Linking EUBrazilCloudConnect and EGI Federated Cloud

Ignacio Blanquer on behalf of the EUBrazilCC consortium
What EUBrazilCC aims at?

- Foster EU-Brazil international cooperation in distributed computing infrastructures at three levels:
  - Heterogeneous (especially cloud) infrastructure federation.
  - Integration of Frameworks to efficiently Access infrastructure resources.
  - User’s applications, creating shared spaces for the benefit of international collaborations.
An integrated platform

- Data analysis framework used for scientific data: ophidia.cmcc.it
- Cloud-enabled Fine-grain workflow engine: www.esciencecentral.co.uk
- Platform-agnostic distributed computing programming framework: compss.bsc.es
- Rapid Prototyping Tool for Scientific Gateways: www(lncc.br)

- PDAS
- eScience Central
- COMPSs PMES
- mc2

- Deployment and cloud broker service supporting multiple back-ends: www.grycap.upv.es/im
- Unified batch submission for heterogeneous HPC systems: www.puc-rio.br

- Infrastr. Manager: fogbow
- CSGRID

- Federation technology for clouds, exposing an OCCI interface: fogbowcloud.org
EUBRazilCC Cloud Architecture

- VOMS Server
- IM
- Fogbow client
- CSGRID
- mc²
- COMPSs / PMES
- Use Case
- mc²
- CSGRID
- COMPSs / PMES
- Use Case
- Fogbow Dashboard
- Fogbow manager
- OCCI (Order)
- Fogbow manager
- OCCI (Comp.)
- Fogbow manager
- Use Case
- eSC VMI
- PDAS VMI
- External VMI Repo
- ONE
- Site A
- Site B
- Site C
- VMI Repo
EUBrazilCC - EGI Interoperability

- At the level of the infrastructure
  - Fogbow exposes (and extends) an OCCI interface and can reuse EGI services for VMIs and authentication.

- At the level of the Platform
  - Infrastructure Manager uses the same recipes for deploying applications in EGI Federated Cloud and EUBrazilCC.
  - COMPSs and PMES use the OCCI interface of fogbow in the same way as when accessing EGI resources.

- At the level of the applications
  - Use cases and main tools are available from appDB
    - LeishVL, Alya-ADAN
    - eSC, mc2 and Ophidia-PDAS (soon)
EUBrazilCC Interoperability
At the level of the infrastructure

- Fogbow (www.fogbowcloud.org) is a lightweight federation middleware
  - Every cloud should be able to join the federation with minimal hassle.
  - No need for a specific cloud middleware or version.
  - Preserve autonomy to specify local security and usage policies.
  - No need to expose endpoints of services running inside the intranet.
  - New services that need to be exposed can run at the DMZ.

- Allocation of resources is governed by a prioritization mechanism autonomously defined by each member.
EUBrazilCC Interoperability
At the level of the infrastructure

- EUBrazilCC infrastructure provides cloud clients with a single endpoint to create resources anywhere in the federation.
  - Targeted allocation: the user specifies in which cloud the resource should be created
  - Transparent failover: tries to create in the cloud with which the user interacts, in case the cloud is unable to create the resource, it will transparently find another one that can fulfil the request (transparent outsourcing)

- Additional features required a new abstraction that prevents server and clients to be blocked until the request is fulfilled.
  - Fogbow supports this feature through the abstraction of “orders” for resources
    - Currently we support only resources of type compute; storage and networking will be available soon
  - It implements an OCCI extension to support these features
    - Order (create, get information, delete)
    - Federation (members, accounting)

- To use all fogbow’s features, clients need to be modified to create requests in the federation through fogbow’s extended OCCI API.

- However, fogbow also provides a generic OCCI interface for legacy clients that provides some of the new features, including transparent failover.
EUBrazilCC Interoperability
At the level of the Applications

- EGI appDB catalogue reused.
- vmcatcher is used to download VMIs to the site storage cache.
Interoperable use cases
Deploy an appDB VMI on EUBrazilCC

Using the CLI / fogbow dashboard

- Fogbow CLI
  
fogbow-cli request --create --n 2 --image
  http://www.grycap.upv.es/vmimages/LVLServer3.ova
  --flavor large --url
  http://fbgrycap.i3m.upv.es:8182 --
  public-key ~/.ssh/id_rsa.pub
EUBrazilCC Interoperability
At the level of the Platform

COMPSs/PMES (compss.bsc.es) and IM (www.grycap.upv.es/im) can deploy VMIs both in EGI and EUBrazilCC.

COMPSs is a programming model which is able to exploit the inherent concurrency of applications for distributed computing platforms.

- By annotating the code a task-dependence graph is created and tasks are executed by a runtime in the nodes of the infrastructure.
- A tutorial has been given in this event

IM is a devops service that can deploy, configure and reconfigure on runtime multi-vm virtual appliances.

- It uses Ansible recipes to code software configurations and to provide idenpotency.
- IM is part of one of the demos in this event.

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<th>Title</th>
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<td>11-Nov-2015</td>
<td>Programming Distributed Computing Platforms with COMPSs</td>
<td>LEZZI, Daniele</td>
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<td>Deploying Cost-Efficient Virtual Elastic Clusters across Multi-Clouds</td>
<td>Amanda Calatrava et al.</td>
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Interoperable use cases
Execute a parallel program on COMPSs

- Browser
- PMES Dashboard
- Job Mgmt (BES)
- PMES Service
- Providers Configuration
- PMES Service
- COMPSs AlyaADAN Service

<CloudProvider name="UPV">
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<Connector>integratedtoolkit.connectors.rocci.ROCCI</Connector>

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EGI AppDB

COMPSs AlyaADAN VM

COMPSs AlyaADAN VM

<CloudProvider name="bscgrid_fogbow">
<Connector>integratedtoolkit.connectors.rocci.ROCCI</Connector>

<Name>auth</Name> <Value>x509</Value>
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<Value>/home/cdiaz/AlyaAdanCOMPSs/certs/proxy</Value>
</Property>
</CloudProvider>

Image name="uuid_aa_compss_149"
Interoperable use cases
Deploy an appDB VMI on EUBrazilCC / EGI using IM

disk.0.image.url='fbw://http://www.grycap.upv.es/vmimages/LVLServer3.ova'

- Or -

disk.0.image.url='http://fc-one.i3m.upv.es/occi/infrasctructure/os_tpl#uuid_image_for_leishmaniasis_virtual_lab_lvl_ubuntu1404vmware_im75_112'
Interoperable use cases
Deploy and configure of a PDAS (multi-VM big data stack)

- Configuring an Ophidia (PDAS) big data analytics stack using IM.
  - Multiple VMI available for front-end, I/O and compute nodes

- Ophidia front-end
  - GSI-enabled
  - VOMS support available
  - Combined authZ mode

- Using IM (www.grycap.upv.es/im)

- Integration of IM in the Ophidia CLI
  - New Ophidia commands: deploy, undeploy, deploy_list, deploy_VMs_list
  - `oph term -H <host> -P <port> -u <user> -p <password> -e 'deploy ophidia_cluster.radl'`
  - `OPH_INFRASTRUCTURE_URL= http://imserver/infrastructures`

- Ophidia & EGIAppDB
  - VMIs soon available on the EGIAppDB (under testing)

http://ophidia.cmcc.it/
Interoperable use cases
Deploy and configure a multi-VM application

Configuring a Galaxy portal and a processing queue from a base vanilla VMI.

Using EC3 (www.grycap.upv.es/ec3) + IM (www.grycap.upv.es/im)

```
ec3 launch galaxy_cluster
  ubuntu-fc-cesnet nfs
torque_pub maui galaxy
galaxy-tools
  escherichia_coli_genome
  -a myauth.dat -y
```

EGI

```
id= egiocci1; type = OCCI; proxy = file{/tmp/fcproxy.pem};
host = https://fc-one.i3m.upv.es:11443
```

EUBrazilCC

```
id= eubcc; type = fogbow; proxy = file{/tmp/eubccproxy.pem};
host = https://fbgrycap.i3m.upv.es:8182
```
Conclusions

- EUBrazilCC has reused several services and components from EGI
  - AAI based on VOMS, appDB, vmcatcher.
  - Key components registered in the appDB catalogue can also be deployed on EGI Federated Cloud.
- Fogbow has extended OCCI standard with a new type (order), while keeping compatibility to the rest of the standard
  - An EGI cloud Resource can be easily integrated in a EUBrazilCC federation.
- EUBrazilCC brokering services keep OCCI compatibility to ensure easy transfer between both infrastructures
  - COMPSs, IM directly, other tools indirectly.
EUBrazilCC consortium