# IN2P3-CC cloud computing (IAAS) status

## Journée ARAMIS

Apr 17th 2014

- **Use cases**
  - Testing systems
  - Infrastructure services
  - Computing
  - Community cloud

- **Some implementation details**
  - Deployment
  - Existing clusters and usage
  - Openstack pros and cons

- **Impacts on infrastructure management**

- **What's next**

# IN2P3-CC IAAS cloud
## Good for ?

For whom : IN2P3-CC people (~80) to provision testing and development systems

Why ?

- Self service =
    - host lifecycle directly handled by end users
    - accurate sizing and environment specification
- Test systems are most of the time resources thrifty
  → efficient mutualization

For whom : IN2P3-CC SA team provisionning infrastructure services

Why ?
- All usual virtualization motivations
  - less hardware to manage
  - mutualization → resources optimization
  - software servers sizing (cpu/ram/disk/net)
  - unbind servers from the hardware for higher availability
- Save VMware licences fee

Same level of service ?
- no DRS, no FT, no storage vMotion
- Sort of HA, live migration available
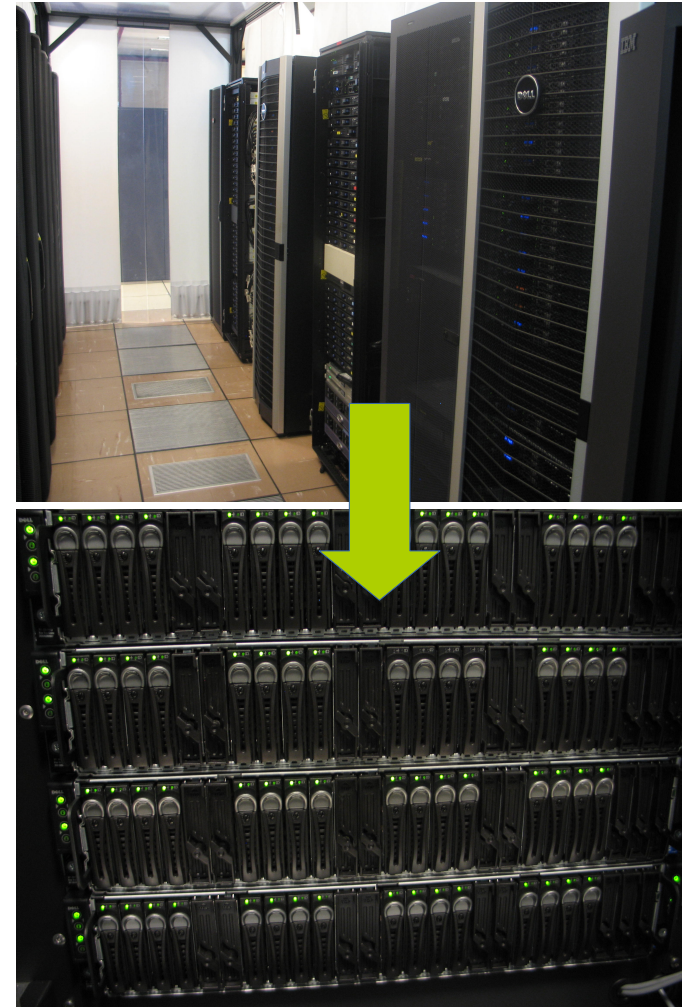
Resource provider motivations :
- Mutualize computing resources with the rest of the IT provisionning
  → use spare resources for computing
- Ensure compatibility with potential users shift

Users motivations :
- Gain access to opportunistic resources
- Use specific environment (OS, softwares...)
- Implement their own scheduling
- Ease software deployment

Envisaged alternatives to compute on cloud resources :
- Integrate UGE and Openstack : Unicloud
- Grid middleware that leverages cloud interfaces (like Dirac)
- Direct use of cloud interfaces (EC2/Nova...)

Currently evaluated computing :
- Large Synoptic Survey Telescop (http://www.lsst.org)
- Euclid (http://www.euclid-ec.org/)
- Atlas with some MC simulation, HammerCloud validation
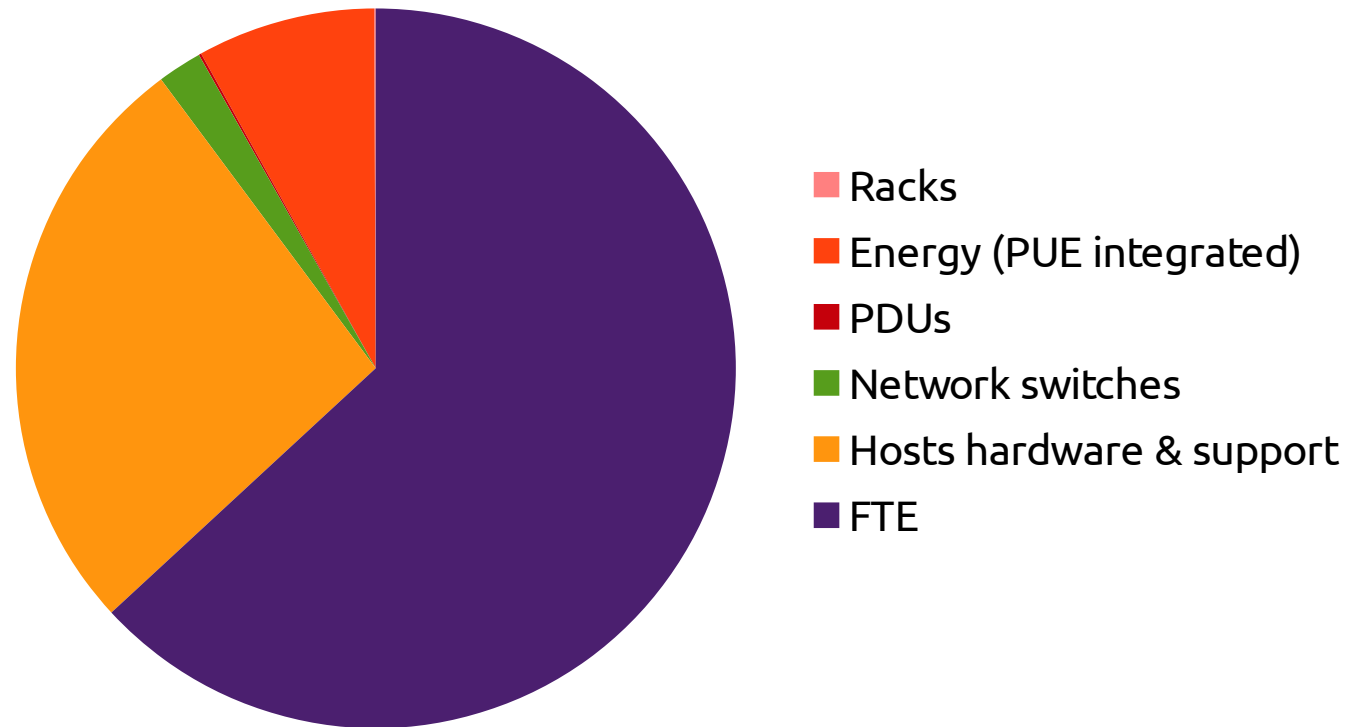- Bioaster

Community cloud for whom ?
- IN2P3-CC institutional users (labs/experiments)

Why ?
- Centralize more institutional resources → maximize mutualization and get bigger extra capacity

## Cost per sector



Legend:
- Racks
- Energy (PUE integrated)
- PDUs
- Network switches
- Hosts hardware & support
- FTE

Some assumptions / moderations :
- Free software
- Costs evaluated for a 400 VM infra of ~400k$ (but the bigger, the cheaper right ?)
- French energy not that costly (is it ?) **0.0874$/kWh**
- French employment not that cheap… but public sector employee is (uhhh ME ?)
- One admin per 400 Vms

## Pricing comparison ($/year)
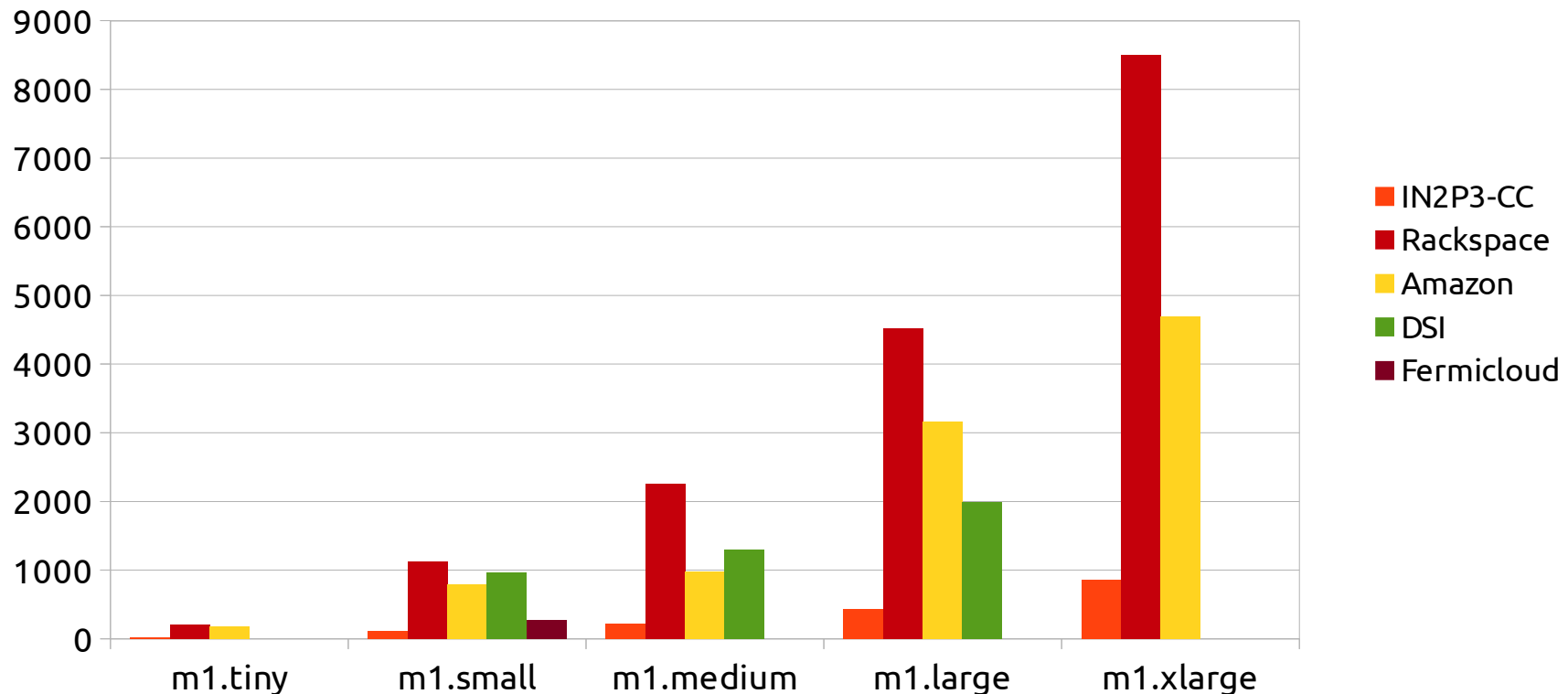


Some assumptions / moderations :
- Based on memory capacity (often the lacking resource in virtualized envs)
- Disk is the cheapest ressource
- CPU is expensive, but is more shareable, depending on the SLA

# IN2P3-CC IAAS cloud

## Some implementation details

# Openstack deployments

| Jan 2012 | Aug 2012 | Mar 2013 | Dec 2013 | ? | ? |
|---|---|---|---|---|---|
| Diablo | Essex | Folsom | Grizzly | Havana | Icehouse |

| 2012.1 release (apr) | 2012.2 release (sep) | 2013.1 release (apr) | 2013.2 release (oct) | 2014.1 release (april) |
|---|---|---|---|---|

## Openstack components :

**Operational** :

Keystone
Glance
Nova
Horizon
Cinder
Ceilometer

**Tested** :

Swift

**Soon to be** :

Neutron

## Clusters :

Infrastructure services
test/dev machines
community cloud
(~400 cores)

Computing
(~500 cores)

One dedicated to eTRIKS project
(~100 cores)

openstack™

## Deployment :

- Scientific Linux 6
- EPEL up to Folsom, RDO starting from Grizzly
- Configuration with Puppet

## Test/dev/service/community cluster :

- DELL C6100 and R610 compute nodes
  (400 cores for test/dev VMs, 100 cores for infrastructure services)
- DELL PE R720xd (30TB Cinder volumes ~ Amazon EBS)
- DELL PE R720xd and GPFS for instances shared storage

## Computing cluster :

- 64 DELL M610 (compute nodes, recycled batch WNs)
- 10 ISILON nodes (instances storage)
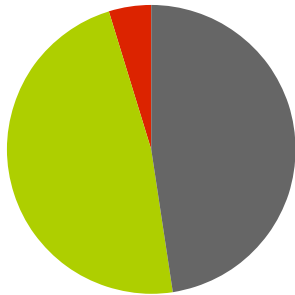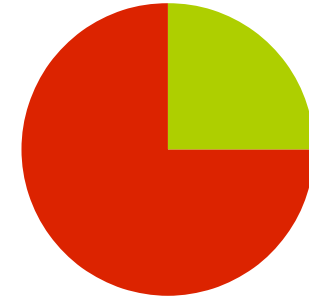- Capacity : ~500 VMs (1 core, 20GB disk, 6GB RAM)

**Physical**   **Openstack VM**   **vSphere VM**

## Testing and developments systems :

- ~150 VMs (400 capacity) in regard with ~50 physical

## : Infrastructure services

- ~10 VMs (100 capacity) in regard with ~100 physical and ~100 vSphere virtualized

## Computing resources :

- ~500 cores in regard with 17000 HT cores (no production yet)

- Nova-network VLAN mode :
  - do you have thousands of available public IPs ?
  - do you support IPv6 everywhere ?
  - don't you care about VLAN isolation ?

- Updates not trivial

- Sparse, not up to date documentation

- Complexity : a lot of features require specific skills (system, networking, storage...)

- Still lacking comfortable features (like vSphere DRS, FT)

- Reliable

- A lot of possible configurations and features

- Huge dynamic community :
  - high developement rate
  - clear roadmaps, release cycle
  - bugs are fixed
  - security actively monitored

- Highly scalable and available

- Trivial to patch (and merge upstream)

# Impact on datacenter organization

IAAS cloud leads to unified hardware provisionning :
- Use commodity hardware : less different vendors, OSes, configs...
- Capacity planning becomes a global consideration
- Unused ressources may be allocated to the most greedy services. Let say computing for HEP sites.
- The more mutualization, the more optimized resources, the more money saved.

Roles evolution, to a certain extent :
- **System administrators** become hardware providers, cloud admins, base image manufacturers.
- **Services administrators** get some of SA former responsability... for better or for worse.

Openstack (managed by SAs) takes over some other teams traditionnal responsabilities (let say networking/storage team):

- Lot of networking configuration is handled by Openstack (like IPs allocation...)
- Requires a lot of storage skills

Openstack (managed by SAs) takes over some other teams traditionnal responsabilities (let say networking/storage team):

- Lot of networking configuration is handled by Openstack (like IPs allocation...)
- Requires a lot of storage skills

→ running an Openstack cluster requires spreading the administration amongst teams

Openstack (managed by SAs) takes over some other teams traditionnal responsabilities (let say networking/storage team):

- Lot of networking configuration is handled by Openstack (like IPs allocation…)
- Requires a lot of storage skills

→ running an Openstack cluster requires spreading the administration amongst teams

… and never leave behind some basic diplomacy skills…

Centre de Calcul de l'Institut National de Physique Nucléaire et de Physique des Particules
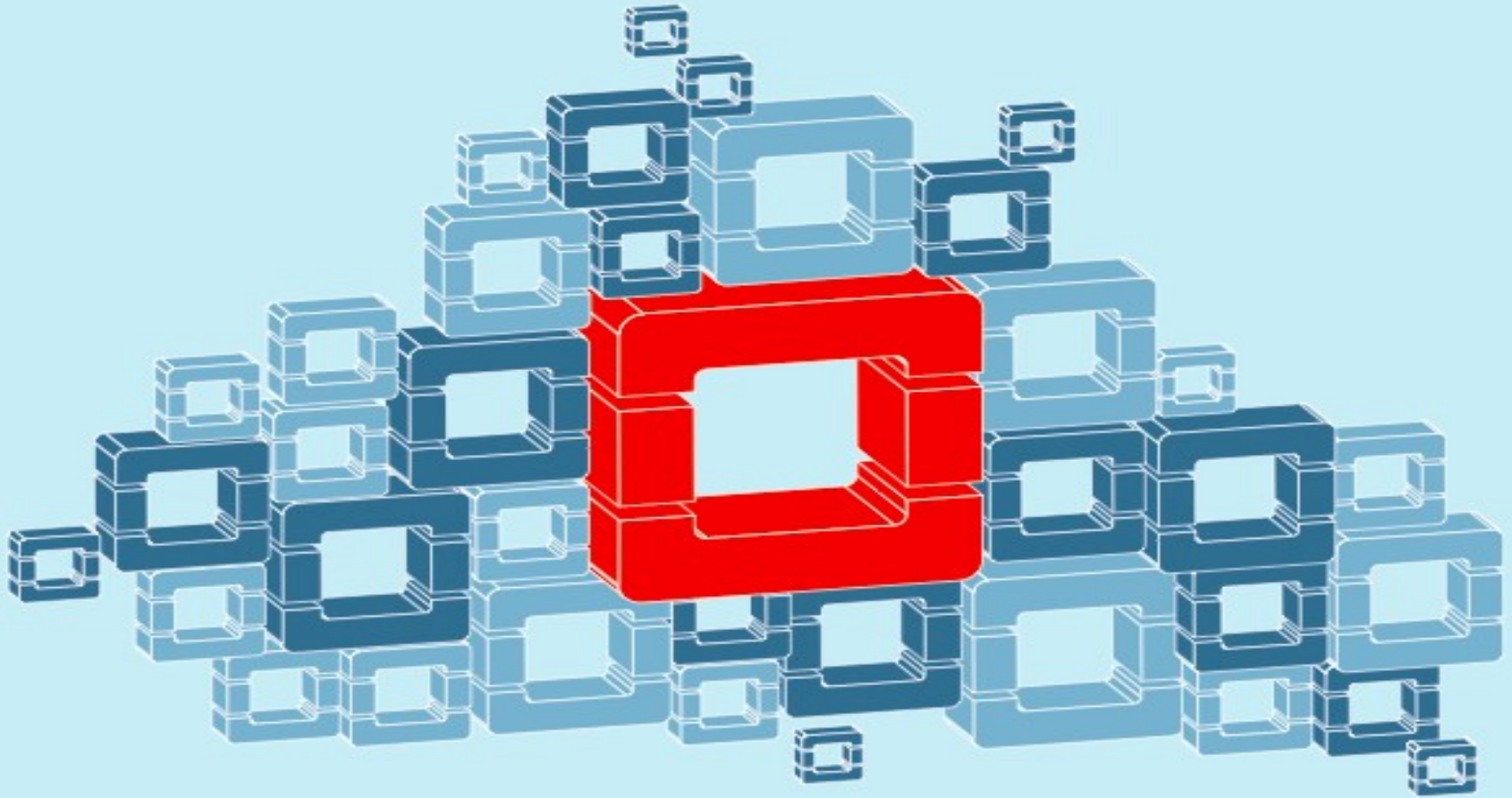
# Status, what's next ?

Other short term objectives :
- Validating France Grilles efforts on cloud federation : DIRAC computing over 6 French clouds (IN2P3-CC Lyon, LAL Orsay, IPHC Strasbourg, IRIT Toulouse, LUPM Montpellier, Univ Lille 1), Openstack, StratusLab and OpenNebula based

Longer term objectives :
- Migrate everything virtualizable to compute cloud
- Public IPs needs to get rid of NAT = IPv6 needs
- IN2P3 community cloud offering **?**

(thank you)

# Questions ?