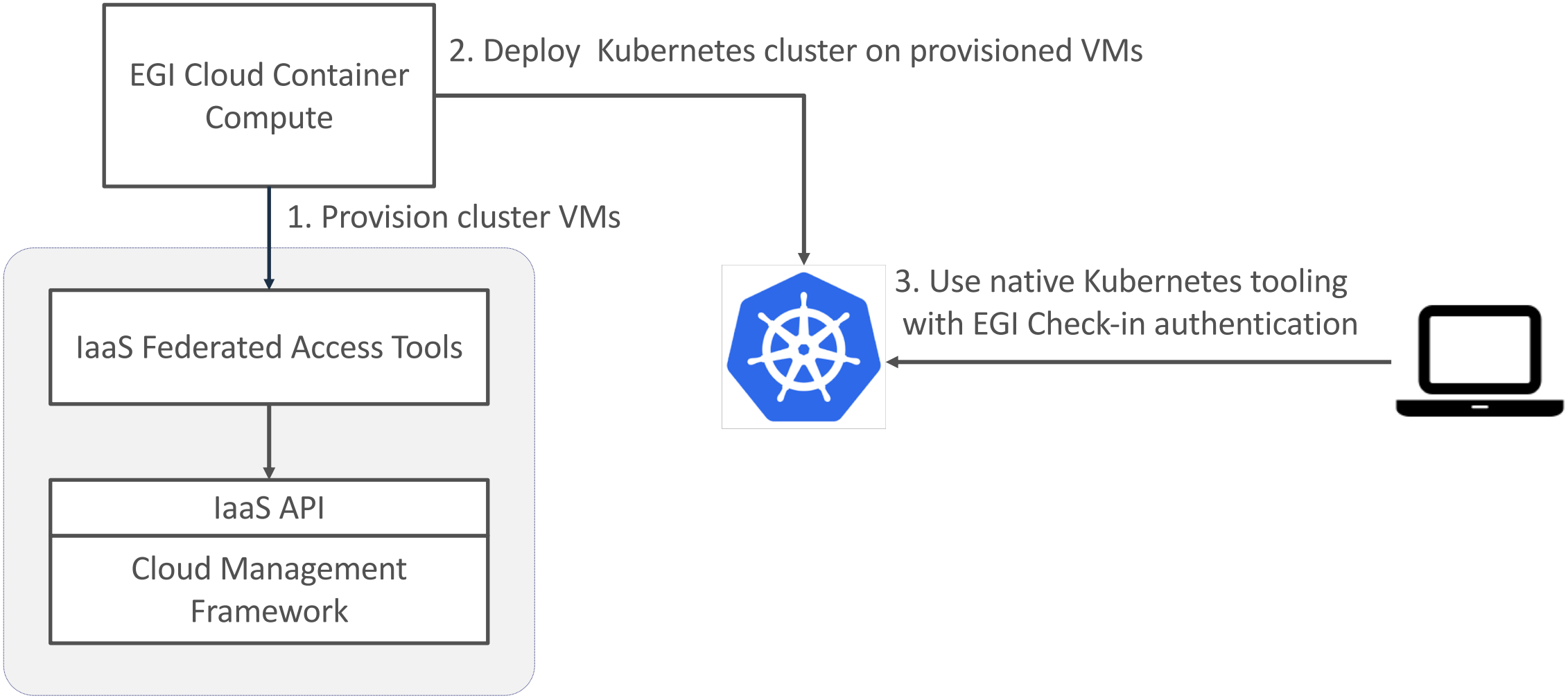


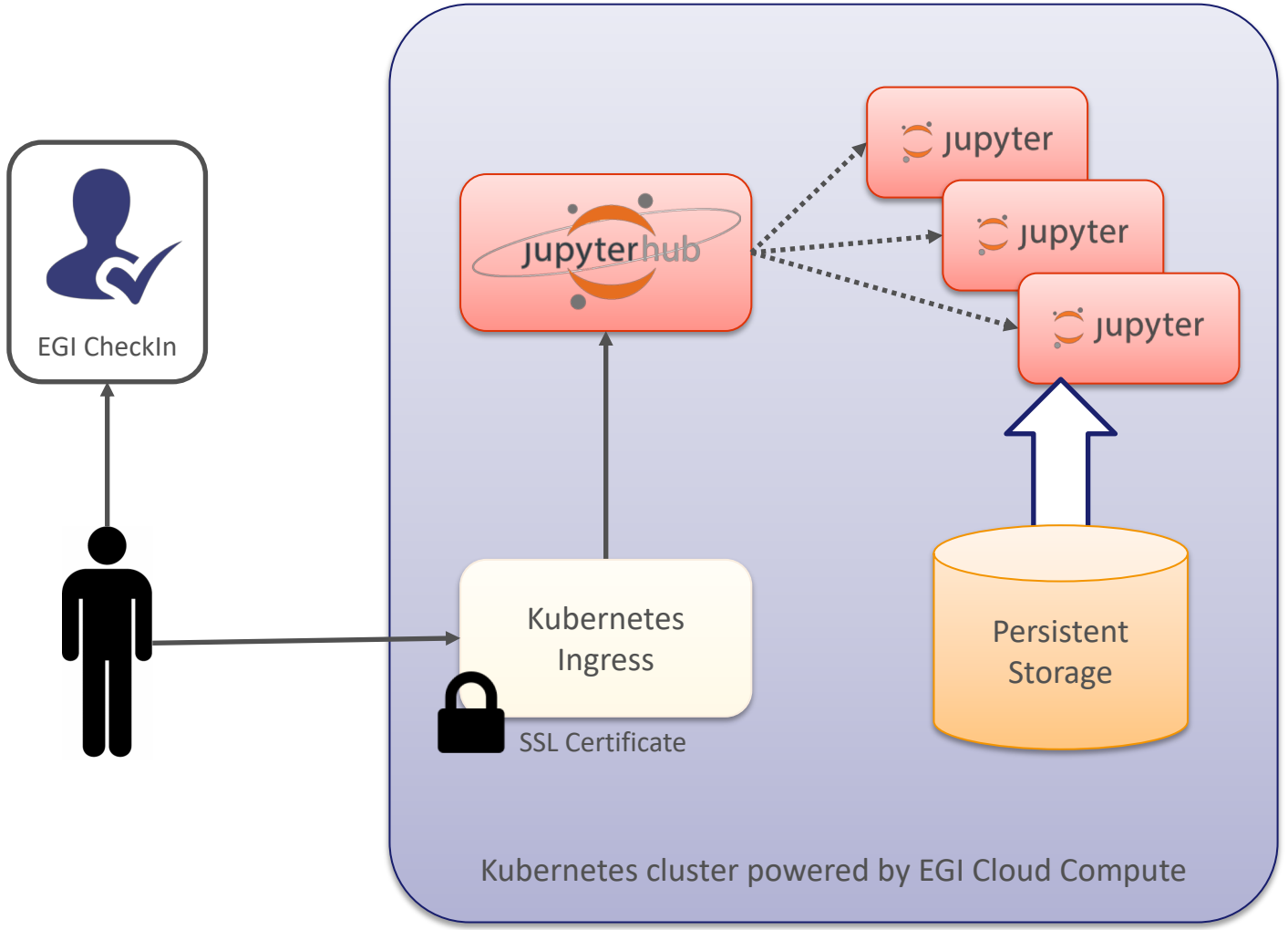
Image taken from slides at https://indico.egi.eu/indico/event/3455/session/13/contribution/84

EGI Cloud Container Compute



EGI Notebooks

- Run Jupyter notebooks from your browser, access with EGI Check-in
  - Interactive computing
  - Access to other EGI services
- Relies on Kubernetes running on EGI Cloud



Summary

- EGI Cloud is a research-oriented IaaS federation
  - Single Sign-On + common VM catalogue
  - Easy for providers to support international communities while keeping control
- Federation tools ready to be used and adapted to your needs
  - Check-in
  - AppDB + cloudkeeper
  - Accounting
  - A/R Monitoring

Upcoming events

Thank you
for your attention!

Questions?

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