Ibercloud: orchestrating services to provide virtualized access to IberGrid

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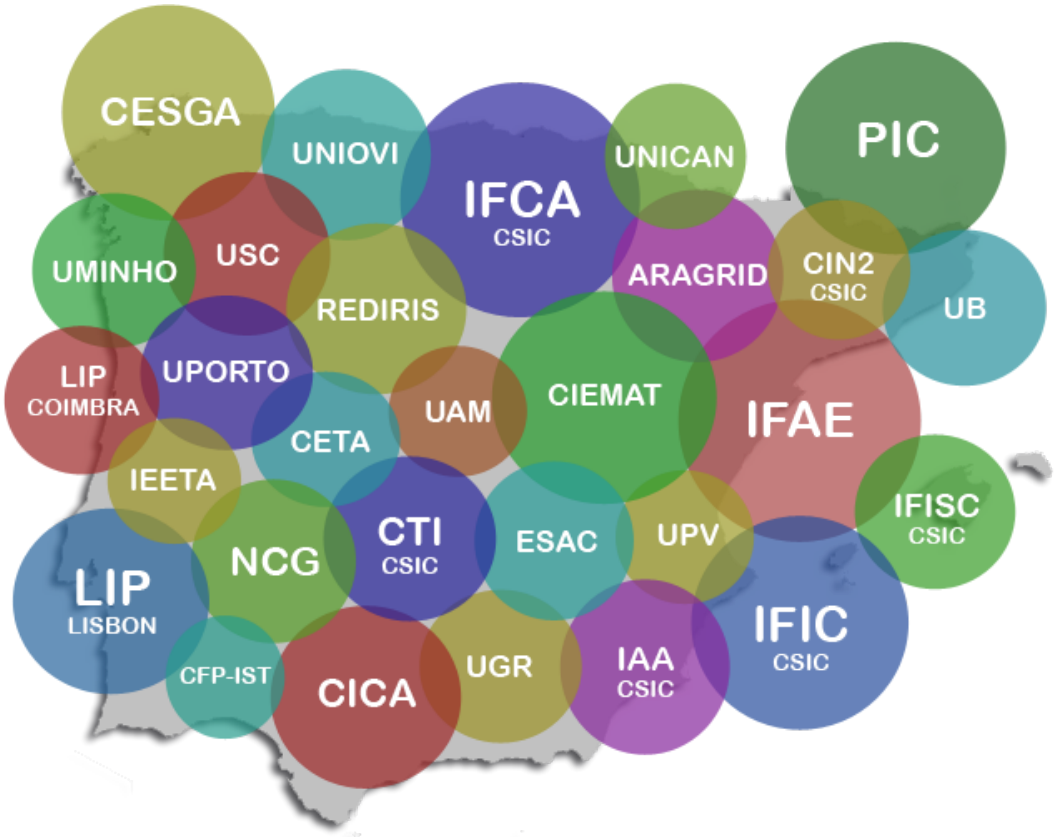
IberGrid

Protugal & Spain NGIs joint operations

24,000 cores and 20PBytes storage available to Grid user community

Wide usage of virtualization techniques



Ibercloud Objectives

- Investigate the requirements of scientific users of cloud technologies
- Deploy a federated cloud IaaS testbed for scientific computing within the Ibergrid collaboration
  - based on existing local deployments
- Provide a unique user friendly interface for the services

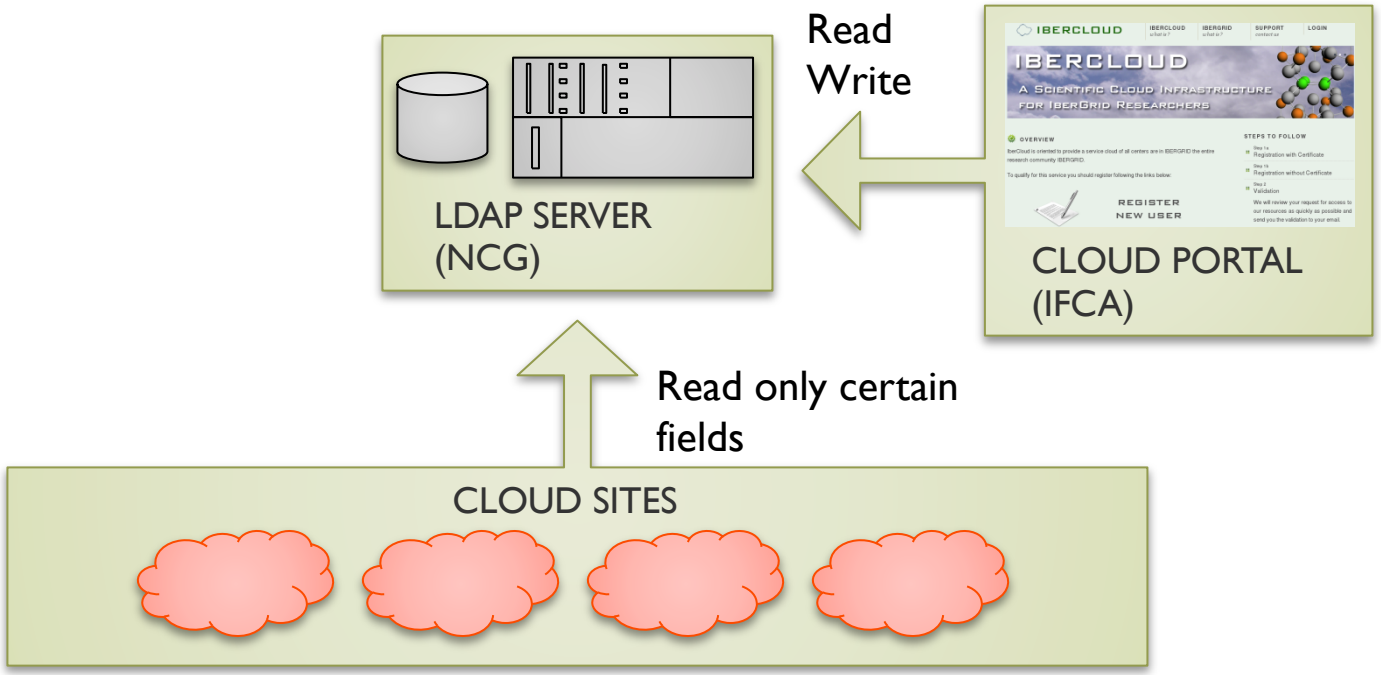
Ibercloud Sites

Authorization

- Users should be able to use a single identity at all sites
- Grid experience
  - VOMS ☺
  - User certificates ☹
- We want a working solution *fast*
  - working across cloud implementations
  - easy enough to be quickly deployable
  - Flexible for different models of federation (country, site)

Architecture

- Start with centralized LDAP authentication:
  1. Cloud service portal adds users do main LDAP instance
  2. Sites can read LDAP records and authenticate against LDAP server

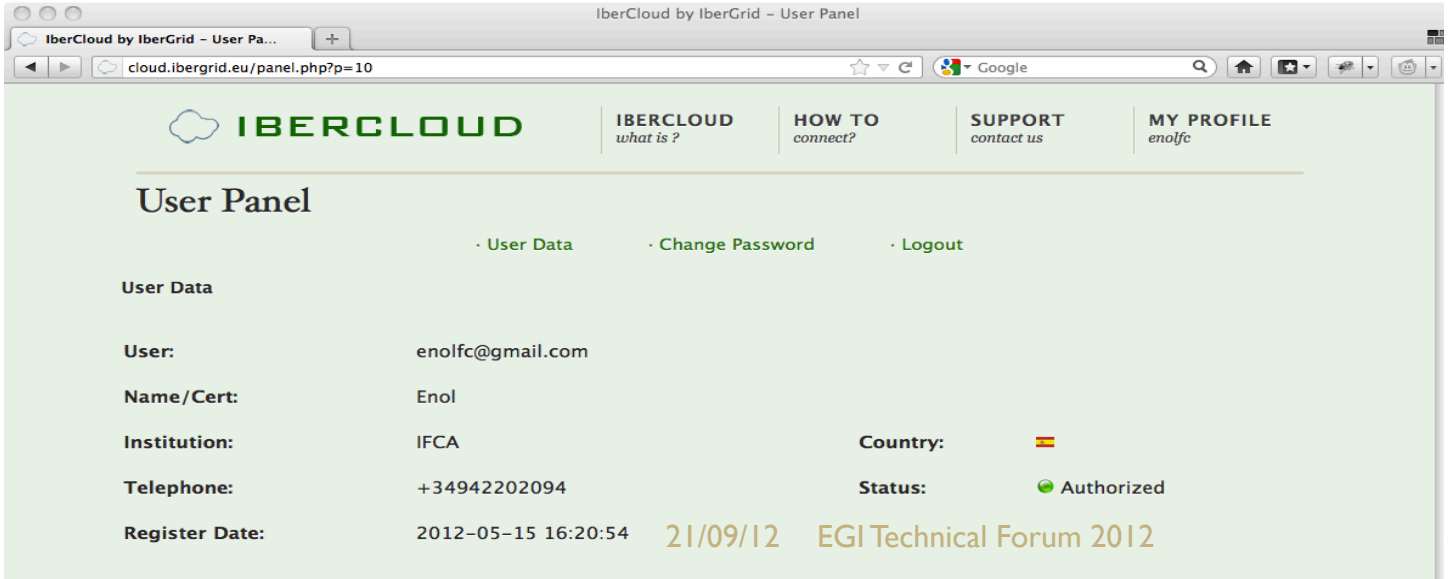


Registration Portal (I)

- Web portal to add users to the infrastructure
- http://cloud.ibergrid.eu

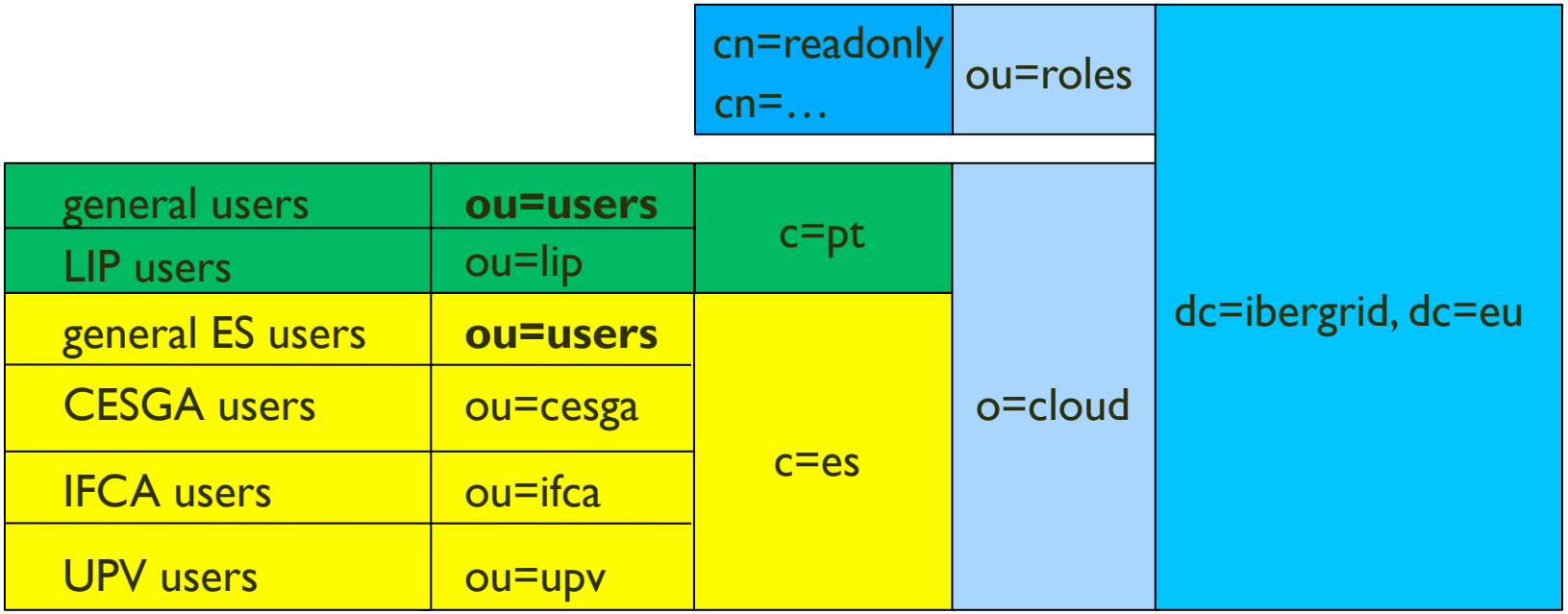
Registration Portal (II)

- Registration consists on filling a survey with intended usage
  - Not needed if already part of IBERGRID
- Each request is evaluated and approved independently



LDAP tree and namespaces (I)

- Tree with country and site branches



uid=aaa@xxx.pt, ou=users, c=pt, o=cloud,dc=ibergrid, dc=eu

uid=bbb@yyy.es, ou=users, c=es, o=cloud,dc=ibergrid, dc=eu

uid=ccc@cesga.es, ou=cesga, c=es, o=cloud,dc=ibergrid, dc=eu

LDAP tree and namespaces (II)

- Users are "uniquely" identified by e-mail with a common suffix:

uid=xxxx@yyyy.pt,	o=cloud, dc=ibergrid, dc=eu

- Internal remapping within the openldap server
  - All users remapped to o=cloud,dc=ibergrid,dc=eu
  - uid=xxxx@yyyy.pt is also a valid DN

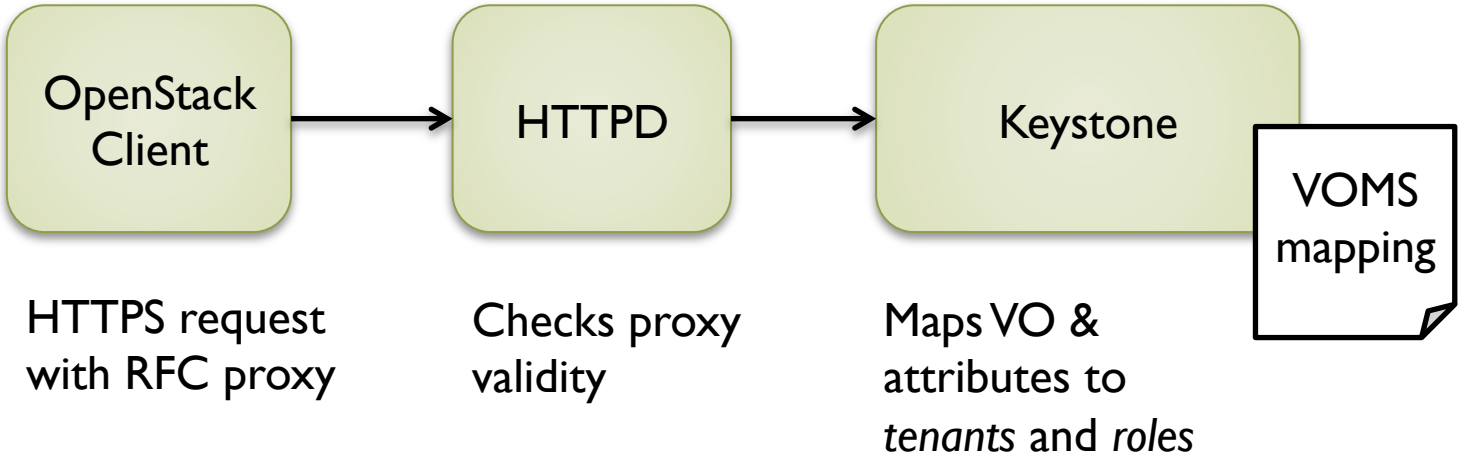
- We get the advantages of a hierarchical namespace with the simplicity of a flat namespace

LDAP Support

- OpenStack:
  - Authentication is performed by a dedicated service named "keystone"
    - Changed architecture while deploying our testbed
    - LDAP support required particular schema
  - IFCA has extended it for LDAP authentication
    - LDAP + LDAPS support
    - No restrictions on DN or LDAP schema
- OpenNebula:
  - Common DN for all users → remapping at the LDAP server
  - Secure LDAPS needed tweaks but worked
  - LDAP authentication with the APIs
    - Does not work → major show-stopper for us !

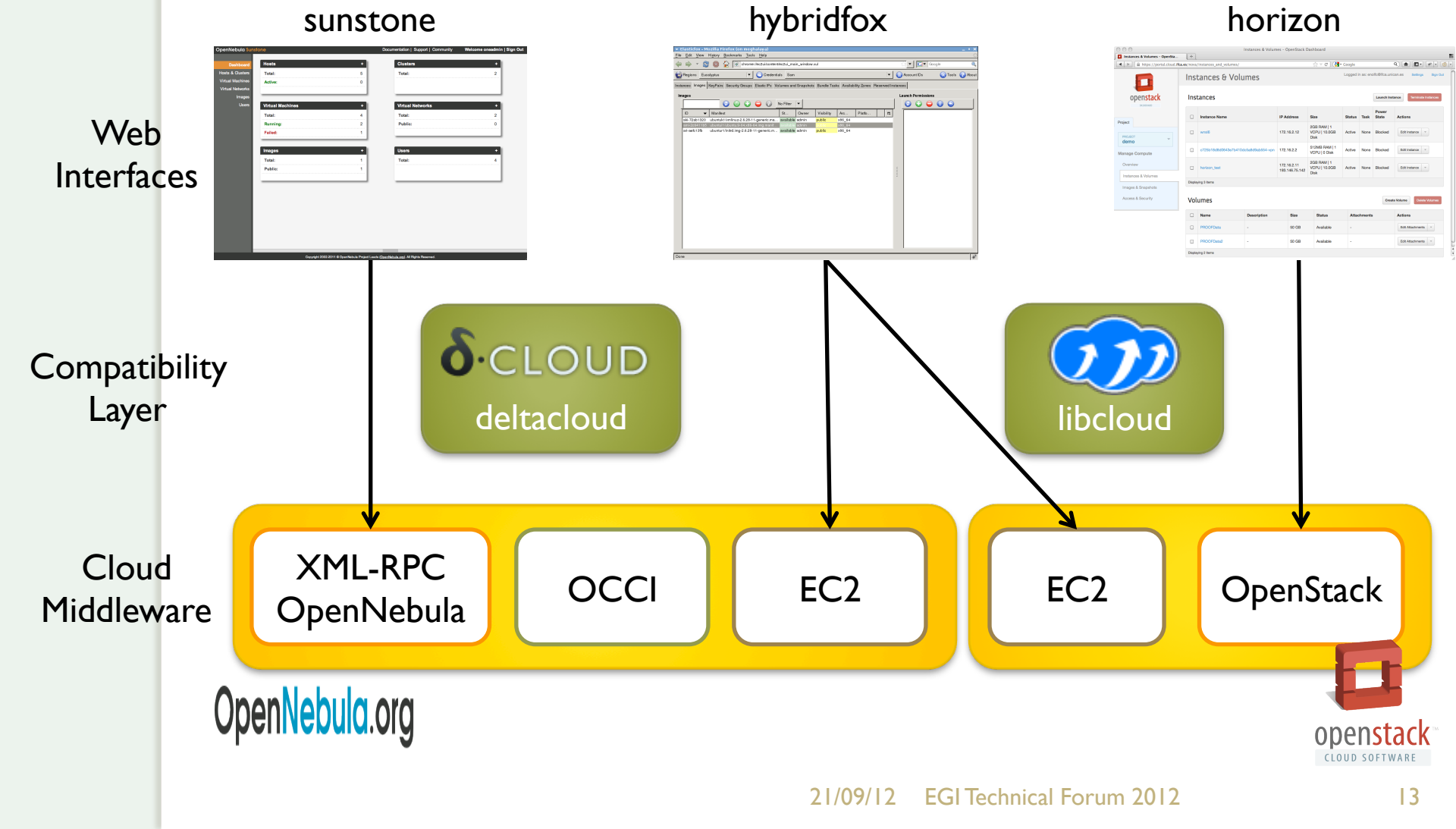
VOMS AuthN

- IFCA+CNRS Started to develop VOMS AuthN in OpenStack Keystone
  - Ibercloud will evaluate if it fits the deployment



Code on github: https://github.com/alvarolopez/keystone/tree/voms_auth
Docs: http://keystone-voms.readthedocs.org/en/latest/voms.html

Accessing the Resources



Site Capabilities (I)

CESGA

Name	small	medium	large	small-kvm	small-occi
Number of Cores	1	4	8	1	1
Memory (RAM)	1024	4096	8192	1024	1024
Disk	40GB	60GB	80GB	40GB	40GB
Intranet Network	10G Eth.				
Public/Private IP	Pool of public IPs with a maximum of 254				

IFCA

Name	m1.tiny	m1.small	m1.medium	m1.large	m1.xlarge
Number of Cores	1	1	2	4	8
Memory (RAM)	512	2048	4096	8192	16384
Disk	0	20	40	80	160
Intranet Network	GB Eth				
Public/Private IP	VLAN and VPN per project, no public IPs currently				

Site Capabilities (II)

LIP

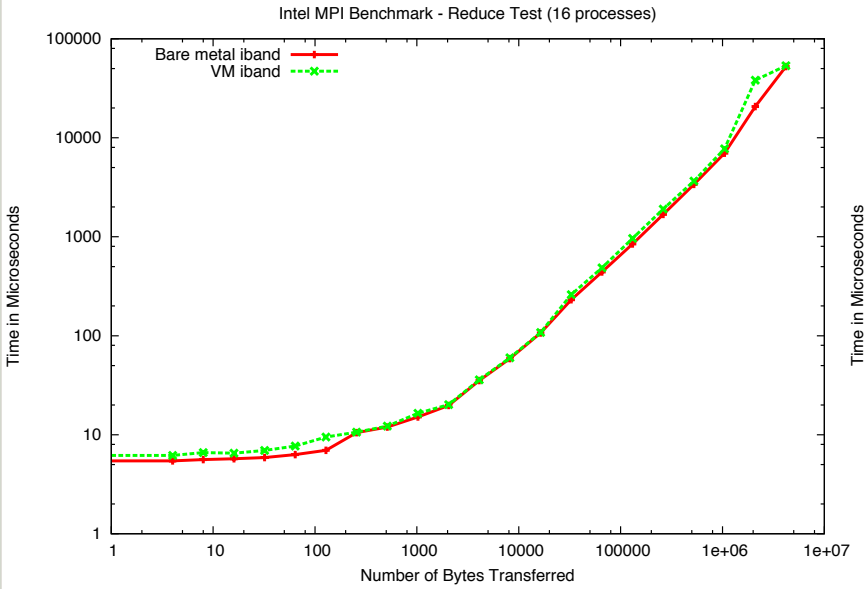
Name	small	medium	large
Number of Cores	1	2	4
Memory (RAM)	512	1024	4096
Disk	10	40	100
Intranet Network	GB Eth		
Public/Private IP	VLAN and VPN per project, no public IPs currently		

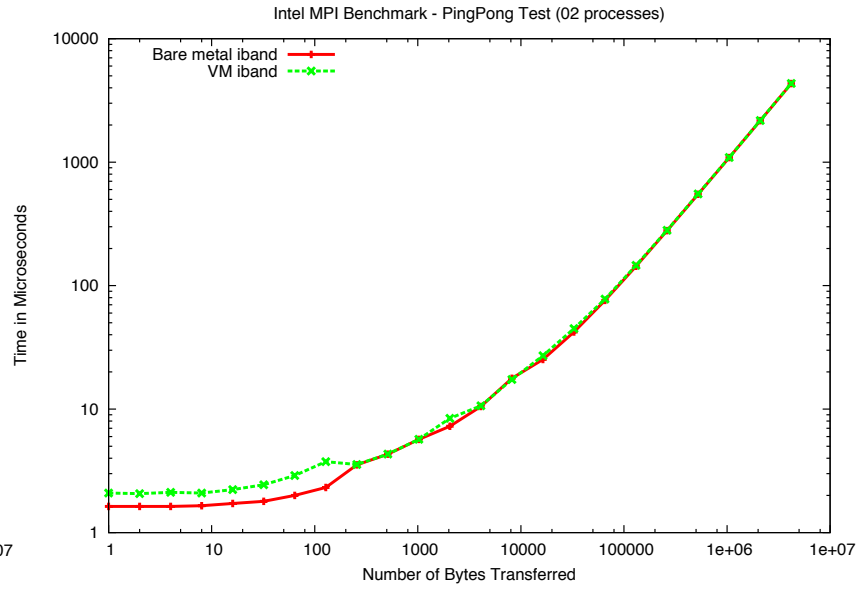
GRyCAP

Name	tiny	small	medium	large
Number of Cores	1	1	2	4
Memory (RAM)	512	1024	2048	4096
Disk	20	40	80	80
Intranet Network	GB Eth			
Public/Private IP	Pool of public IPs with a maximum of 32			

Use case: MPI Applications

- Good I/O performance with PCI Passthrough

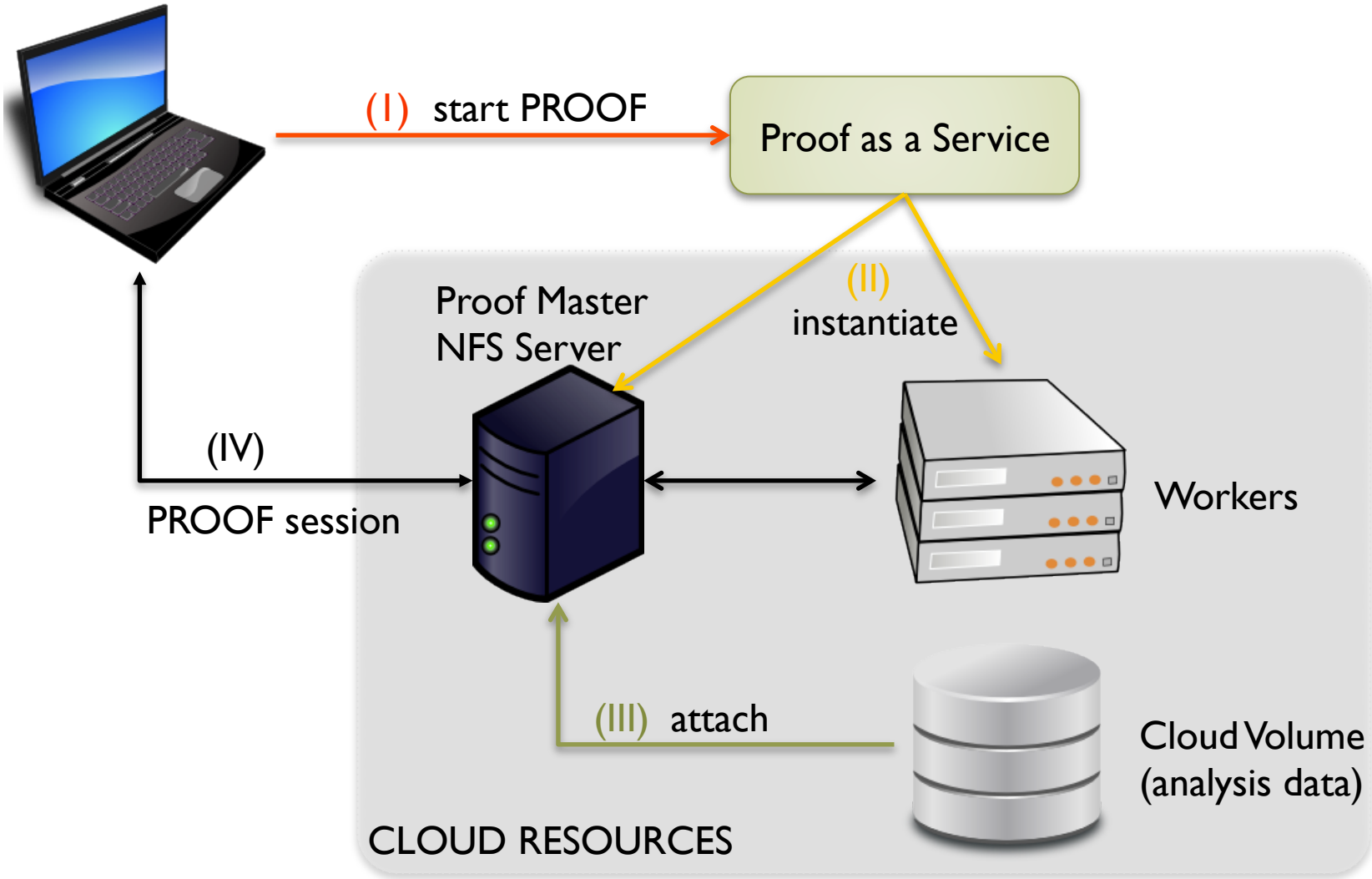




Use Case: PROOF as a Service (I)

- PROOF is a parallel mode for ROOT (HEP analysis software)
- PROOF requires the deployment of a set of services on the executing hosts
  - Not trivial for users
  - Dynamic demand of resources
- PaaS on top of the IaaS service
  - Builds PROOF cluster automatically from the ROOT interface

Use Case: PROOF as a Service (II)



Use Case: Mathematica

- Used at IFCA for physics phenomenology simulations
- Very specific machine configuration
  - not grid friendly
  - too heavy for desktops
- Researchers start VMs with Mathematica as needed
  - hardware independent environment
  - ability to test and execute various software configurations
  - better reliability and availability

Next steps…

- Continue working on federated identity
  - VOMS
  - SAML
- Investigate user interfaces/API compatibility
  - OCCI now also available in OpenStack
- Open infrastructure to pilot users
  - Get feedback and requirements
- VM Image Management
  - Image catalogues & repositories
- Monitoring & Accounting
  - following the EGI Cloud TF developments

Thanks

Questions?