



European Commission
Information Society and Media



 **Ciência e Tecnologia**
Ministério da Ciência e Tecnologia



EU Brazil Cloud Connect

EU Brazil Cloud Computing for Science

Building an IaaS Cloud Federation with Fogbow

Francisco Brasileiro on behalf of the
EUBrazilCC consortium



Cloudscape Brazil 2015

FEDERATING CLOUD E-INFRASTRUCTURES AND CREATING NEW MARKETS



IaaS Cloud Federation

- ⊙ Key requirements for effective federation
 - ⊙ Federation-wide identification
 - ⊙ Common API
 - ⊙ Common way to represent VM images
- ⊙ Additional requirements
 - ⊙ Federation services
 - ⊙ Membership
 - ⊙ Image distribution management
 - ⊙ Accounting
 - ⊙ ...



Approaches

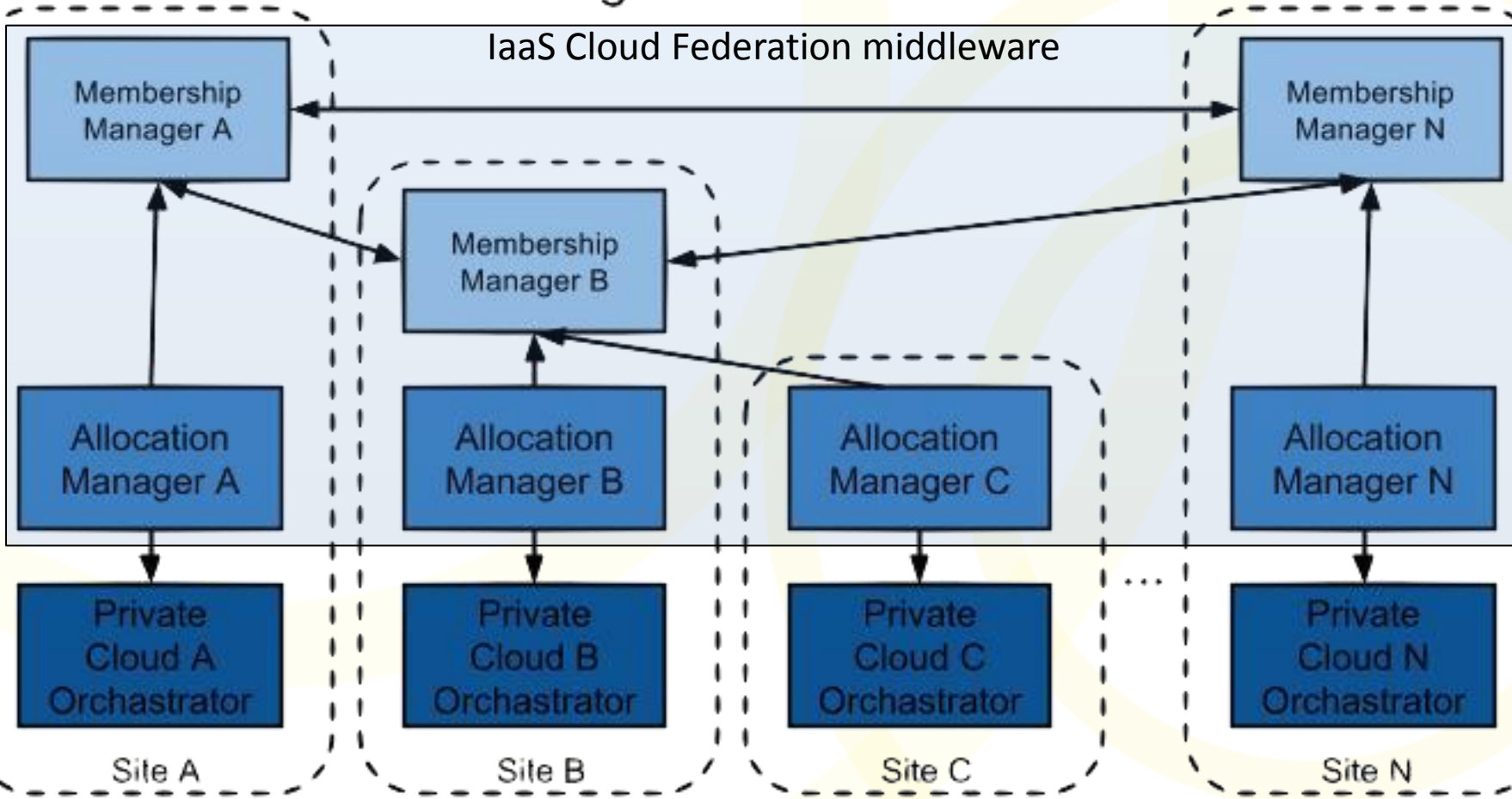
- Single IaaS Cloud Orchestrator that supports federation
 - Offers common API and image format by construction
 - Federation-aware services
 - Identity Provider (IdP)
 - ...
- Multiple IaaS Cloud Orchestrators
 - Enhance the orchestrator to support:
 - Chosen common API
 - Federation-wide IdP
 - Federation-wide auxiliary services
 - Relies on standards for conciliating different orchestrators peculiarities
- IaaS Cloud Federation middleware
 - Decouples federation functionalities from the orchestrator functionalities
 - Offers common API by construction
 - Uses adaptors (plug-ins) to provide interoperation with multiple orchestrators
 - Relies on standards for conciliating different orchestrators peculiarities



Fogbow's architecture

Fogbow federation

IaaS Cloud Federation middleware



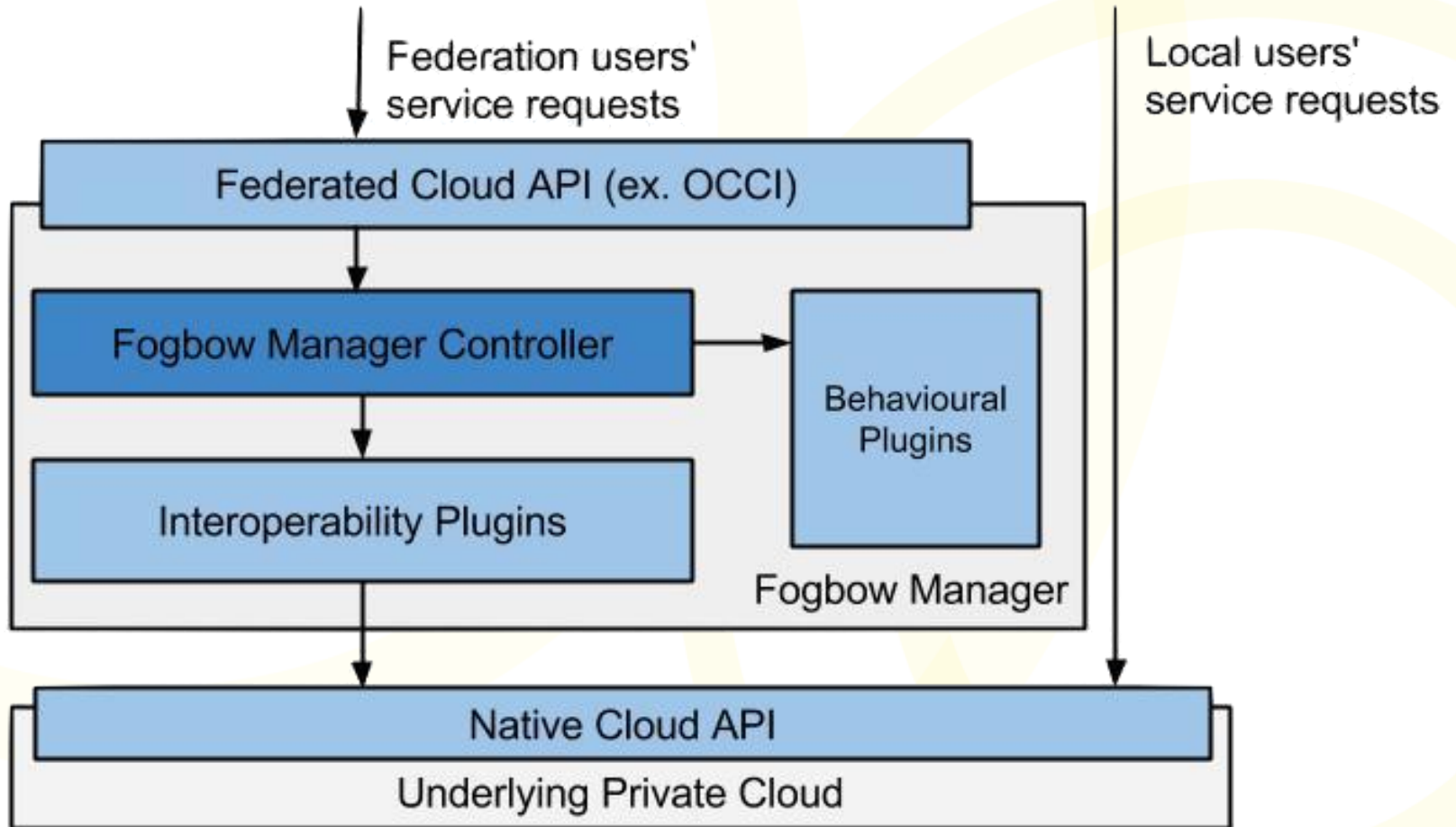


Fogbow's sustainability model

- ⊙ Open source community
 - ⊙ A lot more than a github repository!
 - ⊙ Easy the task of contributing
 - ⊙ Well-thought architecture
 - ⊙ Good documentation



Fogbow manager's architecture



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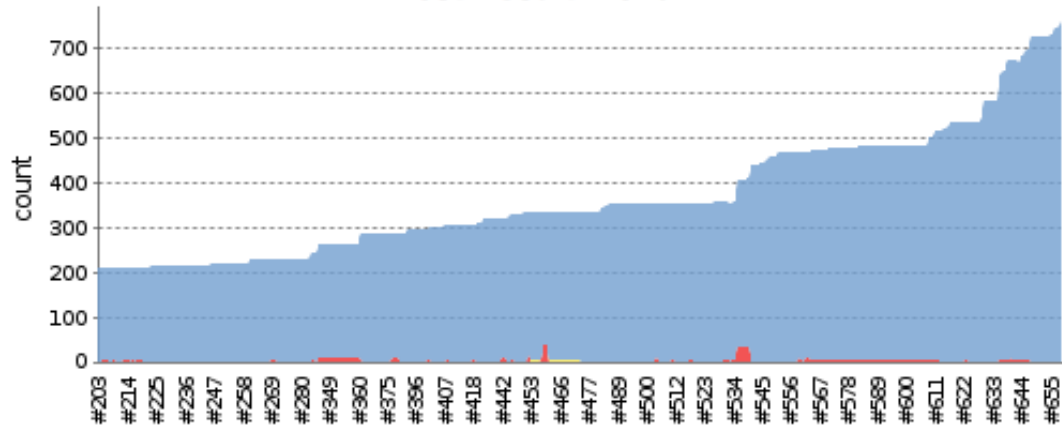
⊙ Support for smooth evolution

⊙ Swift, clear and professional quality assessment of contributed code



Fogbow's test coverage

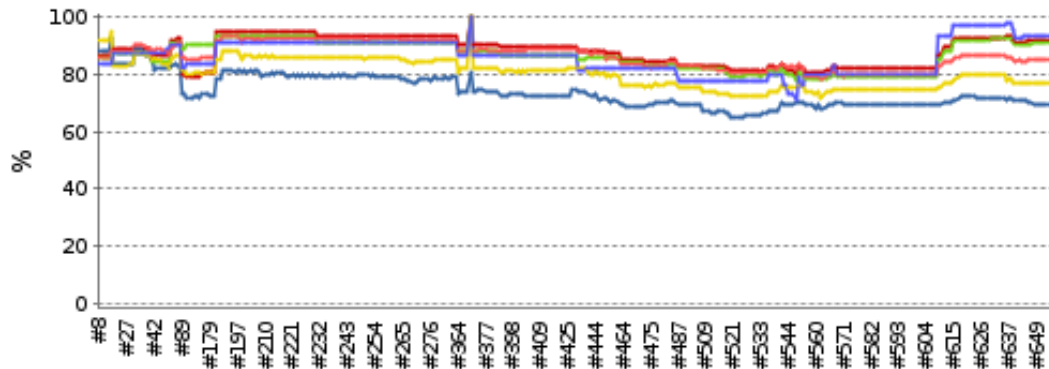
Test Result Trend



[\(just show failures\)](#) [enlarge](#)

Code Coverage

Packages 93% **Files** 90% **Classes** 91% **Methods** 85% **Lines** 77%
Conditionals 70%



— Classes — Conditionals — Files — Lines — Methods — Packages

Fogbow's sustainability model

- ◎ Open source community
 - ◎ A lot more than a github repository!
 - ◎ Easy the task of contributing
 - ◎ Well-thought architecture
 - ◎ Good documentation
 - ◎ Support for smooth evolution
 - ◎ Swift, clear and professional quality assessment of contributed code
 - ◎ Push adoption
 - ◎ OGF plugfests
 - ◎ EGI technical meetings
 - ◎ RNP cloud initiative
 - ◎ SERPRO and Dataprev through CICON initiative
 - ◎ Approach cloud vendors to develop projects using the Informatics Law in Brazil (HP, Huawei, ...)



Fogbow in action: EUBrazilCC

- ◎ Common API: OCCl (with some extensions)
- ◎ Authentication: Interoperable Global Trust Federation (IGTF)
- ◎ Authorization: Virtual Organization Management System (VOMS)
- ◎ Image management: uses EGI appDB as a catalogue and automatic download using vmcather
- ◎ Prioritization: network of favors



Fogbow in action: Compute@RNP

- ⊙ Common API: OCCl (with some extensions)
- ⊙ Authentication: CAFe
- ⊙ Authorization: allow all authenticated users
- ⊙ Image management: automatic download from an external repository
- ⊙ Prioritization: network of favors



Fogbow in action: Cloudbursting

- ⊙ Simplest way to “federate” clouds
 - ⊙ Seamlessly access your private cloud and your public cloud accounts using fogbow
 - ⊙ Currently supporting AWS and Microsoft Azure
 - ⊙ Common API: OCCl (with some extensions)
 - ⊙ Authentication: native local cloud authentication, private clouds accessed with users’ own credentials
 - ⊙ Authorization: native local cloud and private cloud authorization
 - ⊙ Image management: automatic download from the private cloud to the public cloud
 - ⊙ Prioritization: no need



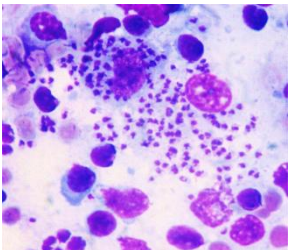
Summary

- ◎ Fogbow provides a very flexible way to federate IaaS cloud providers
- ◎ By decoupling federated-related functionalities from the orchestration middleware, it makes federation as non-intrusive as possible
- ◎ Fogbow is currently being used in the EUBrazilCC federated infrastructure and soon in the experimental Compute@RNP service supported by UFCG and sponsored by RNP
 - ◎ SERPRO is also assessing the possibility of using it

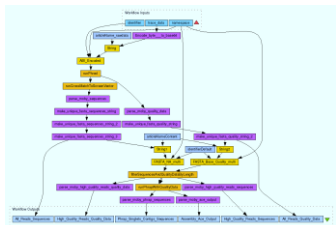


Thank you!

Get ready for our applications!



Develop with our platform!



Federate with our middleware!



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Pointers:

EUBrazil Cloud Connect

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Fogbow

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