

Enabling cloud for e-Science with OpenNebula

cloud-devroom@Fosdem'13

Zeeshan Ali Shah
System Administrator , PDC-HPC
KTH, Stockholm
zashah@pdc.kth.se



disclaimer: opinions expressed in this talk are solely those of the presenter and do not reflect of KTH or any other institute.

Agenda

- eScience users !! customer segmentation
- Projects
 - NEON
 - Venus-C
 - SNIC Cloud
- Challenges
- Federation
 - EGI Fed cloud project
- QA

eScience users

- Initially we focused on bioinformatics
- Currently running on HPC machines
 - That was an issue
- Think in HPC, but an elastic way
 - That was a challenge
- Not all, but some need bursty peaks(longtail users)
 - That was a core proposition

NEON Project

- Northern europe cloud initiative , 2009-2010
- Eucalyptus 2.0
- Federated with other centre

Venus-C Project

- Finished May 2012
- OpenNebula with CDMI, OVF

The screenshot shows the Venus-C project website homepage. At the top left is the Venus-C logo with the tagline "Virtual multidisciplinary Environments Using Cloud infrastructures". To the right of the logo are login fields for "login / password" and "Login", along with links for "Forgotten Your Password?" and "Register Now". Below these is a search bar with "Search" and "Advanced Search" buttons. A navigation menu includes links for Home, News, Mission, Partners, Experts, Cooperation, PaaS, Users, Document Library, Events, eTraining, and Media Room. The main content area is divided into several sections: "Building a highly-scalable and flexible Cloud infrastructure" with a brief description of the project; "VENUS-C User Communities" featuring a grid of eight research areas with corresponding images and university affiliations: Chemical Property Prediction (Newcastle University), Sequence mapping (Universidad Politécnica de Valencia), Next-generation sequencing (University of Malaga), Molecular docking (University of Westminster), Systems biology (COSBI), Micro-array data (Royal Holloway, University of Essex), Phylogenetics (University of Applied Sciences), and MicroRNA target prediction (Athens Research Centre); "Access components" with a cloud icon and a download arrow, and buttons for "Please log-in", "Join Now", and "Latest Events"; and a "Partners" section at the bottom right with the logo for "ENGINEERING INGENIERIA INFORMATICA". On the left side, there are buttons for "VENUS-C First Year Results", "VENUS-C Second Year Results", and "Public Deliverables", and an "Experts" section featuring a portrait of a man and a quote: "It was particularly revealing to see so many different applications being in need of cloud services, yet with rather diverse characteristics and diverse requirements".

SNIC cloud Project

- Currently running
- Started with Public cloud Amazon AWS.
 - Why ?
 - Prebuilt images, App stacks, Trainings, Workshops ..
- Planning to connect with Private Cloud (**with new challenges**)

Challenges @ Private Cloud

- Non-Technical (changing hearts n minds)
- Technical (Using minds to solve issues)

Non-Technical

- Myth of security
- Living in HPC world.
- It is hard to digest elasticity , self provisioning , on demand and other cloud benefits.
- But Private cloud has to live with other computer/network admins ... or may be configure by same sysadmin

more cloud = jobless sysadmins !
is this true ?



Same Role (Driver)
Different styles
(Choose yours !)

Technical

- Network Latency
 - Infiniband
 - Multiple NICs
- Storage
 - Image repository
 - EBS style (for application data)
 - CDMI

Technical (more)

- Public IPs
 - For Cluster deployment limit to 1 master and X private ips
- We want more ...
 - (hybrid cloud)
- Sharing of images (but be careful about private data)
 - Hooking mechanisms in Open Nebula

Technical (more)

- Usage
 - UI based on Sunstone
 - command line with OCA client
 - For Programmers , use SDK (Java n Ruby)

agile developer vs static administrator



```
if (newPassword != oldPassword)
{
    _Password = newPassword;
    return true;
}
else {
    return false;
}
```



SDK

NoDep on
sysadmin

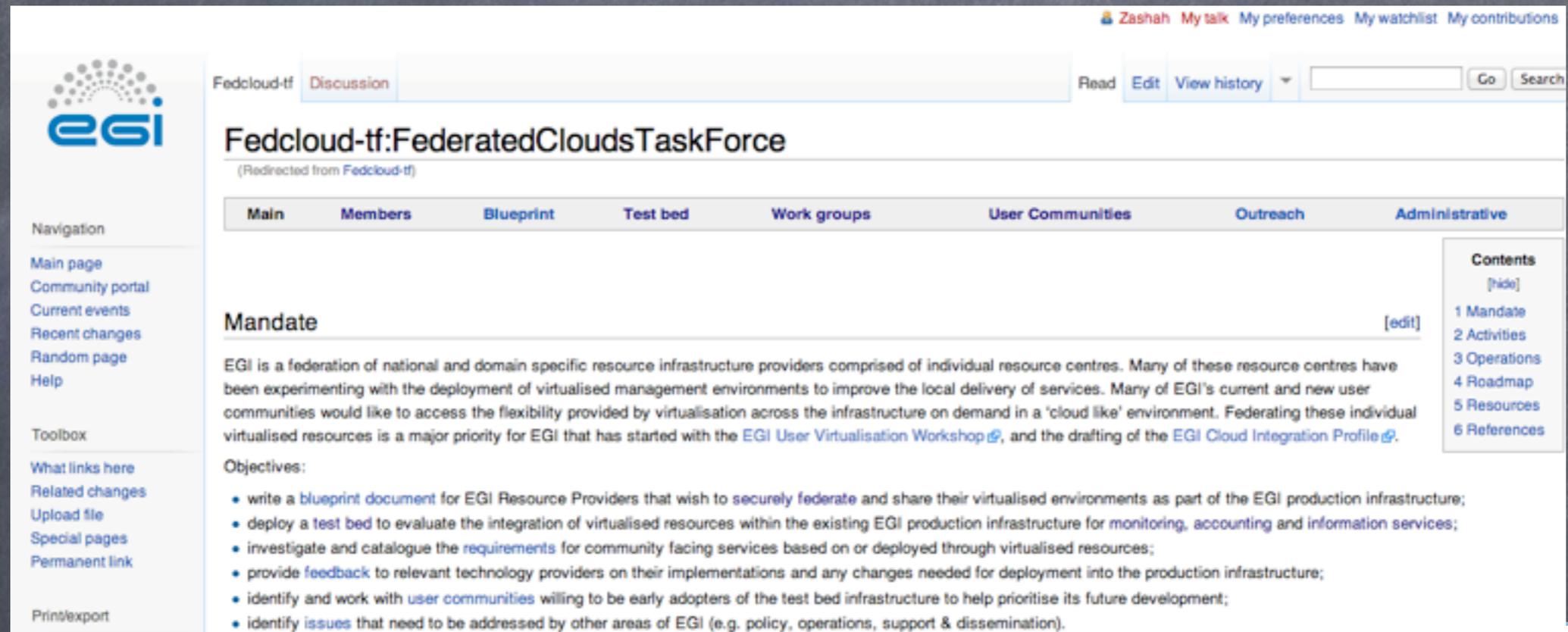
Think compute and storage as an object
(Create/Operate/Destroy whenever you want)

```
VirtualMachine vm = new VirtualMachine
.....
Spark sp = new Spark(4); # spark with 1 master 4 slaves
.....
if load increase 90% launch more #(just an e.g.)
...
PlainDebian pd = new PlainDebian();
.....
#Expand as you want :)
```

Technical (more)

- Security
 - VLANs
 - Bridge firewalls
 - Network auditing and other traditional tools
 - Q: What if legitimate user install legal software but left its mgt panel opened , e.g. tomcat

EGI Cloud Federation



The screenshot shows a MediaWiki page for 'Fedcloud-tf: Federated Clouds Task Force'. The page is titled 'Fedcloud-tf: Federated Clouds Task Force' and is a redirect from 'Fedcloud-tf'. The page content includes a 'Mandate' section and a list of 'Objectives'. The 'Mandate' section states: 'EGI is a federation of national and domain specific resource infrastructure providers comprised of individual resource centres. Many of these resource centres have been experimenting with the deployment of virtualised management environments to improve the local delivery of services. Many of EGI's current and new user communities would like to access the flexibility provided by virtualisation across the infrastructure on demand in a 'cloud like' environment. Federating these individual virtualised resources is a major priority for EGI that has started with the [EGI User Virtualisation Workshop](#), and the drafting of the [EGI Cloud Integration Profile](#).' The 'Objectives' section lists six bullet points: write a blueprint document, deploy a test bed, investigate requirements, provide feedback, identify user communities, and identify issues. The page also features a navigation sidebar on the left and a table of contents on the right.

Navigation: Main page, Community portal, Current events, Recent changes, Random page, Help

Toolbox: What links here, Related changes, Upload file, Special pages, Permanent link

Print/export

Contents: 1 Mandate, 2 Activities, 3 Operations, 4 Roadmap, 5 Resources, 6 References

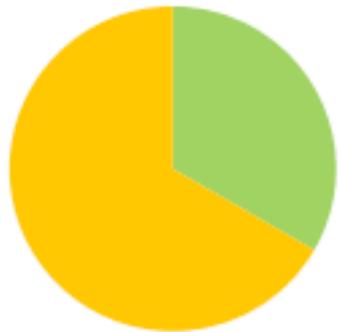


<https://wiki.egi.eu/wiki/Fedcloud-tf>

Areas

- VM Management**
 - . OCCI 1.1 proxy for multiple IaaS
- Data Management**
 - . CDMI proxy for multiple IaaS
 - . OVF
- Information Systems**
 - . Extended GLUE2 schema
 - . LDAP server
- Accounting**
 - . Cloud Usage Record (UR) schema
 - . UR server
 - . UR client for each IaaS
- Monitoring**
 - . Nagios with cloud probes
- Federated AAI**
 - . X509 certificates
 - . Support for Virtual Organisations (Vos)
- Image catalogue**
 - . StratusLab marketplace

Consolidation



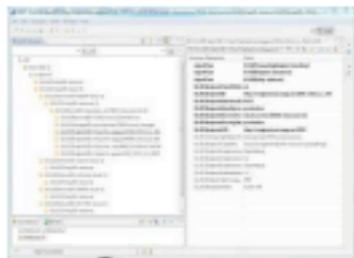
Federation

- OCCI/CDMI deployment



Notification

- Review available implementations.



Information System

- GLUE2 extension
- upload from the RPs

x.509

Federated AAI

- RP account integration
- VOMS?

Accounting

- OGF UR extension
- upload clients



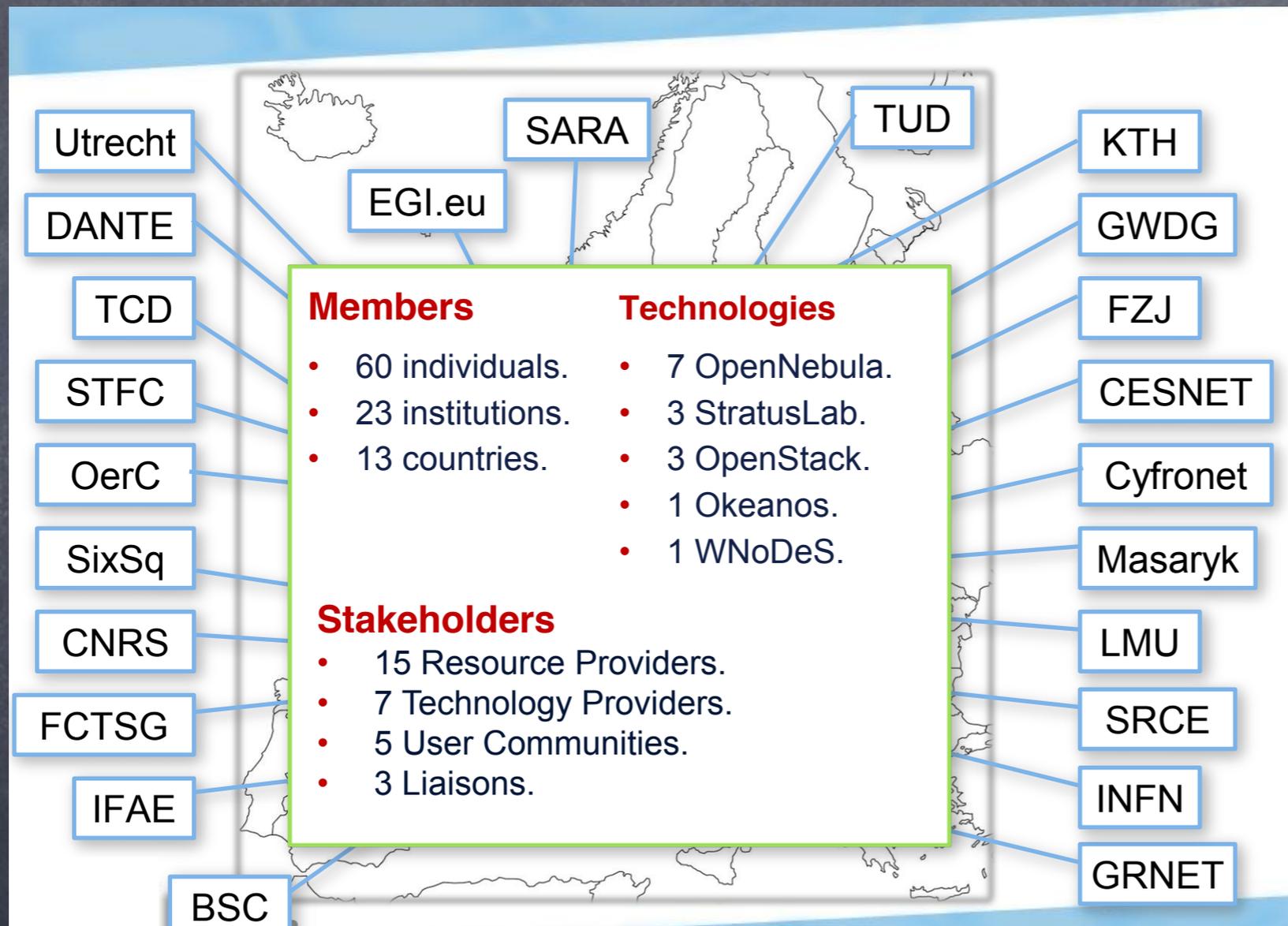
Image management

- Multiple storage model

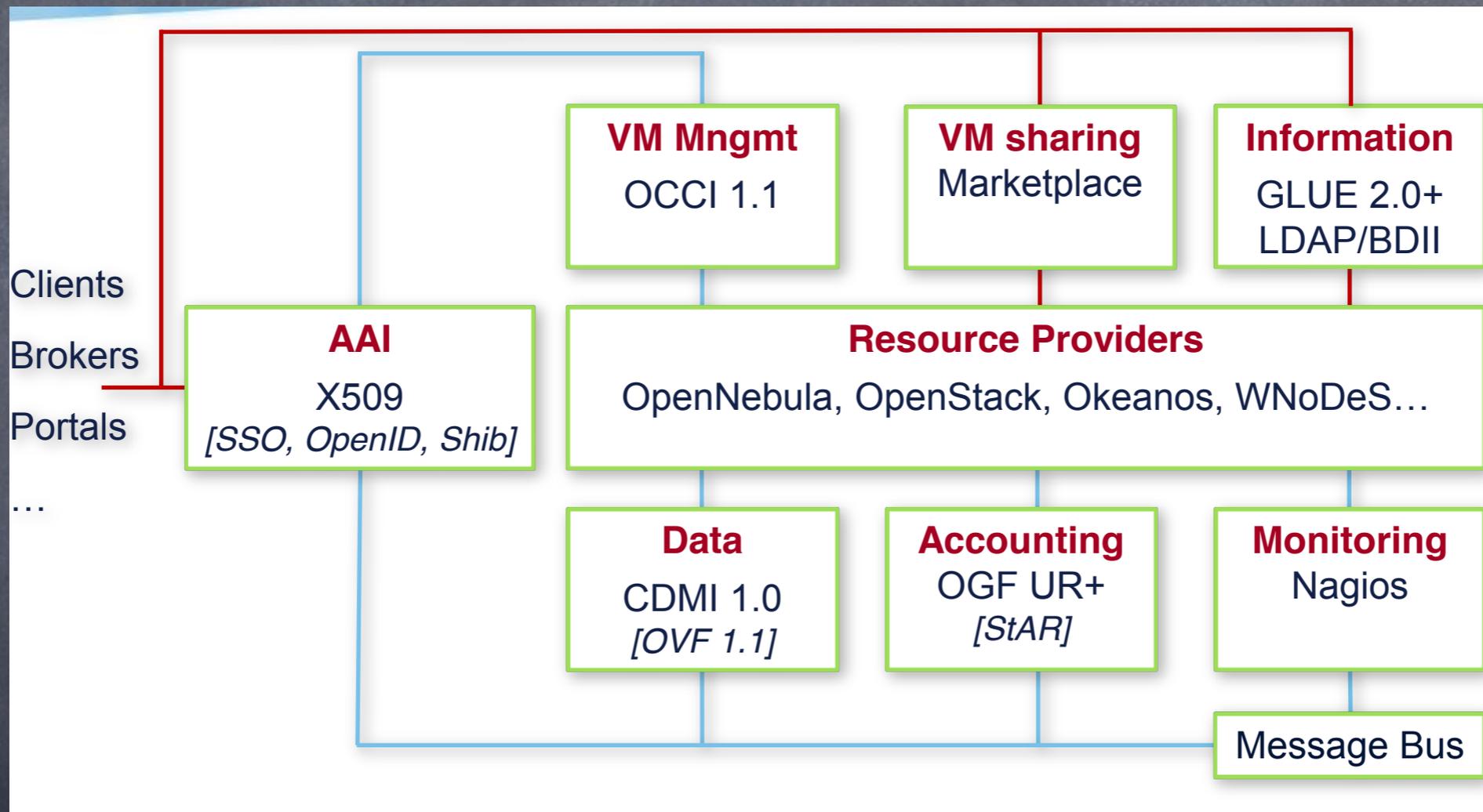
Monitoring

- Metrics
- Availability -> performance

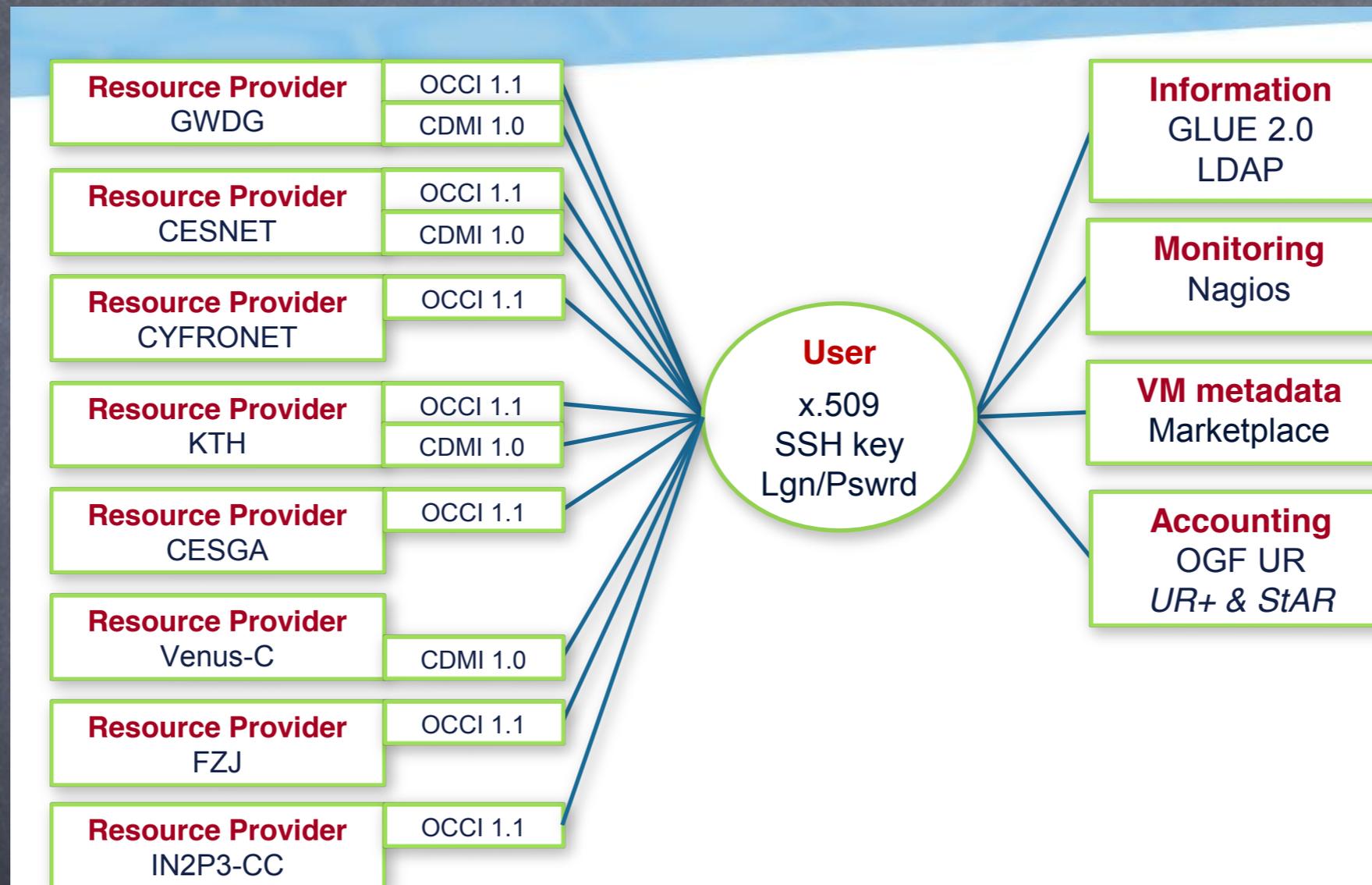
EGI Cloud Federation



Components



Architecture



Issues @ Hands

- Workflow (like SWF of Amazon AWS)
- Orchestration service, Scale up/down (like cloudwatch of AWS)
- Auditing VM from inside! should we ?
- Bare metal IaaS to apps. (Galaxy, Mapreduce , Spark ...)
 - **But platform security is even harder !**

Thanks

QA

@zeeshanalishah
zashah@pdc.kth.se