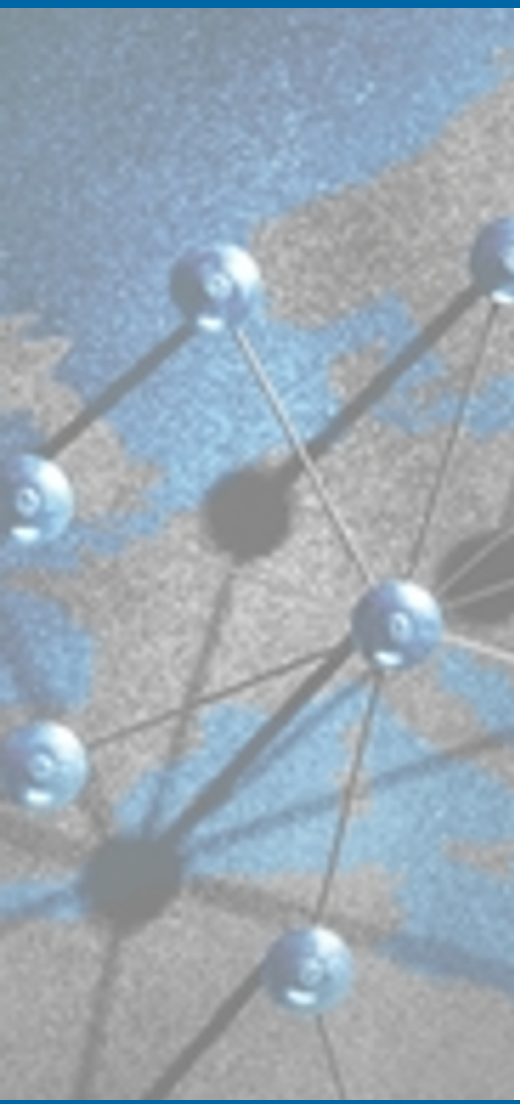

VOMS-aware identity service for Openstack

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e-infrastructure

Outline

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Introduction to Openstack Architecture

Openstack is based on several components

- compute service (nova)
- store service (swift)
- image service (glance)
- identity service (keystone)
- block storage service (cinder)
- network service (quantum)
- dashboard service (horizon)

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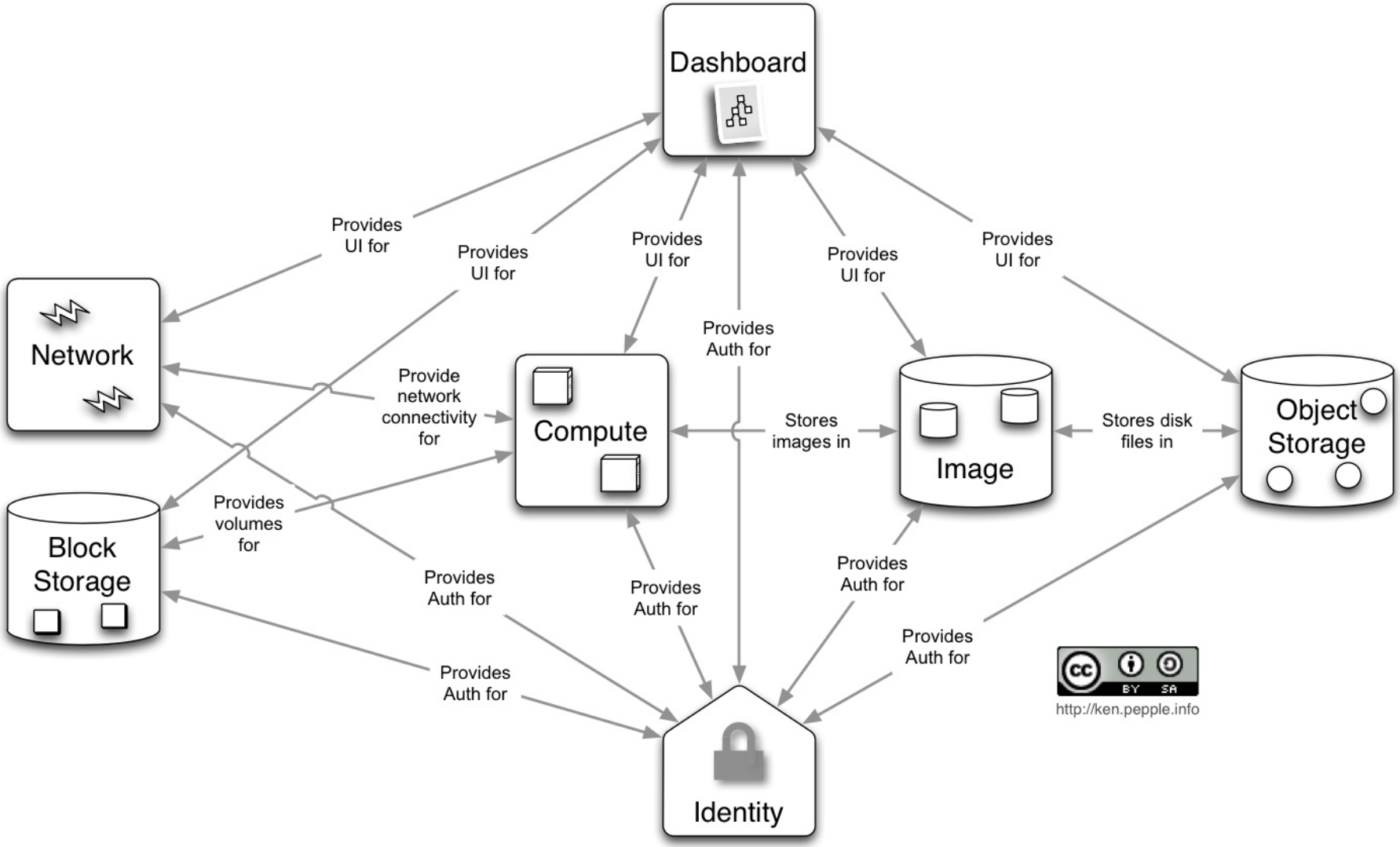
dashboard service (horizon) Web interface.

Openstack Architecture



AuthN and AuthZ in Openstack

- Authentication and Authorization is orchestrated around the identity service *Keystone*.
- Auth is based on users, tenants, domains, roles and tokens.
  - A user is member of 1 or more tenants.
  - A tenant (group, project) is part of 1 or more domains.
  - A user may have specific roles within a tenant or globally within a Keystone domain.
  - A token may be associated with a tenant or not:
    - Unscoped tokens are not associated with a tenant. Used for discovery (available tenants, endponts) and are only understood by keystone
    - Scoped tokens are associated within a tenant and are required to interact with any other component.
  - A token can be unsigned (UUID) or signed (PKI based).

AuthN and AuthZ in Openstack

- Authentication in Keystone is a 2 part mechanism.
  - 1st phase: A user initiates authentication against Keystone and a token is issued.
  - 2nd phase: The token is used to authenticate against all the other Openstack services.
- All authenticated requests require a scoped token.
- A token has a limited validity.
  - Valid within only one tenant.
  - Fixed expiration time.
- The token is verified with each of the requests by all of the Openstack components.
  - UUID tokens are validated online: it requires a call back to the Keystone server.
  - PKI tokens can be verified offline: signed message.
- Role based authorization (RBAC).

Federation Efforts

- EGI and the NGIs are already a federation of resources providers.
- Many of the resource providers have some virtualized and/or cloud resources.
  - Many different software stacks.
  - Different interfaces.
  - Different capabilities.
- Many users are interested in accessing those resources.
  - Profit from flexibility.
  - Deploy its own software environment.
- Authentication is the cornerstone of such a Federation

Federated Identity

Cloud federation across several providers has some consequences for RPs:

- Manage large numbers of users, in different (and sometimes overlapping) groups.
- Populate the user base to each of the sites involved in the federation.
- Each site is free to use a different cloud middleware with its own AuthN/AuthZ mechanism.
- EGI Fedcloud requires that it is X.509 and not user/password based.
- Same situation as in the Grid $\rightarrow$ VO based authentication might be the answer.

For the users and communities

- Manage different credentials: user/password based, X.509 proxies, VOMS...
- Readapting the existing tools.
- Difficult to manage users for the communities.

Outline

VOMS Authentication in the Cloud

Apply VOs to the Cloud using VOMS-based authentication.

- Widely used in the Grid. Infrastructure already in place (PKI, VOMS servers, portals, etc.)
- User communities are familiar with it.
  - No extra credentials for users
  - No extra effort for managers.
  - No transition effort.
- Resource providers are familiar with it.
  - No extra effort for configuration.
  - No extra effort on their side to allow a VO to execute.
- Grid tools can be easily adapted to interact with cloud testbeds
- Integrated (or possible integration) with other operational tools.
- Extensible (for example it is possible to move towards SAML).

Keystone VOMS AuthN middleware

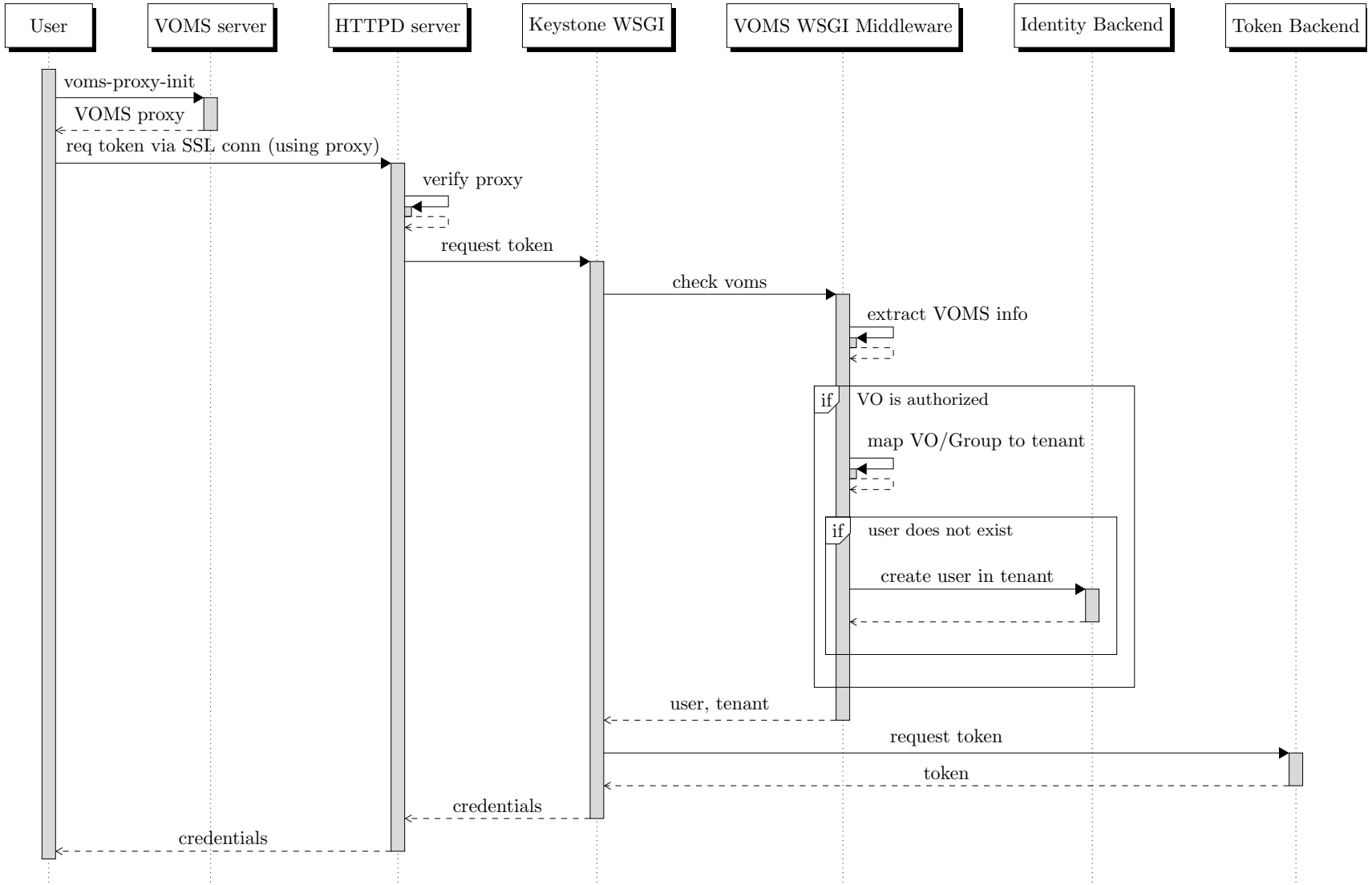
Deployment.

- Keystone is a WSGI application.
- Keystone is deployed behind Apache (or other HTTPD server).
- The HTTPD server verificates the X.509 proxy: validity, CA, CRLs.

VOMS module.

- WSGI middleware filter.
- Add-on to the Keystone server, no need for patch or modification.
- The VOMS proxy should be authenticated upstream (by the HTTPD server).
- Extracts the VO info from the VOMS proxy and maps it to a user, internal tenant and domain.

VO support in Openstack



Openstack Client AuthN module

- Pluggable authentication mechanism has been contributed to the mainline from version 2.13.0.
- VOMS auth module available for novaclient.

```
$ git clone https://github.com/IFCA/voms-auth-system-openstack
$ cd voms-auth-system-openstack
$ python setup.py install
$ voms-proxy-init -voms VONAME -rfc
$ nova --os-auth-system voms --x509-user-proxy /tmp/proxy credentials
```

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Perspective and Future work

Several Openstack sites using it so far.

- CC-IN2P3 (France), IFCA (Spain), IISAS (Slovakia), Jüelich Supercomputing Center (Germany).

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Integration with applications.

- VOMS modules for Openstack clients.
- libcloud (Apache) fork to support VOMS auth.
- Dirac module.

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Future steps.

- Exploit VOMS roles for RBAC in Keystone.
- Study the possibility of SAML assertions instead of proxies.
- Integration with Openstack dashboard (horizon).

Thanks!

Talk is cheap. Show me the code.

- Keystone module:
  https://github.com/IFCA/keystone-voms
  - Documentation:
    https://keystone-voms.readthedocs.org/en/latest/
- Client module:
  https://github.com/IFCA/voms-auth-system-openstack

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