

The EGI Federated Cloud, a production IaaS infrastructure for the ERA

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University of Oxford
Chair, EGI Federated Cloud

- Why
- Principles
- What
 - Scenarios → Capabilities → Functionality
- Who
- For whom
- Future



International Symposium on Grids & Clouds 2011

19 ~ 25 March 2011, Academia Sinica, Taipei, Taiwan

- Home
- Committees
- Program
- Call for Paper
- Conference Information
- Registration
- Hotel Reservation
- Visitor Information
- Past ISGC
- Photos

Full paper submission deadline is now extended to 18 April.

On 25 March, ISGC 2011 (International Symposium on Grids and Clouds) in conjunction with OGF31 (Open Grid Forum) has closed with satisfaction. The following links are material that have produced on-site over the past week by friends from e-Science Talk and iSGTW. Check these out to see what have happened and highlights during the event.

- <http://www.isgtw.org/blogs>
- <http://www.egi.eu/blog/>
- <http://gridtalk-project.blogspot.com/>

GROUP PHOTO DOWNLOAD



18



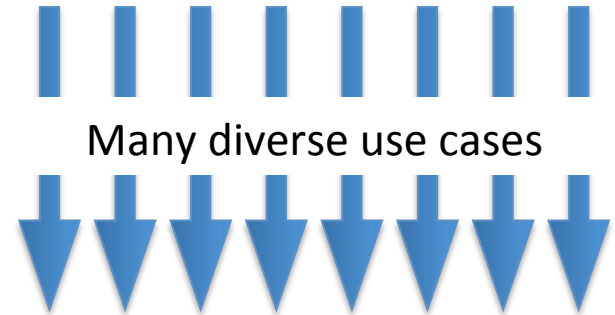
20k researchers

Few related use cases

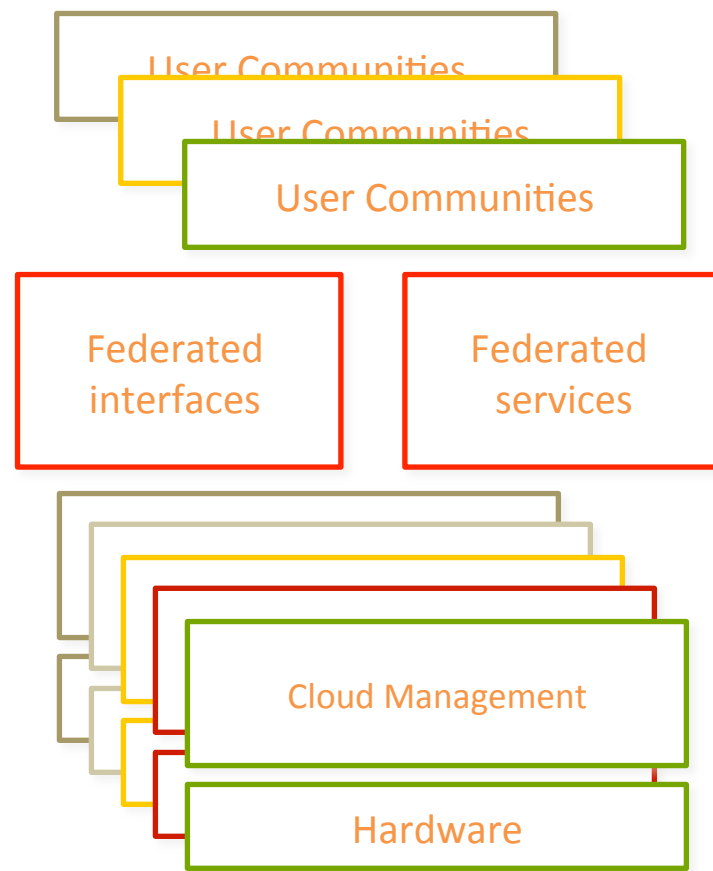


2M researchers!

Many diverse use cases



- **Standards and validation:** Recommended and common open standards for the interfaces and images – OCCI, CDMI, OVF, GLUE2.
- **Resource integration:** Cloud Computing to be integrated into the existing production infrastructure.
- **Heterogeneous implementation:** no mandate on the cloud technology.
- **Provider agnosticism:** the only condition to federate resources is to expose the chosen interfaces and services.



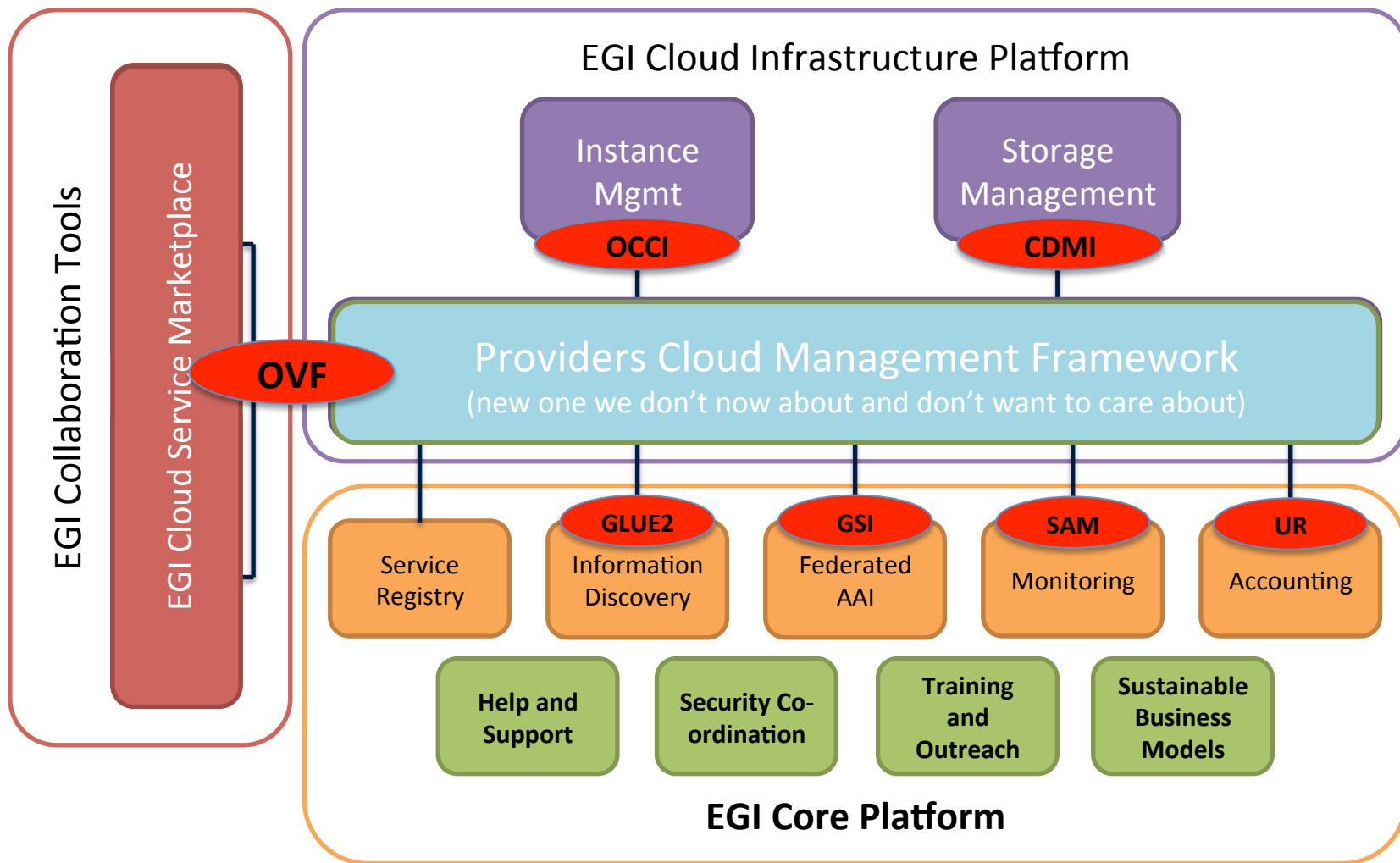
The EGI Federated Cloud is the federation of institutional private Clouds, offering Cloud Services to researchers in Europe and worldwide

A single cloud system able to

- Scale to user needs
- Integrate multiple different providers to give resilience
- Prevent vendor lock-in
- Enable resource provision targeted towards the research community

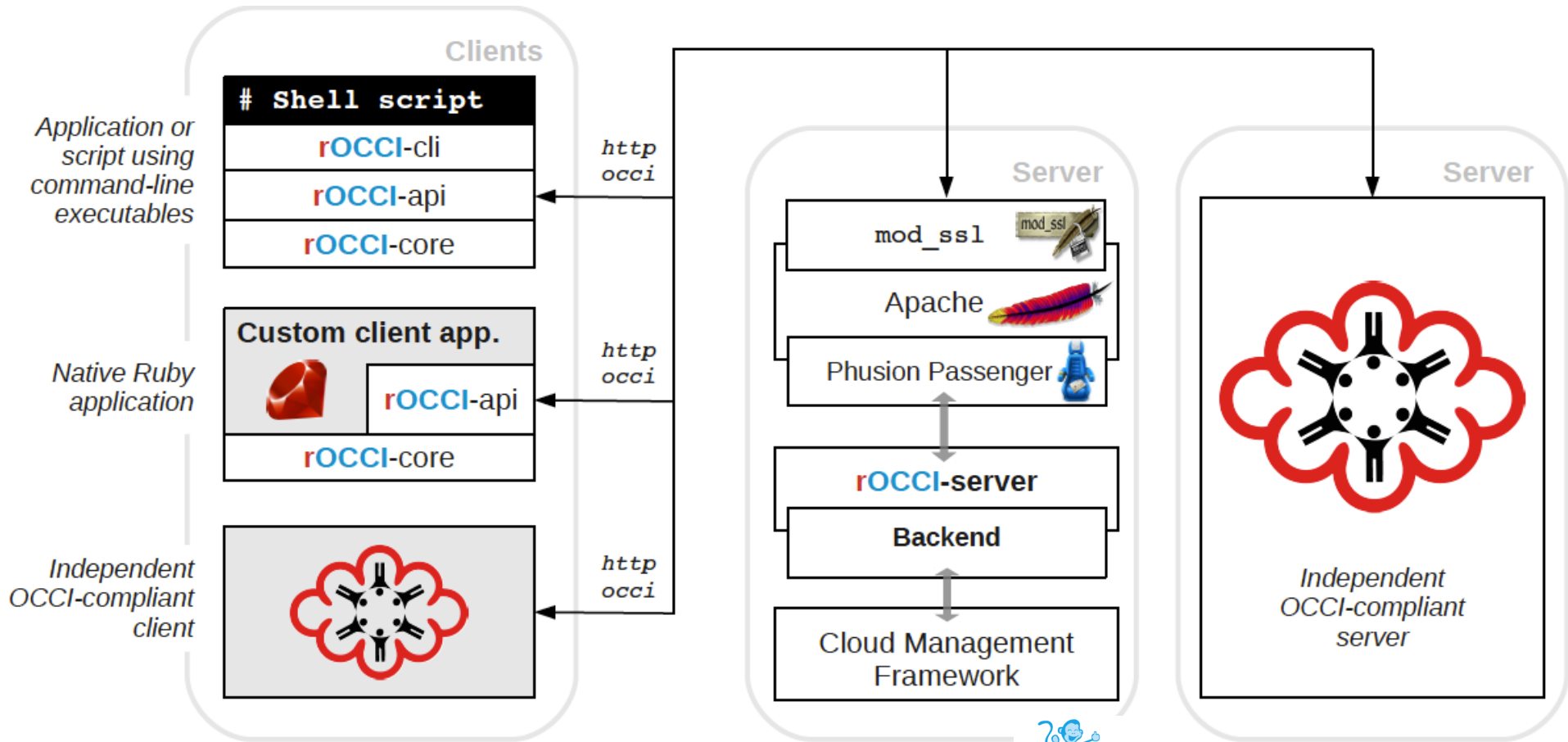
Standards based federation of IaaS cloud:

- Exposes a set of independent cloud services accessible to users utilising a common standards profile
- Allows deployment of services across multiple providers and capacity bursting



1. Manage VM instances (Production Ready)
 - OGF OCCl
 - Consistent operations across multiple different CMF

VM Instance Management through rOCCI



- [1. See What Can be Provisioned](#)
- [2 Create a VM](#)
- [3 Get a Listing of VMs](#)
- [4 Get an Individual VM's Details](#)
- [5 Execute a Stop Action Upon a VM](#)
- [6 Execute a Start Action Upon a VM](#)
- [7 Create Some a Block Storage Volume](#)
- [8 Show the Volume Details:](#)
- [9 Link and Associate that Volume to the New Instance](#)
- [10 Inspect the Storage Link](#)
- [11 Unlink and disassociate that volume with the new instance](#)
- [12 Delete Storage Volume](#)
- [13 Scale Up a VM](#)
- [14 Scale Down a VM](#)

- [15 Delete a VM](#)
- [16 Update a VM: Change the OS](#)
- [17 Create a Security Group](#)
- [18 List Security Groups](#)
- [19 Create a Security Rule](#)
- [20 List the Associated Rules/Compute Resources to a Group](#)
- [21 Get Security Rule's Details](#)
- [22 Delete a Security Rule](#)
- [23 Delete a Security Group](#)
- [24 Create a Secured VM with a Security Group](#)
- [25 Allocate Floating IP to VM](#)
- [26 Deallocate Floating IP to VM](#)
- [27 Change VM Administrative \(root\) Password](#)
- [28 Create a Image from an Active VM](#)

1. Manage VM instances (Production Ready)
 - OGF OCCI
 - Consistent operations across multiple different CMF
2. Data access/transfer interface (In roadmap)
 - SNIA CDMI
 - Minimal useful operation set available

Value

- Cloud Object Storage Service, PUT and GET files into the storage, accessible by cloud appliances and other applications

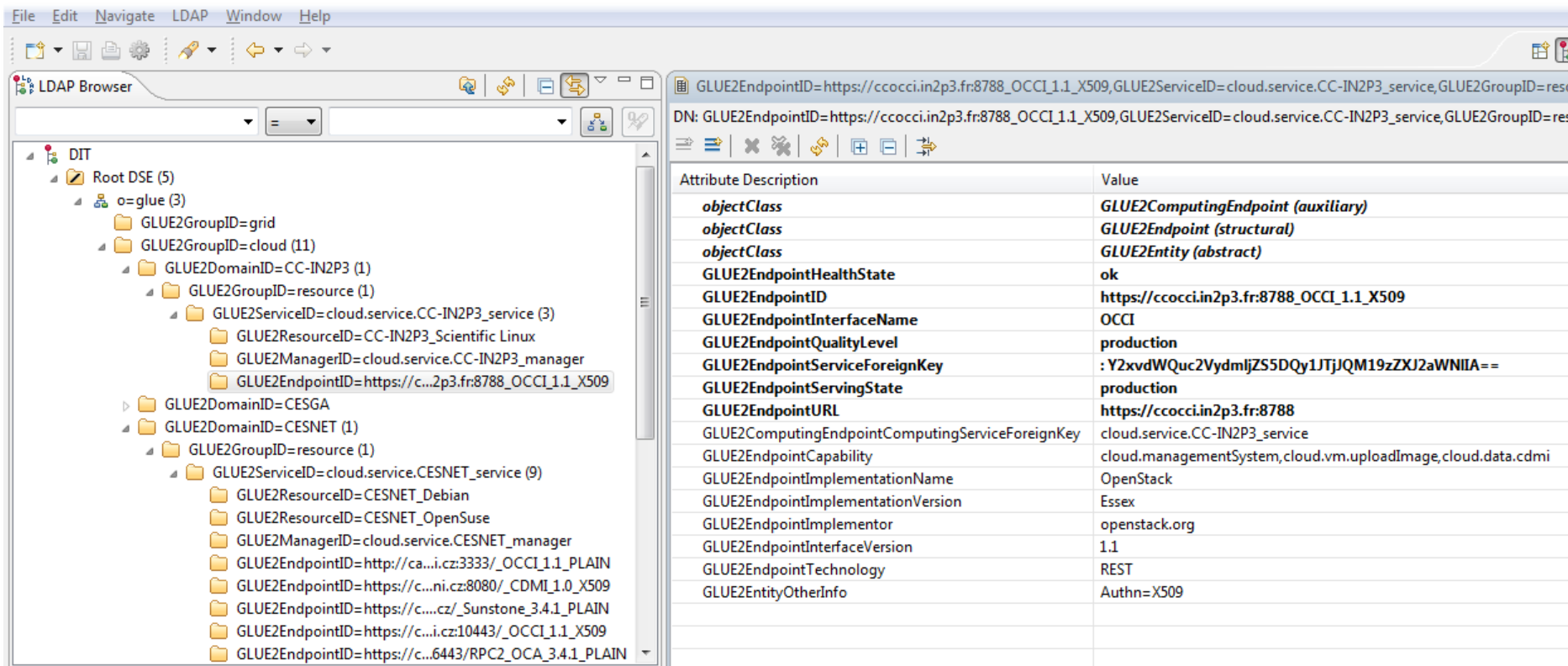
Example implementation (Stoxy)

- Multiplatform
- Support for flexible authentication schemas (incl. PAM)
- OpenStack Keystone token compliant
- Selected as a supporting technology for FP7 Strategic project for OpenData use case

- Other implementations from BSC (Emotive)

1. Manage VM instances (Production Ready)
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2. Data access/transfer interface (In the roadmap)
 - SNIA CDMI
 - Minimal useful operation set available
3. Cloud service information federation (Production Ready)
 - Extended GLUE2 schema + BDII
 - New GOCDB service types for cloud including;
 - eu.egi.cloud.vm-management.occI
 - eu.egi.cloud.storage-management.cdmi

Information system. Each cloud infrastructure exposes a LDAP server publishing information by means of a customised GLUE2 schema. Each LDAP server is polled by a top-BDII server.



The screenshot shows an LDAP Browser window with a tree view on the left and a detailed view of a specific entry on the right.

LDAP Browser Tree View:

- DIT
 - Root DSE (5)
 - o=glue (3)
 - GLUE2GroupID=grid
 - GLUE2GroupID=cloud (11)
 - GLUE2DomainID=CC-IN2P3 (1)
 - GLUE2GroupID=resource (1)
 - GLUE2ServiceID=cloud.service.CC-IN2P3_service (3)
 - GLUE2ResourceID=CC-IN2P3_Scientific Linux
 - GLUE2ManagerID=cloud.service.CC-IN2P3_manager
 - GLUE2EndpointID=https://c...2p3.fr:8788_OCCL1.1_X509
 - GLUE2DomainID=CESGA
 - GLUE2DomainID=CESNET (1)
 - GLUE2GroupID=resource (1)
 - GLUE2ServiceID=cloud.service.CESNET_service (9)
 - GLUE2ResourceID=CESNET_Debian
 - GLUE2ResourceID=CESNET_OpenSuse
 - GLUE2ManagerID=cloud.service.CESNET_manager
 - GLUE2EndpointID=http://ca...i.cz:3333/_OCCL1.1_PLAIN
 - GLUE2EndpointID=https://c...ni.cz:8080/_CDMI_1.0_X509
 - GLUE2EndpointID=https://c...cz/_Sunstone_3.4.1_PLAIN
 - GLUE2EndpointID=https://c...i.cz:10443/_OCCL1.1_X509
 - GLUE2EndpointID=https://c...6443/RPC2_OCA_3.4.1_PLAIN

Detailed View of Entry:

DN: GLUE2EndpointID=https://ccocci.in2p3.fr:8788_OCCL1.1_X509, GLUE2ServiceID=cloud.service.CC-IN2P3_service, GLUE2GroupID=resource

| Attribute Description | Value |
|--|--|
| objectClass | GLUE2ComputingEndpoint (auxiliary) |
| objectClass | GLUE2Endpoint (structural) |
| objectClass | GLUE2Entity (abstract) |
| GLUE2EndpointHealthState | ok |
| GLUE2EndpointID | https://ccocci.in2p3.fr:8788_OCCL1.1_X509 |
| GLUE2EndpointInterfaceName | OCCL |
| GLUE2EndpointQualityLevel | production |
| GLUE2EndpointServiceForeignKey | : Y2xvdWQuc2VydmljZS5DQy1JTjJQM19zZXJ2aWNlIA== |
| GLUE2EndpointServingState | production |
| GLUE2EndpointURL | https://ccocci.in2p3.fr:8788 |
| GLUE2ComputingEndpointComputingServiceForeignKey | cloud.service.CC-IN2P3_service |
| GLUE2EndpointCapability | cloud.managementSystem,cloud.vm.uploadImage,cloud.data.cdm |
| GLUE2EndpointImplementationName | OpenStack |
| GLUE2EndpointImplementationVersion | Essex |
| GLUE2EndpointImplementor | openstack.org |
| GLUE2EndpointInterfaceVersion | 1.1 |
| GLUE2EndpointTechnology | REST |
| GLUE2EntityOtherInfo | Authn=X509 |

ldap://test03.egi.cesga.es:2170



Welcome to GOCDB

GOCDB is the official repository for storing and presenting EGI topology and resources information.

Browse

Browse

- My Sites
- Projects
- NGIs
- Sites
- Service Groups
- Services

Add

- Add Site
- Add Service Group
- Add Service
- Add Downtime

Downtimes

- Active & Imminent

About GOCDB5

- Doc, Help & Support

Search

Submit

User Status

Registered as:
Michel Drescher

View Details
Manage Roles

Filter (clear)

Service Type: Search Service Type:

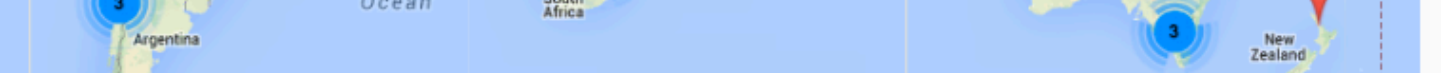
NGI: (all)

Production: Certification: Include Closed Sites:

Extension: Division Name:

15 Services

| Hostname | Service Type | Production | Monitored | Scope(s) | Host Site |
|---------------|---------------------------------|------------|-----------|----------|---------------------|
| » carach5.ic | eu.egi.cloud.vm-management.occi | ✓ | ✓ | EGI | CESNET-MetaCloud |
| » cloud.cesg | net.perfSONAR.Bandwidth | ✓ | ✓ | EGI | CESGA |
| » cloud.ifca | net.perfSONAR.Latency | ✓ | ✓ | EGI | IFCA-LCG2 |
| » egi.cloud. | ngi.OpsPortal | ✓ | ✓ | EGI | KTH-CLOUD |
| » fcctrl.ulak | ngi.SAM | ✓ | ✓ | EGI | TR-FC1-ULAKBIM |
| » head.cloud | OpsTool | ✓ | ✓ | EGI | CYFRONET-CLOUD |
| » nebula-ser | org.irods.irods3 | ✓ | ✓ | EGI | INFN-CATANIA-NEBULA |
| » nova2.ui.s | org.nordugrid.arex | ✓ | ✓ | EGI | IISAS-FedCloud |
| » occi-api.1 | org.ogf.bes.BESFactory | ✓ | ✓ | EGI | 100IT |
| » occi.cloud | org.squid-cache.Squid | ✓ | ✓ | EGI | GeoGrid |



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 - eu.egi.cloud.storage-management.cdmi
4. Resource consumption management (Production Ready)
 - APEL service with cloud specific UR
 - Secure Stomp messenger

GLOBAL View

VO MANAGER View

VO MEMBER View

SITE ADMIN View

REPORTS

METRICS PORTAL

LINKS

The following table shows the distribution of Total number of VM run grouped by SITE and DATE.

| SITE | Total num | | | | | | | | | | | | |
|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|--------------|---------------|---------------|
| | Jun 2013 | Jul 2013 | Aug 2013 | Sep 2013 | Oct 2013 | | | | | | | | |
| 'HG-09-Okeanos-Cloud' | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| 100IT | 2 | 0 | 1 | 1 | | | | | | | | | |
| BIFI | 0 | 0 | 0 | 0 | | | | | | | | | |
| CERN-PROD | 0 | 0 | 0 | 0 | | | | | | | | | |
| CESGA | 474 | 28 | 2 | 61 | | | | | | | | | |
| CESNET | 83 | 302 | 26 | 720 | | | | | | | | | |
| CESNET-MetaCloud | 0 | 0 | 0 | 0 | | | | | | | | | |
| CYFRONET-CLOUD | 0 | 0 | 0 | 0 | | | | | | | | | |
| FZJ | 10 | 2 | 10 | 31 | | | | | | | | | |
| GoeGrid | 0 | 0 | 0 | 10 | | | | | | | | | |
| GWDG | 0 | 0 | 0 | 10 | | | | | | | | | |
| HG-09-Okeanos-Cloud | 0 | 0 | 0 | 0 | | | | | | | | | |
| IFCA-LCG2 | 0 | 0 | 2 | 12 | | | | | | | | | |
| IISAS-FedCloud | 0 | 0 | 0 | 0 | | | | | | | | | |
| INFN-CATANIA-NEBULA | 0 | 0 | 0 | 0 | | | | | | | | | |
| INFN-CATANIA-STACK | 0 | 0 | 0 | 0 | | | | | | | | | |
| KTH CLOUD | 14 | 18 | 65 | 1 | | | | | | | | | |
| KTH-CLOUD | 23 | 18 | 46 | 5 | | | | | | | | | |
| MK-04-FINKICLOUD | 0 | 0 | 0 | 0 | | | | | | | | | |
| PRISMA-INFN-BARI | 0 | 0 | 0 | 0 | | | | | | | | | |
| SZTAKI | 0 | 0 | 0 | 0 | | | | | | | | | |
| TR-FC1-ULAKBIM | 0 | 0 | 0 | 0 | | | | | | | | | |
| TW-EMI-PPS | 0 | 0 | 0 | 213 | 0 | | | | | | | | |
| Total | 606 | 368 | 152 | 1,064 | 740 | 539 | 5,770 | 209 | 76 | 116 | 1,032 | 4,872 | 15,544 |
| Percentage | 3.90% | 2.37% | 0.98% | 6.85% | 4.76% | 3.47% | 37.12% | 1.34% | 0.49% | 0.75% | 6.64% | 31.34% | |

Current Usage Record Content

- Site
- User: local user/group, Digital Certificate DN
- VMUUID (VM instance identifier)
- Start (and End) Time
- Status
- Wall and CPU Duration
- VM source image
- Cloud Type

119069 VMs launched across 22 clouds

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4. Resource consumption management (Production Ready)
 - APEL service with cloud specific UR
 - Secure Stomp messenger
5. Cloud service availability (Production Ready)
 - NAGIOS
 - Utilising production EGI monitoring framework with published probes



Graph Type Quality Plot Bar Plot

View

VO

Profile

Regions or Tier

Sites

Production Pre-production

Fixed period

Today Last month Last 6 months Last year

Custom period

From To

Resolution Hourly Daily Weekly Monthly

Scalable System... Dashboard - C

Nagios®

- General
- Home
- Documentation
- Current Status

- Tactical Overview
- Map
- Hosts
- Services
- Host Groups
 - Summary
 - Grid
- Service Groups
 - Summary
 - Grid
- Problems
 - Services (Unhandled)
 - Hosts (Unhandled)
 - Network Outages

Quick Search:

Reports

- Availability
- Trends
- Alerts
 - History
 - Summary
 - Histogram
- Notifications
- Event Log

System

- Comments
- Downtime
- Process Info
- Performance Info
- Scheduling Queue
- Configuration

Current N
Last Update
Updated eve
Nagios® Co
Logged in as

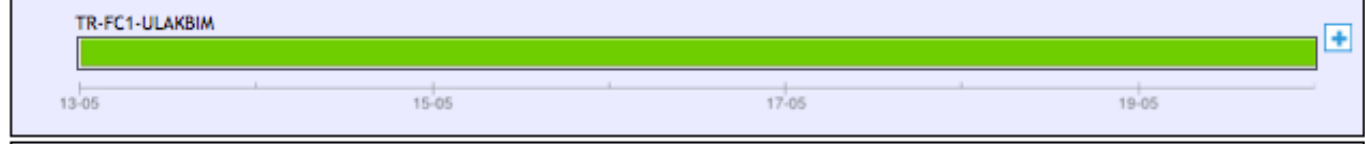
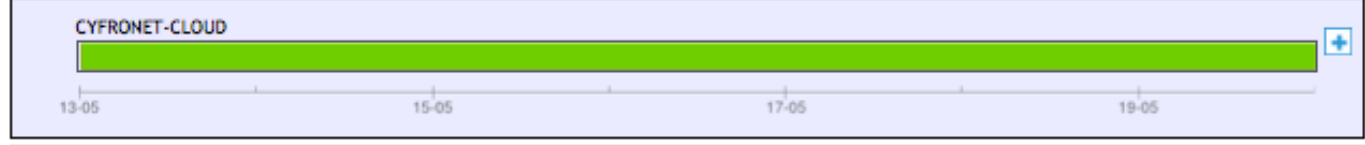
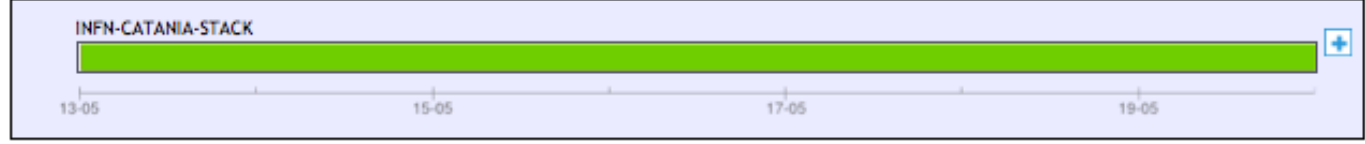
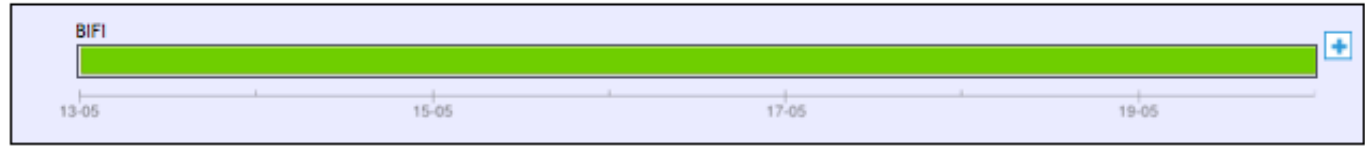
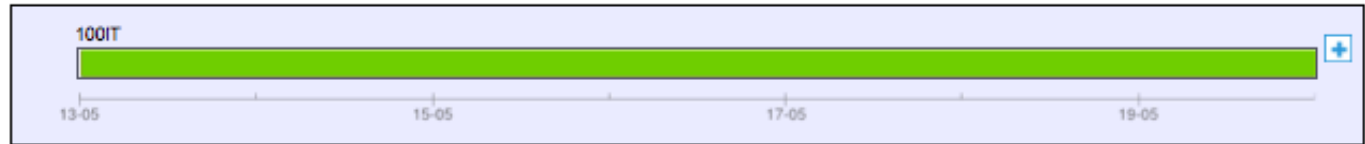
View Status
View Status
View Servi
View Servi

Host **◆◆**

- carach5.ic
- cloud.cesg
- cloud.ifca.i
- egi-cloud.2
juelich.de
- egi.cloud.p
- nebula-ser
- nova.ui.sa
- nova2.ui.s
- occi-api.10
- occi.cloud
- oceanos-o
- onehost-2
- prisma-clo
- server4-ep
- stack-serv

hide filters

Update Page



Watch L... >>

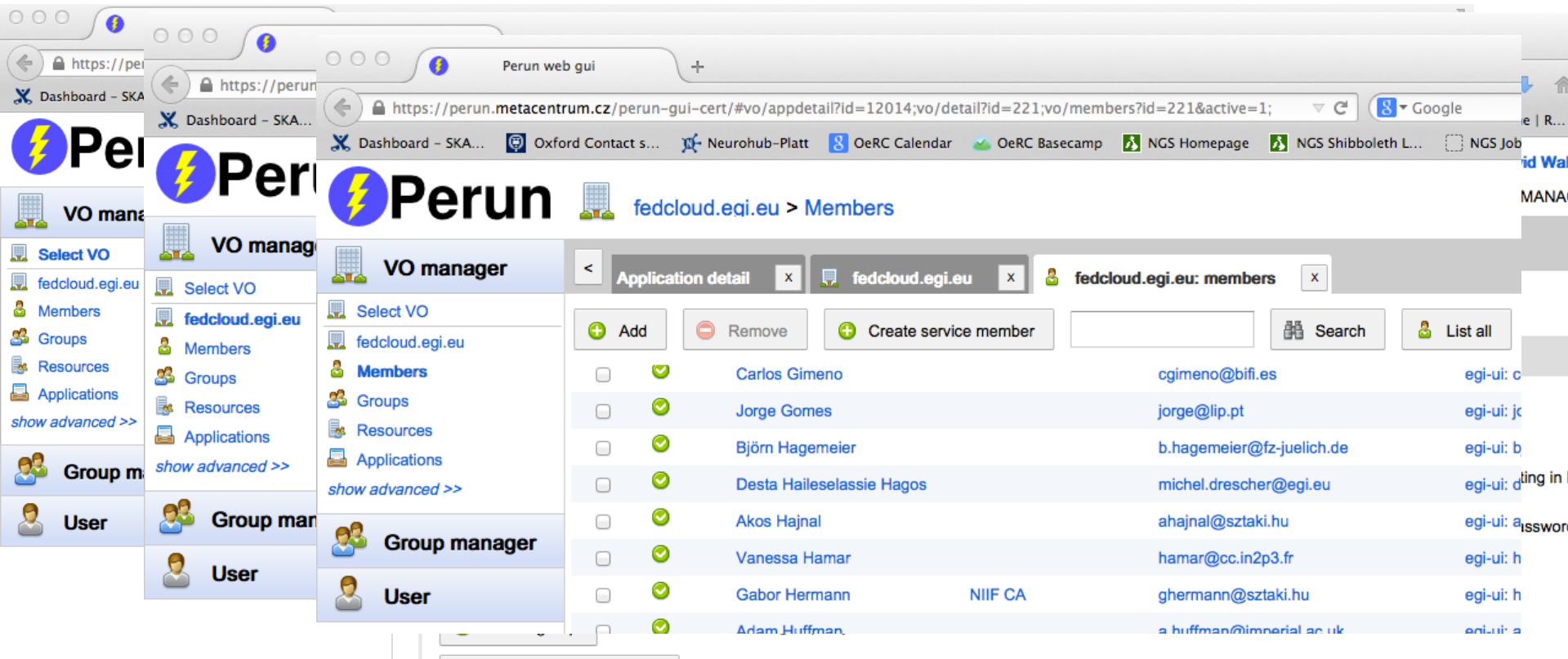
- baba*
- 8f87b439c*
- 95c632d*
- 4d2f64*
- 03*
- certificate B: certificate
- if5d*
- iscb*
- 9fb02*

6. Federated AAI (Production Ready)

- x509
- VOMS - PERUN

Inherited from the EGI AAI framework

- Scalable with many users
- Uniform authentication across multiple service providers
- Users manage their community via Virtual Organisations



The screenshot displays the Perun web GUI interface. The main content area shows a list of members under the heading "fedcloud.eqi.eu > Members". The list includes columns for checkboxes, status indicators, names, email addresses, and user identifiers.

| Checkbox | Status | Name | Email | User ID |
|--------------------------|--------|---------------------------|---------------------------|---------------|
| <input type="checkbox"/> | ✓ | Carlos Gimeno | cgimeno@bifi.es | egi-ui: c... |
| <input type="checkbox"/> | ✓ | Jorge Gomes | jorge@lip.pt | egi-ui: jc... |
| <input type="checkbox"/> | ✓ | Björn Hagemeyer | b.hagemeyer@fz-juelich.de | egi-ui: b... |
| <input type="checkbox"/> | ✓ | Desta Haileselassie Hagos | michel.drescher@egi.eu | egi-ui: d... |
| <input type="checkbox"/> | ✓ | Akos Hajnal | ahajnal@sztaki.hu | egi-ui: a... |
| <input type="checkbox"/> | ✓ | Vanessa Hamar | hamar@cc.in2p3.fr | egi-ui: h... |
| <input type="checkbox"/> | ✓ | Gabor Hermann | ghermann@sztaki.hu | egi-ui: h... |
| <input type="checkbox"/> | ✓ | Adam Huffman | a.huffman@imperial.ac.uk | egi-ui: a... |

The interface also features a sidebar with navigation options like "VO manager", "Select VO", "Members", "Groups", "Resources", and "Applications". The top navigation bar includes "fedcloud.eqi.eu > Members".

6. Federated AAI (Production Ready)

- x509
- VOMS - PERUN

7. VM Image Management (Production Ready)

- AppDB
- VMCaster/VMCatcher



AppDB – Virtual Appliance catalogue

https://appdb.egi.eu/browse/cloud

https://appdb.egi.eu/store/vappliance/chain.reds.generic.vm

About Contact

Search... Sign In Help

https://vmcast...vm/image.list

https://vmcaster.appdb.egi.eu/store/vappliance/chain.reds.generic.vm/image.list

MIME-Version: 1.0
Content-Type: multipart/signed; protocol="application/x-pkcs7-signature"; micalg="sha1"; boundary="-----4DE2861D9DE6A9B8DDF973923F18D6D2"

This is an S/MIME signed message

-----4DE2861D9DE6A9B8DDF973923F18D6D2

```
{
  "hv:imagelist": {
    "dc:date:created": "2014-05-16T11:23:32Z",
    "dc:date:expires": "2499-12-31T22:00:00Z",
    "dc:description": "This is a generic VM used to execute many applications in the Chain-Reds Science Gateway",
    "dc:identifier": "ce41175e-86be-4706-9d24-cac7397b4c73",
    "dc:source": "https://appdb.egi.eu/",
    "dc:title": "CHAIN-REDS Generic VM",
    "ad:swid": "821",
    "hv:endorser": {
      "hv:x509": {
        "dc:creator": "EGI Applications Database",
        "hv:ca": "/DC=ORG/DC=SEE-GRID/CN=SEE-GRID CA",
        "hv:dn": "/DC=EU/DC=EGI/C=NL/O=Hosts/O=EGI.eu/CN=appdb.egi.eu",
        "hv:email": "appdb-support@iasa.gr"
      }
    }
  },
  "hv:images": [
    {
      "hv:image": {
        "dc:description": "",
        "dc:identifier": "f2337fda-5540-42c8-810b-a69bfa311c36",
        "ad:mpuri": "https://appdb.egi.eu/store/vm/image/f2337fda-5540-42c8-810b-a69bfa311c36:37/",
        "dc:title": "Image for CHAIN-REDS Generic VM Scientific Linux/6.4/KVM",
        "ad:group": "General group",
        "hv:hypervisor": "KVM",
        "hv:format": "qcow2",
        "hv:size": "1413283840",
        "hv:uri": "http://appliance-repo.egi.eu/images/base/Chain-Reds/Chain-Reds-generic-VM.qcow2",
        "hv:version": "1.0",
        "sl:arch": "x86_64",
        "sl:checksum:sha512":
      }
    }
  ]
}
```

6. Federated AAI (Production Ready)
 - x509
 - VOMS - PERUN
7. VM Image Management (Production Ready)
 - AppDB
 - VMCaster/VMCatcher
8. Brokering (Production Ready)
 - Slipstream
 - VMDIRAC
 - COMPs
 - Catania Science Gateway Framework



module/basic
State: Aborted

Dashboard

Control and monitor your cloud activity

This page provides you with an overview of the activities on each cloud you have access to

Home > runs > d64d6a0e

Overview

Home > dashboard

Deployments / Runs / Builds

| | Run Id | Module | State | Start Time | User | Tags |
|--|--------------------------|--------------------------------------|----------|-----------------------------|-----------|------|
| | d64d6a0e | basictest/basicdep/6 | Aborted | 2014-05-07 13:01:01.900 UTC | salvatore | |
| | 3bf6c424 | basictest/basicsl6/7 | Done | 2014-05-07 12:53:08.252 UTC | salvatore | |
| | 93e1f89e | basictest/basicsl6/7 | Aborted | 2014-05-07 10:17:04.738 UTC | salvatore | |
| | 9ddbafa9 | basictest/basicdep/6 | Inactive | 2014-05-07 07:58:51.900 UTC | salvatore | |
| | b21fe5c2 | basictest/basicdep/6 | Aborted | 2014-05-07 07:41:23.574 UTC | salvatore | |

Virtual Machines

Summary

Global

orchestrator

sl6.1

Reports



6. Federated AAI (Production Ready)
 - x509
 - VOMS - PERUN
7. VM Image Management (Production Ready)
 - AppDB
 - VM Caster/VM Catcher (Production Ready)
8. Brokering (Production Ready)
 - Slipstream
 - VMDIRAC
 - COMPs
 - Catania Science Gateway Framework
9. Contextualisation (Production Ready)
 - Cloudinit
 - Extensions to OCCl

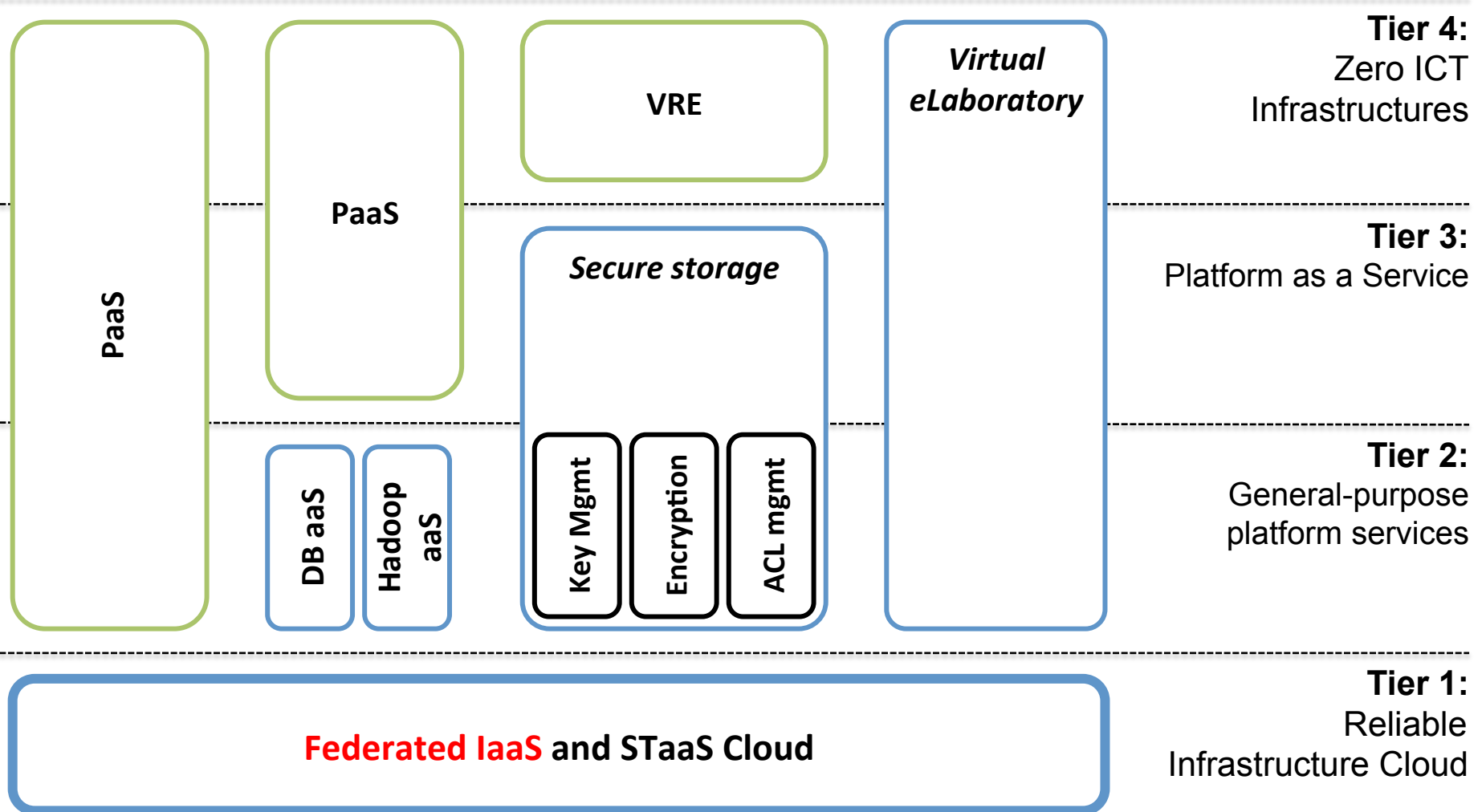
- Process of installing, configuring and preparing software upon boot time
- All uploaded Fedcloud images **should** support Cloudinit
- All supported CMF OCCI implementations extended to support

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 - Catania Science Gateway Framework
9. Contextualisation (Production Ready)
 - Cloudinit
 - Extensions to OCCl
10. SLA & Business Models – Sustainability (Under development)
 - Pricing/charging models
 - Operational standards and expectations

| Resource Provider | Service | Contact | Configuration | Access | Price | Storage | Other |
|--|-------------------------------------|---|------------------------|---|---|------------------------|-------|
| CESGA-IBERGRID
CESGA
Alvaro Simon
Ivan Diaz | Batch + Cloud | <ul style="list-style-type: none"> FS (/home and /scratch systems), EMI dCache, EMI DPM, OpenStack Swift and OpenStack Cinder 720 cores (Batch) AMD Opteron(tm) Processor 6174 2.2Ghz 240 cores (Cloud) Intel(R) Xeon(R) CPU E5520 2.27Ghz MPI jobs RAM from 1GB to 32GB per core | Direct | €0.02/core/HEPSPEC06 hour | €0.04/core+2GB RAM/hour (+VAT)
Example:
<ul style="list-style-type: none"> small: 1 core & 2GB €0.04/hour medium: 2 cores & 4GB €0.08/hour large: 4 cores & 8GB €0.16/hour | €0.055/GB/month (+VAT) | 21% |
| IFCA-IBERGRID
IFCA-LCG2
Jesus Marco | Batch (SLURM, SGE) + Cloud | <ul style="list-style-type: none"> Batch via CREAM CE Cloud via OpenStack Up to 2500 cores in servers with 4, 8, 16, 40 physical cores Infiniband access to other nodes and storage possible for MPI jobs RAM from 4GB to 256GB per core (max 1TB) | Both, Direct preferred | <ul style="list-style-type: none"> €0.05/core/hour for usual instances, <0.01/core/H506 hour (+ VAT) €0.04/core/hour for multicore use (>128 cores) | Minimal storage free, requests up to 100 TB high performance storage possible | | |
| Institute of Informatics of the Slovak Academy of Sciences (II SAS)
IISAS-FedCloud
Ladislav Hluchy
Viet Tran | Cloud (Openstack) | <ul style="list-style-type: none"> 120 cores (Cloud) Intel(R) Xeon(R) CPU E5570 2.93Ghz 1, 2, 4, 8 cores VMs RAM up to 4GB per core | Both | not available | €0.06/core/h +VAT | | 20% |
| Latvian Grid
IMCSUL
Kaspars Krampis | Cloud: OpenStack, GRID, ARC + SLURM | <ul style="list-style-type: none"> CPU: Up to 256 cores, RAM up to 4GB per core | TBC | -€0.07/core/hr + VAT (TBC) | | | 21% |
| MASTER-UP Srl
UNI-PERUGIA
Alessandro Costantini
Antonio Lagana | EMI1/2, CE, WN, SE | <ul style="list-style-type: none"> EMI1 middleware (phasing to EMI2) - CE's, WN's and SE. 10 nodes to start (intel 4core, ethernet connection) Long experience in Molecular Science and Comp Chem, can provide support for such innovative applications and in the field of R&D for combustion, energy and material science. Managing a computer farm of 200 cores and 4TB of storage part of those resources are supporting EGI. | Direct | To be evaluated | | | |
| NGI_GRNET
All HG-*
Kostas Koumantaros | Cloud and Grid | <ul style="list-style-type: none"> TBC | TBC | €0.05/hr + VAT | | | 23% |
| NG-IT
INFN-BARI PRISMA-
INFN-BARI (cloud)
INFN-XX
Vincenzo Spinoso | EMI, OpenStack | <ul style="list-style-type: none"> gLite MW stack: Cream CE, LFC, Storm SE, WMS+LB, BDI. Cloud: OpenSTACK | TBD | €0.07/hr + VAT | €0.05 + VAT | | 22% |
| 100 Percent IT
100IT
David Blundell | Cloud (Openstack) | <ul style="list-style-type: none"> Intel Xeon X5670 @ 2.93Ghz Cloud via OpenStack | Both | | €0.07 + VAT | | 20% |
| | | <ul style="list-style-type: none"> Computing power, storage, and human support | | | | | |

6. Federated AAI (Production Ready)
 - x509
 - VOMS - PERUN
7. VM Image Management (Production Ready)
 - AppDB
 - VMCaster/VMCatcher
8. Brokering (Production Ready)
 - Slipstream
 - VMDIRAC
 - COMPs
 - Catania Science Gateway Framework
9. Contextualisation (Production Ready)
 - Cloudinit
 - Extensions to OCCI
10. SLA & Business Models - Sustainability (Production Ready)
 - Pricing/charging models
 - Operational standards and expectations
11. Security
 - Technology Providers
 - Resource Providers

Federated Cloud Services



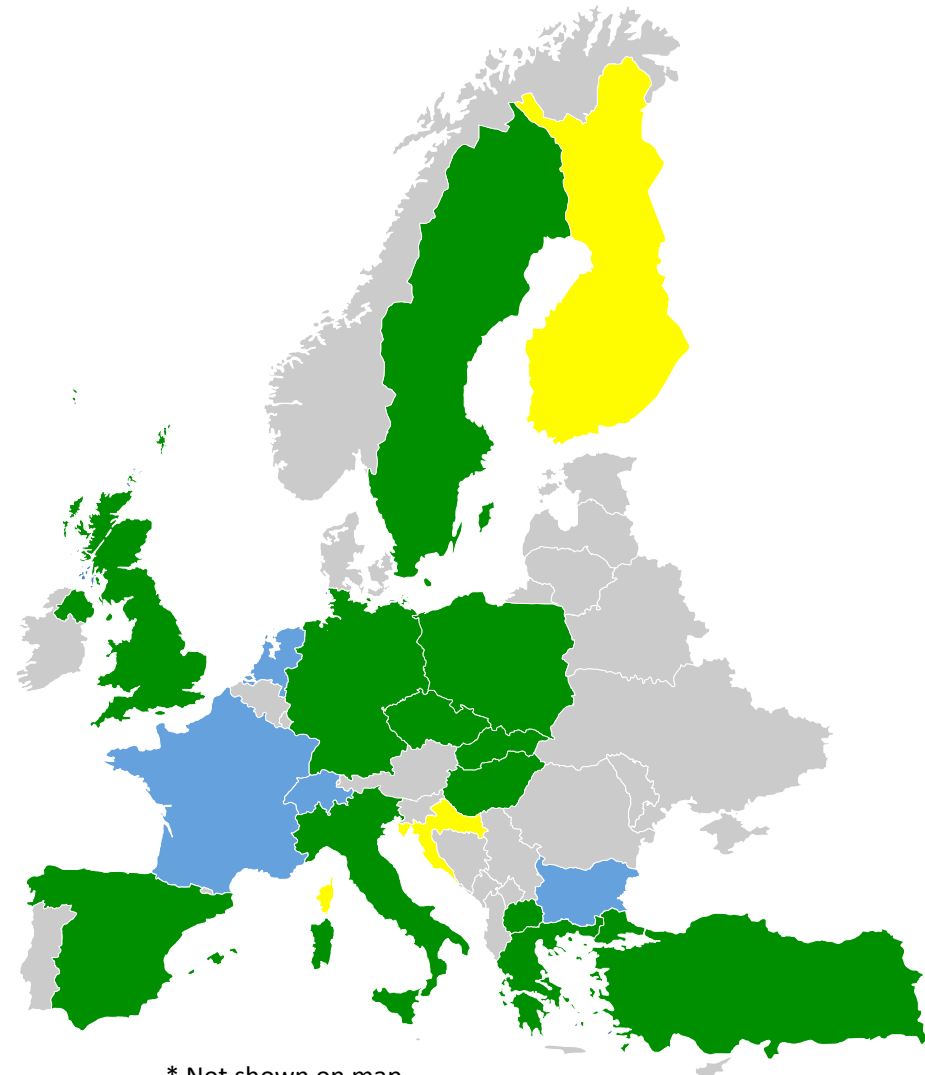
- Rich and diverse set of individual offerings
- Application/VM Image repository
- User community choice of provider at all levels
- Academic and commercial resource & service providers
- User community from the public and private sector

| Cloud Mgmt. Fram. | Fed. AAI | Monitoring | Accounting | Img. Mgmt. | OCCI | CDMI |
|-------------------|----------|------------|------------|------------|------|------|
| OpenStack | Yes | Yes* | Yes | Yes | Yes | Yes |
| OpenNebula | Yes | Yes* | Yes | Yes | Yes | Yes |
| Synnefo | Yes | Yes | Yes | - | Yes | - |
| StratusLab* | Yes | Yes | Yes | - | Yes | - |
| Cloudstack | | | | | Yes | |
| Emotive | Yes | | | | | Yes |

Example documentation for a CMF:-

<https://wiki.egi.eu/wiki/Fedcloud-tf:ResourceProviders:OpenStack>

- 12 countries provide certified resources
 - Czech Republic, Germany, Greece, Hungary, Italy, Macedonia, Poland, Slovakia, Spain, Sweden, Turkey, United Kingdom
- 2 countries currently integrating
 - Croatia, Finland
- 5 countries interested
 - Bulgaria, France, Israel*, The Netherlands, Switzerland
- Worldwide interest
 - South Africa* (SAGrid)
 - South Korea* (KISTI)
 - United States* (NIST, NSF Centres)



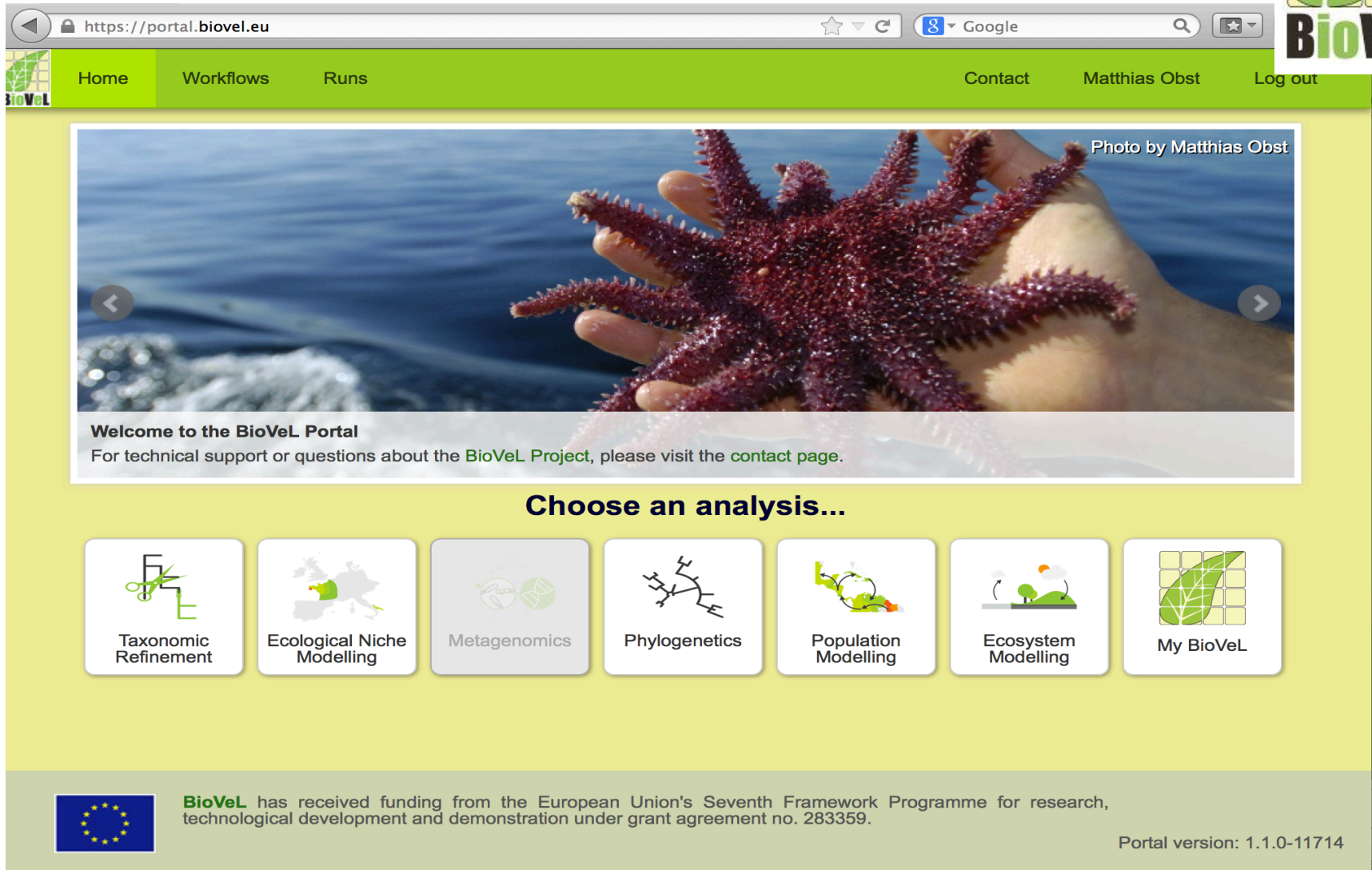
* Not shown on map

- 15 certified Resource Providers
 - 100 Percent IT Ltd, United Kingdom
 - The University of Zaragoza's Institute for Biocomputation and Physics of Complex Systems (BIFI), Spain
 - Academic Computer Centre CYFRONET AGH (Cyfronet), Poland
 - The Supercomputing Centre of Galicia (CESGA), Spain
 - The Czech Education and Scientific NETwork (CESNET), Czech Republic
 - Gesellschaft für wissenschaftliche Datenverarbeitung mbH Göttingen (GWDG), Germany
 - Consejo Superior de Investigaciones Científicas (CSIC) / Instituto de Física de Cantabria (IFCA), Spain
 - ~Okeanos by the Greek Research and Technology Network (GRNET), Greece
 - Institute of Informatics, Slovak Academy of Sciences (II SAS), Slovakia
 - Italian National Institute of Nuclear Physics (INFN), Division of Catania, Italy
 - The Royal Institute of Technology, Sweden (KTH), Sweden
 - Italian National Institute of Nuclear Physics (INFN), Division of Bari, Italy
 - The Hungarian Academy of Sciences Institute for Computer Science and Control (MTA SZTAKI), Hungary
 - Turkish Academic Network and Information Centre (*ULAKBIM*), Turkey
 - The European Information & Innovation Centre (*UKIM*), Macedonia
- 152 individuals participating and contributing to the Federated Cloud group
 - 130 conference calls (Sep 2011 – May 2014)
 - 14'800 VM instantiations accounted for in the last year

- Resources will be available for request through e-Grant
- Preliminary Units of Allocation



| Name | # of vCPU | Mem (GB) | Storage (GB) |
|--------|-----------|----------|--------------|
| Small | 1 | 2 | 1 x 20 |
| Medium | 2 | 4 | 1 x 40 |
| Large | 4 | 8 | 2 x 80 |
| Other | >2 | >7.5 | n x >40 |



<https://portal.biovel.eu>
Google

[Home](#)
[Workflows](#)
[Runs](#)
[Contact](#) [Matthias Obst](#) [Log out](#)







Photo by Matthias Obst

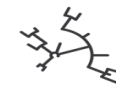
Welcome to the BioVeL Portal
 For technical support or questions about the [BioVeL Project](#), please visit the [contact page](#).


Choose an analysis...



 Taxonomic Refinement



 Ecological Niche Modelling



 Metagenomics


 Phylogenetics


 Population Modelling


 Ecosystem Modelling


 My BioVeL

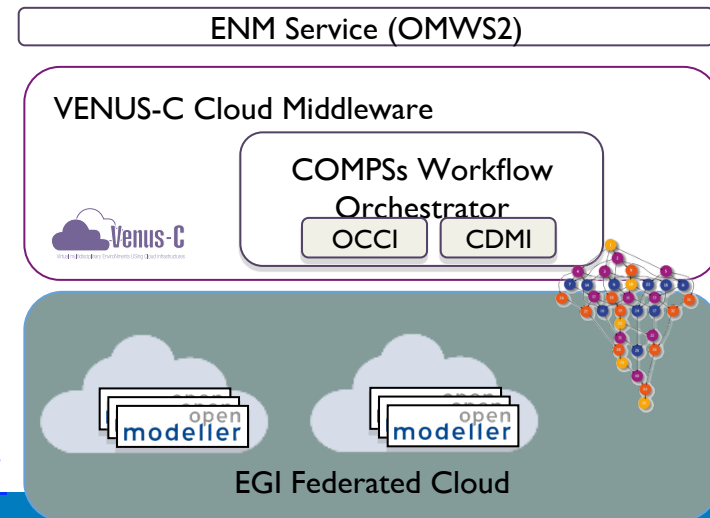
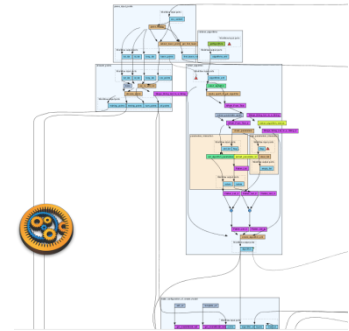
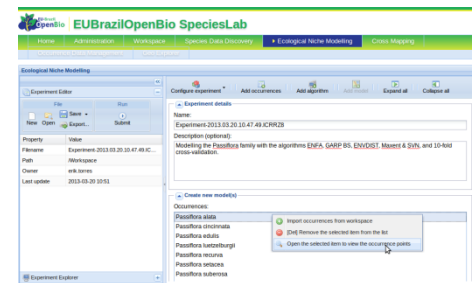


BioVeL has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no. 283359.

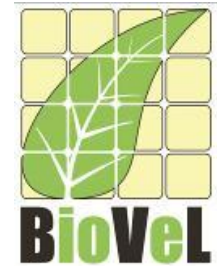
Portal version: 1.1.0-11714

The Ecological Niche Modelling (ENM) Workflow takes as input a file containing species occurrence points to create a model with the [openModeller](#) Web Service.

- The EUBrazilOpenBio ENM service is exposed through an extended openModeller Web Service interface
- Multi-staging and multi-parametric oM experiments are implemented through [COMPSs](#) that dynamically creates the virtual resources to execute the operations.
- An OCCI connector is used for the VMs management while data management supports CDMI endpoints.



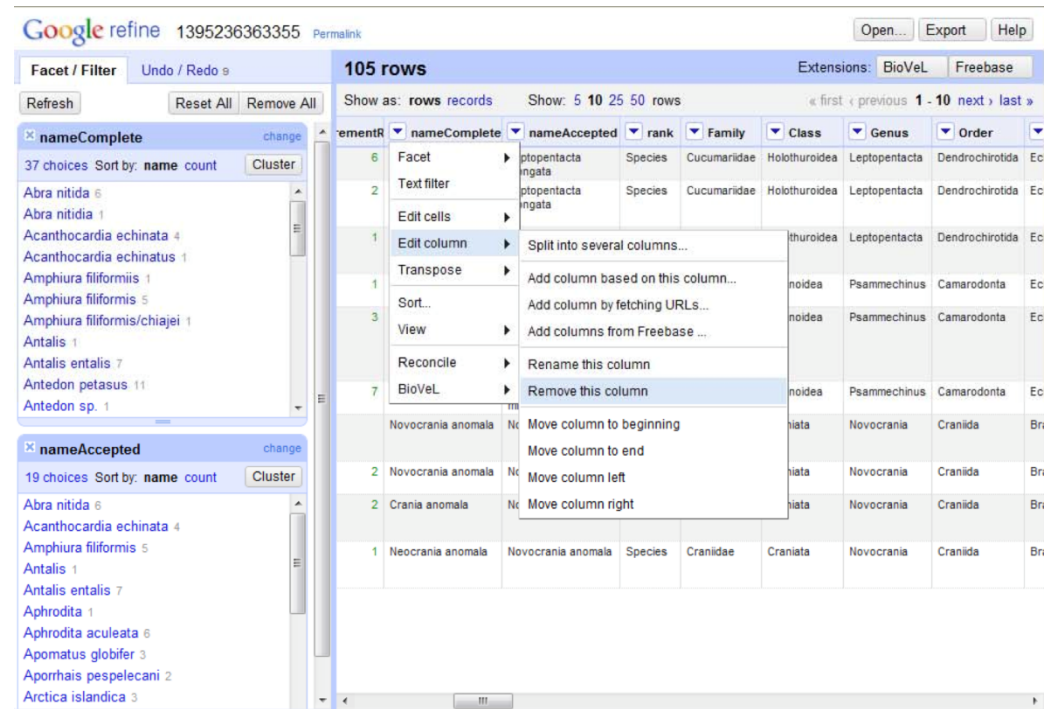
Service available at
<https://portal.biovel.eu/>



[OpenRefine](#) (originally developed as [Google Refine](#)) is a framework for viewing and cleaning large amounts of messy data.

It is used within [BioVeL](#) for taxonomic data to ensure data quality and integrity.

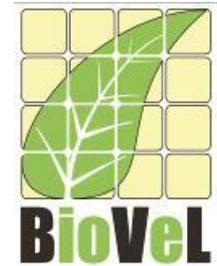
The service integrates existing know-how of taxonomic data with existing functionality in Google Refine to develop BioVeL specific data cleaning tools.



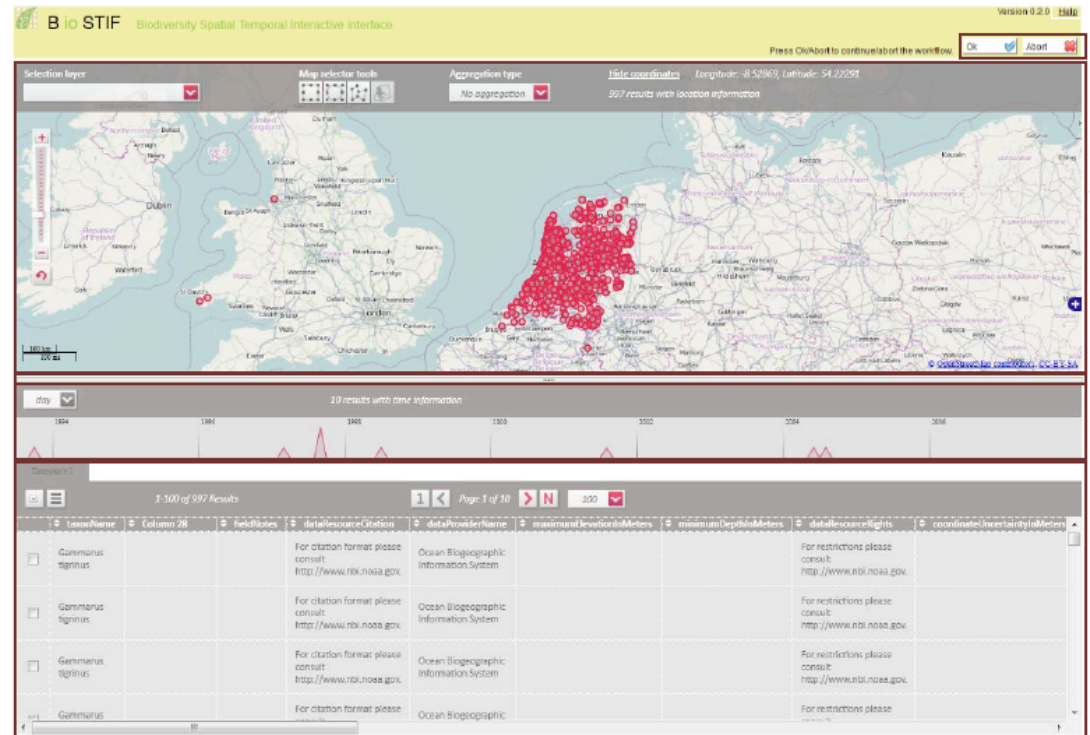
The screenshot shows the Google Refine interface with a dataset of 105 rows. The interface includes a 'Facet / Filter' panel on the left with two facets: 'nameComplete' (37 choices) and 'nameAccepted' (19 choices). The main table displays columns for 'nameComplete', 'nameAccepted', 'rank', 'Family', 'Class', 'Genus', and 'Order'. A context menu is open over the 'nameComplete' column, showing options like 'Edit column', 'Transpose', 'Sort...', 'View', 'Reconcile', and 'BioVeL'. The 'BioVeL' option is highlighted, and a sub-menu is visible with options like 'Remove this column', 'Move column to beginning', 'Move column to end', 'Move column left', and 'Move column right'.

Service available at
<https://portal.biovel.eu/>

[BioSTIF](#) provides an easy GIS interface to visualize and quality control biodiversity data in time and space



The interface contains a map widget (displaying geographical data), a timeline widget (displaying data on a time scale), and a table widget (displaying data in table format).



Service available at
<https://portal.biovel.eu/>

Co-ordination & Harmonisation of Advanced e-Infrastructures
for Research and Education Data Sharing



Science Gateway

[Welcome](#) [Help](#) [Demo Applications](#) [Demo Status](#) [Project Home](#)

By definition, a Science Gateway is a "community-development set of tools, applications, and data that is integrated via a portal or a suite of applications, usually in a graphical user interface, that is further customized to meet the needs of a specific community".

The present Science Gateway has been built in the context of the EU [CHAIN](#) and [CHAIN-REDS](#) projects to demonstrate how the Science Gateway paradigm and standard adoption can make e-Infrastructures worldwide, based on different middleware and architectures (Grid, HPC, Cloud or simply local clusters), [interoperable](#) amongst each other, at user application level.

Thanks to the collaboration with [CNGrid](#), [EGI-InSpire](#), [ENEA-CRESCO](#), [EUMEDGRID-Support](#), [FutureGrid](#), [GARUDA](#), [GISELA](#), [IGI](#), [JSAGA](#), [SAGrid](#) and [WeNMR](#) projects, a set of Demo Applications has been deployed on various Grid (based on [EMI - gLite](#) and [UNICORE - Genesis II](#), [Globus](#), [GOS](#), [OurGrid](#) middleware), Cloud (based on [OCCI](#) compliant - [Okeanos](#), [OpenNebula](#) and [OpenStack](#) - stacks) and local (based on the [Platform Computing](#) resource manager) resources and you can execute them through this portal in a simple and easy way. Some of the Cloud sites belong to the [EGI Federated Cloud](#).

If you don't have yet an account on the CHAIN-REDS Science Gateway, click on [Instructions to Register and Sign In](#). Otherwise, choose the application you wish to run from the list which appears in the above Demo Applications menu and execute it.

If, instead, you are only interested in checking the current status of the demo, click on [Demo Status](#).

Contributors



Follow us on Social Networks

This Includes the possibility to access the Science Gateway from within the Social Network page.



The Weather Research and Forecasting ([WRF](#)) Model is a next-generation meso-scale numerical weather prediction system designed to serve both atmospheric research and operational forecasting needs.



3 VM Settings

Please, use the drop-down list to choose the VM profile you wish to deploy on the available infrastructures (Grid/Cloud)

? Virtual Server *

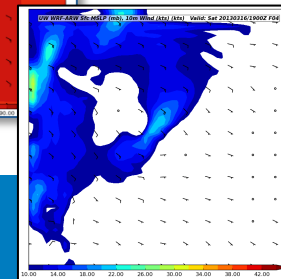
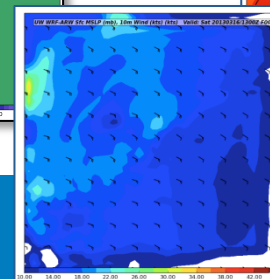
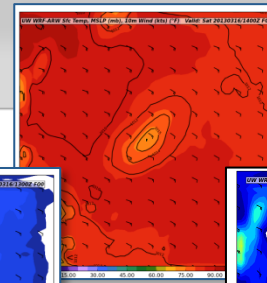
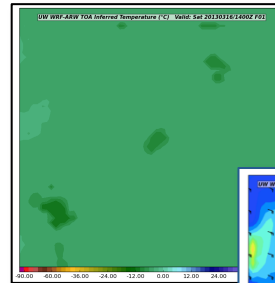
? VM Template *

? Simulation *

? Description

? Notification 





CHAIN-REDS Science Gateway
-CHAIN-REDS RI-306819





CHAIN-REDS Science Gateway
-CHAIN-REDS RI-306819

Co-ordination & Harmonisation of Advanced e-Infrastructure for Research and Education Data Sharing

Science Gateway

Welcome Help Demo Applications Demo Status Project Home

"Hello World"

Computer Science and Mathematics

By definition, a Science Gateway is a development set of tools, applications, and services that provide a suite of

Contributors

Cloud Applications



With this service it is possible to execute scientific applications on Virtual Machines (VMs) deployed on standard-based federated clouds, including the EGI Federated Cloud.

The following applications are currently available:



Sequential "Hello World!"

This application just outputs the name of the Virtual Machine where the job has been executed.



GNU Octave

GNU Octave is a high-level interpreted language, primarily intended for numerical computations. It provides capabilities for the numerical solution of linear and nonlinear problems, and for performing other numerical experiments. It also provides extensive graphics capabilities for data visualization and manipulation.



GNU R Environment

R is a free software environment for statistical computing and graphics. R provides a wide variety of statistical (linear and nonlinear modelling, classical statistical tests, time-series analysis, classification, clustering, etc.) and graphical techniques, and is highly extensible.

2 The Cloud Testbed

See the Cloud Resource(s) where you can run your application

Legend Split dose sites Unsplit dose sites Cloud Resource

Map controls: Mappa Satellite

Map labels: Stockholm, Hamburg, Berlin, Roma, Athens, etc.

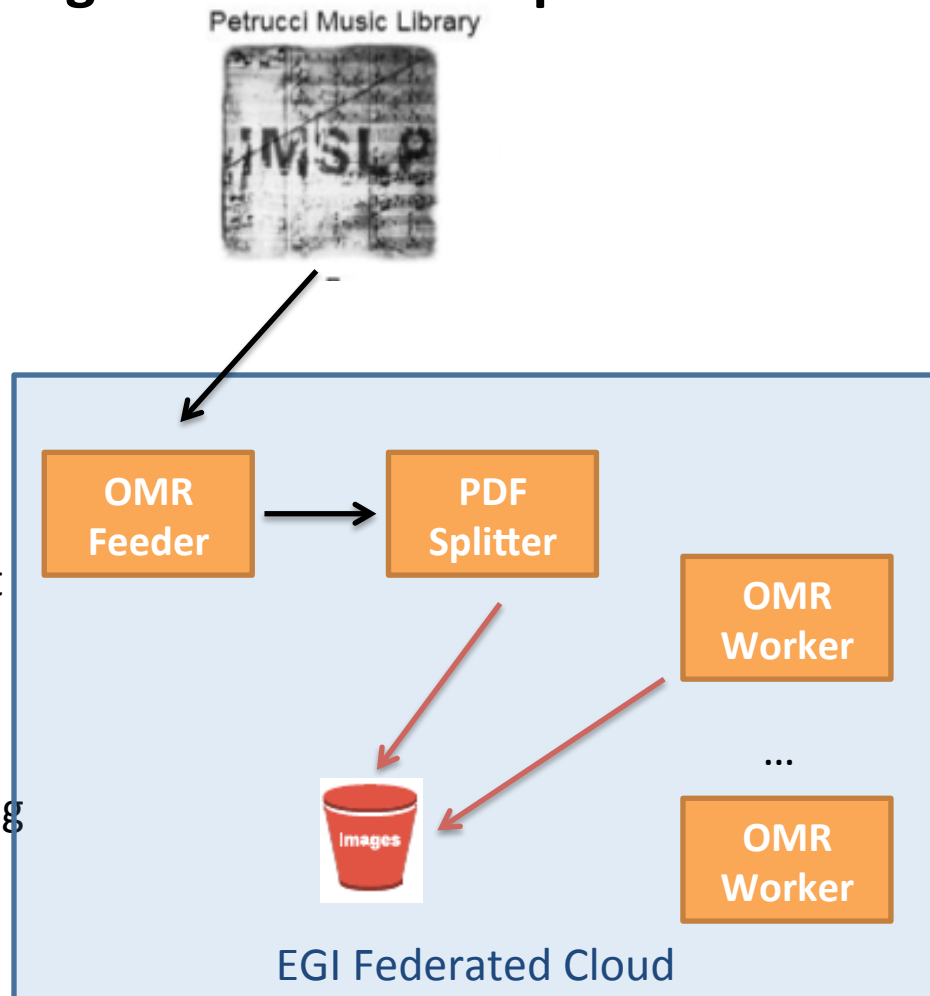
Peachnote is a **music score search engine and analysis platform**.

Hundreds of thousands of music scores are being digitized by libraries all over the world. In contrast to books, they generally remain inaccessible for content-based retrieval and algorithmic analysis.

There is no **analogue to Google Books for music scores**, and no large corpora exists that can empower advanced analysis on music scores.

Peachnote **want to help change that** providing visitors and researchers access to a massive amount of symbolic music data.

Petrucci Music Library



A large purple arrow pointing upwards, representing the growth of user services and communities.

Value added services for User
Communities

- Broader support for open standards in Cloud management frameworks
 - Utilisation of rOCCI for interfaces to commercial cloud frameworks
- New feature additions to foundational tools depending on requests
 - Accounting, monitoring, service discovery, Application DB
- Innovate and deploy PaaS & SaaS
- Large improvements on documentation for all 3 stakeholder groups

A large purple arrow pointing to the right, representing the strengthening of the underpinning platform.

Strengthening the underpinning platform

EGI's Cloud Vision for 2020

To support the digital European Research Area through a pan-European research infrastructure based on an open federation of reliable services that provide uniform access to computing and data resources provided by the public and private sector.

EGI Federated Cloud capability vision

10M cores Cloud compute

1 EB Cloud storage

- Today we launch the Federated Cloud into production
- Paving the way for a global federated cloud marketplace
 - Established best practice
 - Illustrating European leadership
 - Open standards, open technology
 - Open membership, open processes
 - Open competition

| | | | |
|-------------------|---|--------------------------------|---------------------------------|
| Launch capability | – | 5,000 cores, | 225 TB storage |
| Q4 2014 (planned) | – | 18,000 cores,
(3.6x) | 6000 TB storage
(26x) |

Alison Packer, Álvaro López García, Alvaro Simon, Binh Minh Nguyen, Björn Hagemeyer, Boris Parak, Boro Jakimovski, Cal Loomis, Daniele Cesini, Daniele Lezzi, David Blundell, Diego Scardaci, Elisabetta Ronchieri, Emir Imamagic, Enol Fernandez, Feyza Eryol, Florian Feldhaus, Gergely Sipos, Jan Meizner, John Gordon, Kostas Koumantaros, Malgorzata Krakowian, Marios Chatziangelou, Marco Verlato, Marica Antonacci, Mattieu Puel, Matteo Turilli, Michel Jouvin, Michel Drescher, Miroslav Ruda, Nuno L. Ferreira, Owen Synge, Paul Miller, Peter Solagna, Piotr Kasprzak, Roberto Barbera, Ruben Valles, Sándor Ács, Salvatore Pinto, Silvio Spardi, Soonwook Hwang, Steven Newhouse, Stuart Pullinger, Thijs Metsch, Tomasz Szepieniec, Viet Tran, Zeeshan Ali Shah.

Task Force resources

Mailing List: fedcloud-tf@mailman.egi.eu

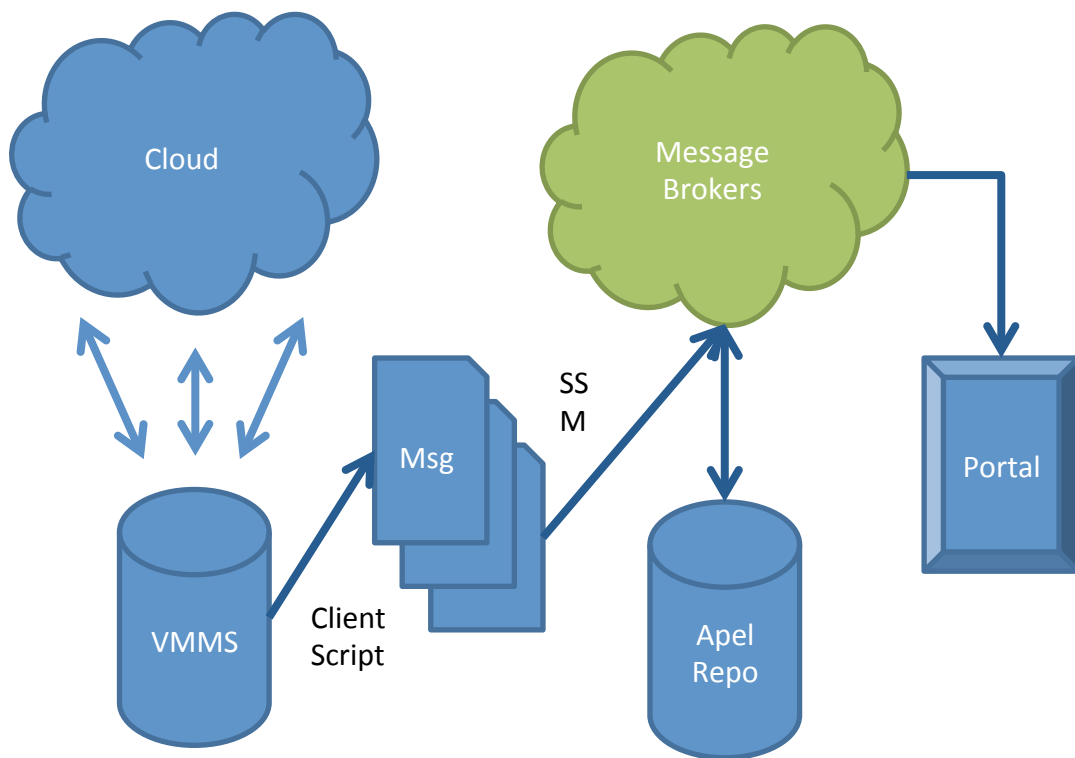
Wiki site: <http://go.egi.eu/tf-fedclouds>

GitHub: <https://github.com/EGI-FCTF>

Indico site: <https://www.egi.eu/indico/categoryDisplay.py?categId=112>

Questions?

How does it work?



UR Content

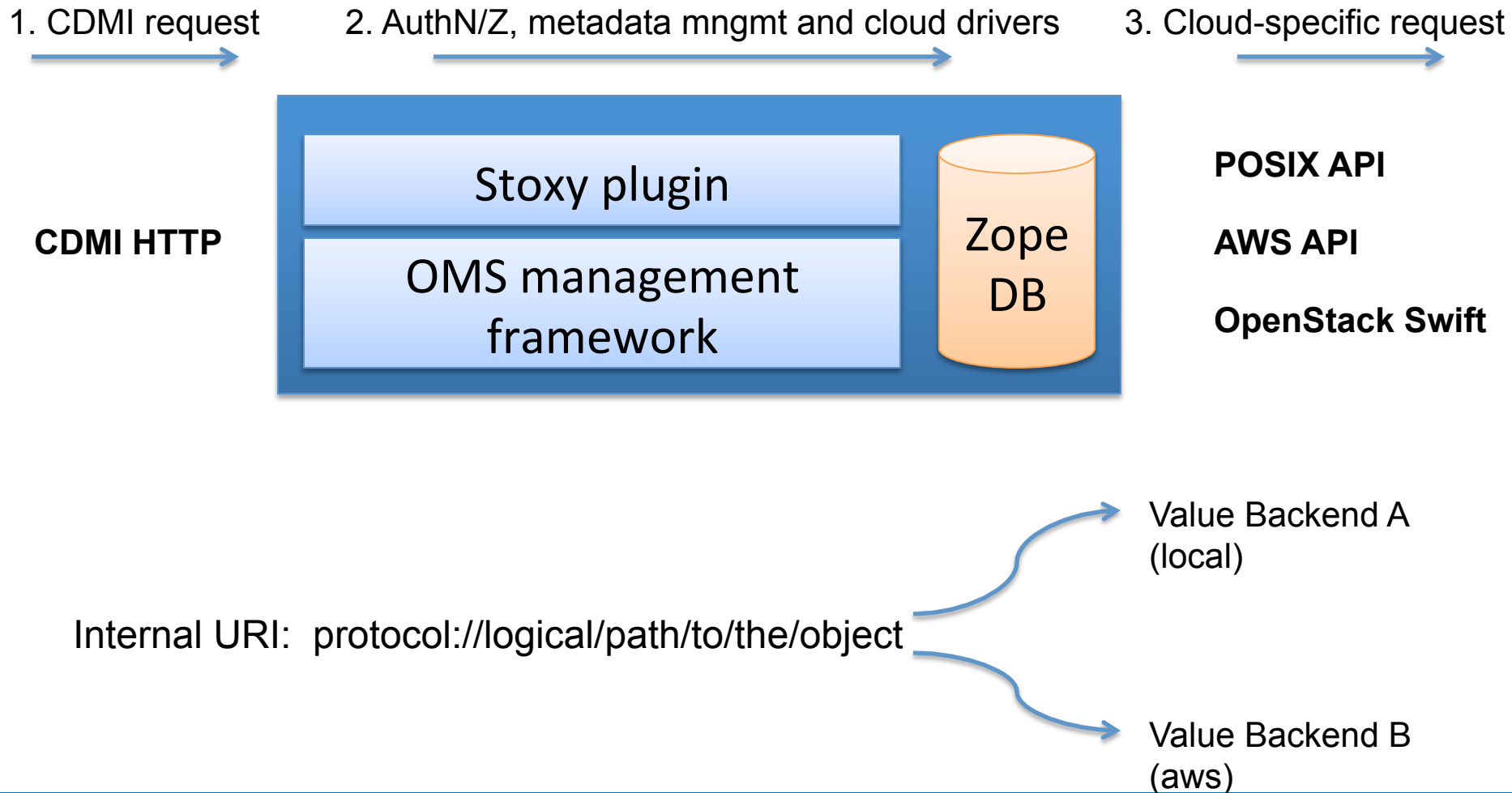
Currently

- Site
- User: local user/group, Digital Certificate DN
- VMUUID (VM instance identifier)
- Start (and End) Time
- Status
- Wall and CPU Duration
- VM source image
- Cloud Type

Planned

- FQAN: VO, VO Group, VO Role
- Network in and out
- Memory
- Disk
- Storage Record

Stoxy architecture



- **Different Pricing models under consideration**
 - **Free at the point of use**
 - accounted resource consumption, best effort support, no direct reimbursement of accrued costs
 - **Try before you buy**
 - Limited access to free resources, expires after defined time.
 - Facilitates conversion rate from user to customer
 - **Pay-as-you-go**
 - Fixed price per consumption unit, fees directly correlate with consumed resources
 - **Wholesale resource guarantee**
 - Soft-quota, 2-tier cost plan: Resources within quota paid as you go on wholesale price, overdraft within limits costed at pay-as-you-go plan
 - **Reserved resources**
 - Exclusive resource reservation up to agreed limits. Overdraft not allowed, fixed payments