

Sharing Virtual Appliances with the StratusLab Marketplace

HEPiX (Darmstadt, Germany)

5 May 2011



StratusLab is co-funded by the
European Community's Seventh
Framework Programme (Capacities)
Grant Agreement INFSO-RI-261552



Goal

- Create comprehensive, open-source, IaaS cloud distribution
- Focus on supporting grid services

Information

- 1 June 2010—31 May 2012 (2 years)
- 6 partners from 5 countries
- Budget : 3.3 M€ (2.3 M€ EC)

Contacts

- Site web: <http://stratuslab.eu/>
- Twitter: @StratusLab
- Support: support@stratuslab.eu



CNRS (FR)



UCM (ES)



GRNET (GR)



SIXSQ (CH)



TID (ES)



TCD (IE)

Goal

- Offer remote access to computing resources

Advantages

- Customized environments
- Rapid access via simple API
- Complete control (root access) with “pay as you go” model

Disadvantages

- Non-standard interfaces (vendor lock-in)
- Creating new virtual machines is difficult

Software as a Service (SaaS)

Platform as a Service (PaaS)

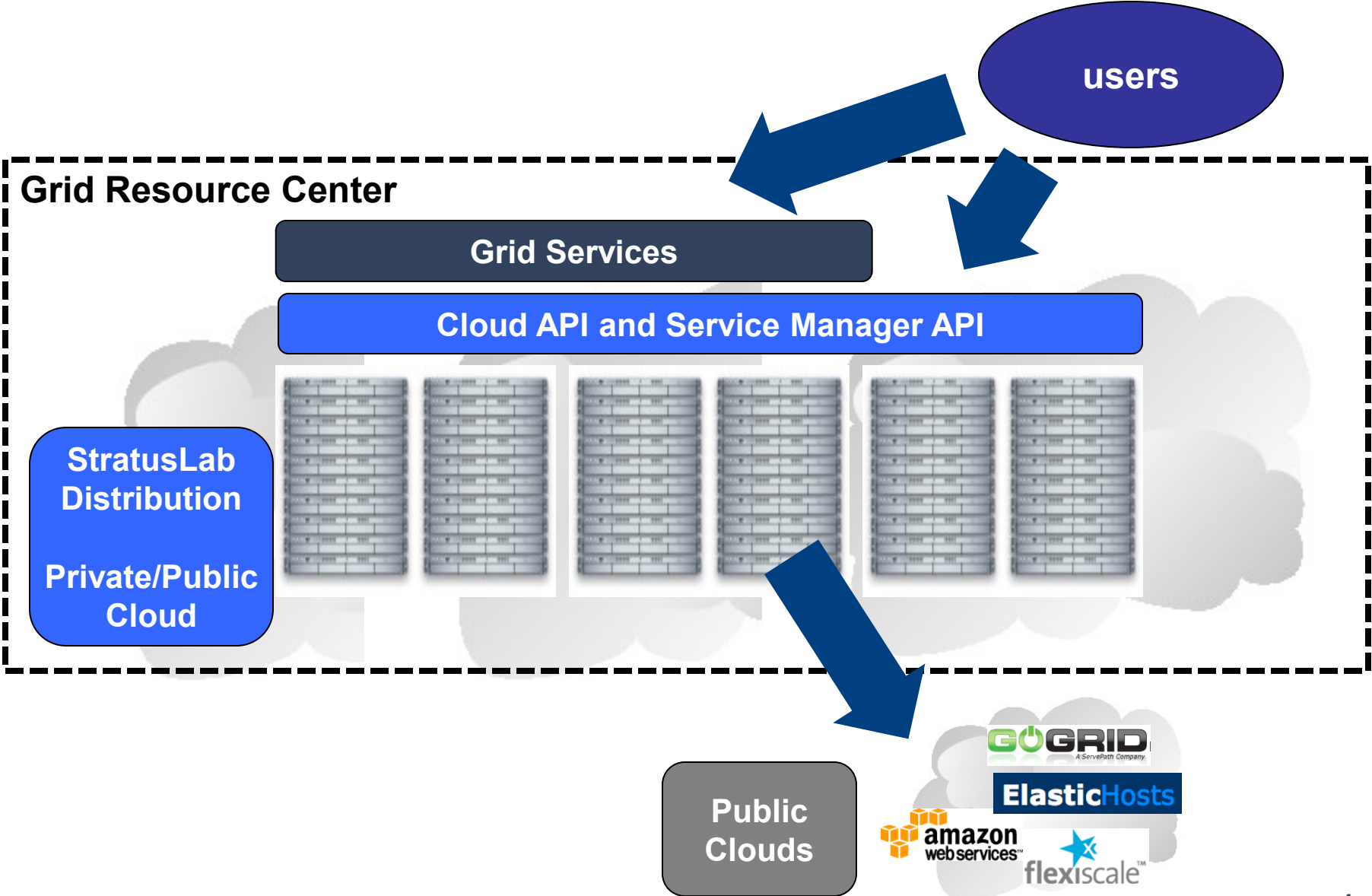
Infrastructure as a Service (IaaS)



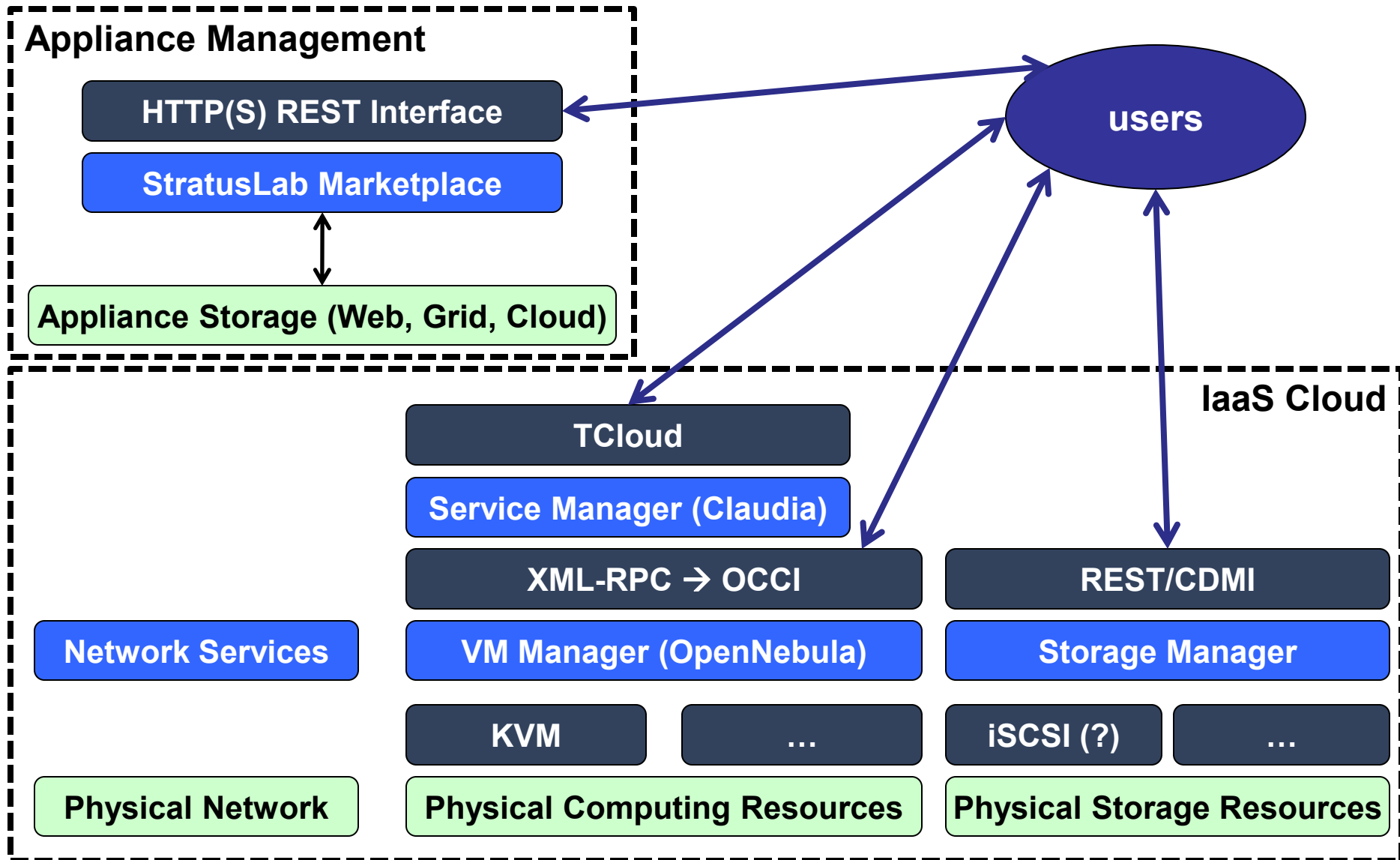
ElasticHosts



Grid and Cloud Integration



Architecture of StratusLab v1.0



Machine image creation is a barrier to cloud adoption

- Creating virtual machine images is time-consuming
- Ensuring that machines are secure and correct is difficult
- Sharing existing machines lowers this barrier

Marketplace facilitates sharing of images

- Registry of metadata for machine & disk images
- Image contents are kept in cloud, grid, or web storage
- Supports trust between creators, users, and administrators

Benefits

- End-users: browse and use existing images for their analyses
- Creators: publicize their work and attract larger user base
- Cloud Admins.: Use metadata to evaluate trustworthiness of images

REST interface

- Exposes a simple HTTP-based REST interface
- Easy to program against in all languages

Web interface

- REST interface also allows access via a web browser
- Signed entries can also be uploaded via the browser

Endpoint:

- Test endpoint: <http://appliances.stratuslab.eu/marketplace/>
- Production endpoint: TBD

A screenshot of a web browser window displaying the StratusLab Marketplace page. The browser's address bar shows "localhost:8080". The page features the StratusLab logo and the tagline "Enhancing Grid Infrastructures with Virtualization and Cloud Technologies". Below this is a section titled "StratusLab Marketplace" containing a table with four rows: Metadata, Endorsers, Query, and Upload. At the bottom of the page, there is a footer with the CAPACITIES logo, text stating "StratusLab is co-funded by the European Community's Seventh Framework Programme (Capacities) Grant Agreement INF50-RI-261552", and the European Union flag.

StratusLab :: Combining Grid x

localhost:8080

Home SixSq StratusLab Grid Cloud News Mac Quattor Maven Other Bookmarks

 **Enhancing Grid Infrastructures with Virtualization and Cloud Technologies**

StratusLab Marketplace

Metadata	List all image identifiers in the registry
Endorsers	List current endorsers
Query	Query the registry
Upload	Upload metadata via your browser

 **StratusLab is co-funded by the European Community's Seventh Framework Programme (Capacities) Grant Agreement INF50-RI-261552** 



The screenshot shows a web browser window with the following details:

- Browser: StratusLab :: Combining Grid
- Address bar: localhost:8080/metadata/Ez81pTmB4cgvWEbnhay0GxL2sI3/loomis@lal.in2p3.fr/2011-04-06T10:...
- Bookmarks: Home, SixSq, StratusLab, Grid, Cloud, News, Mac, Quattor, Maven, Other Bookmarks
- Page Header: StratusLab logo and the text "Enhancing Grid Infrastructures with Virtualization and Cloud Technologies"
- Section Header: Ez81pTmB4cgvWEbnhay0GxL2sI3
- Table of metadata:

type:	base
checksum:	MD5 4f2278435f539b657ca3ce3dd09153d4 SHA-1 4cfcd694e6078720bd611b9e16b2d06c4bdac237 SHA-256 63579492ebcb6247443c86c2d0892110b9ab7b8aceb30ea2b567b3 SHA-512 364e3ef9df9c9907e1eb15f5dde9a9e66458267ae43452e16caada2bccb480d
endorser:	loomis@lal.in2p3.fr
os:	ttylinux v9.3 i686
version:	1.0

At the bottom of the page, there is a footer with the following information:

- Logo: CAPACITIES
- Text: StratusLab is co-funded by the European Community's Seventh Framework Programme (Capacities) Grant Agreement INFSO-RI-261552
- Image: European Union flag

Image metadata

- Must conform to a defined schema
- Uses the RDF-XML format
- Must be cryptographically signed with a (grid) certificate
- Must contain image ID, size, and checksums to make connection to image
- Contains (optionally) location elements with URL(s) for image content

Tools

- Create, sign, and validate metadata

```
<rdf:RDF xmlns:rdf=". . .">
<rdf:Description rdf:about="#MMZu9WvwKIro-rtBQfDk4PsK07_">
  <dcterms:identifier>
    MMZu9WvwKIro-rtBQfDk4PsK07_
  </dcterms:identifier>

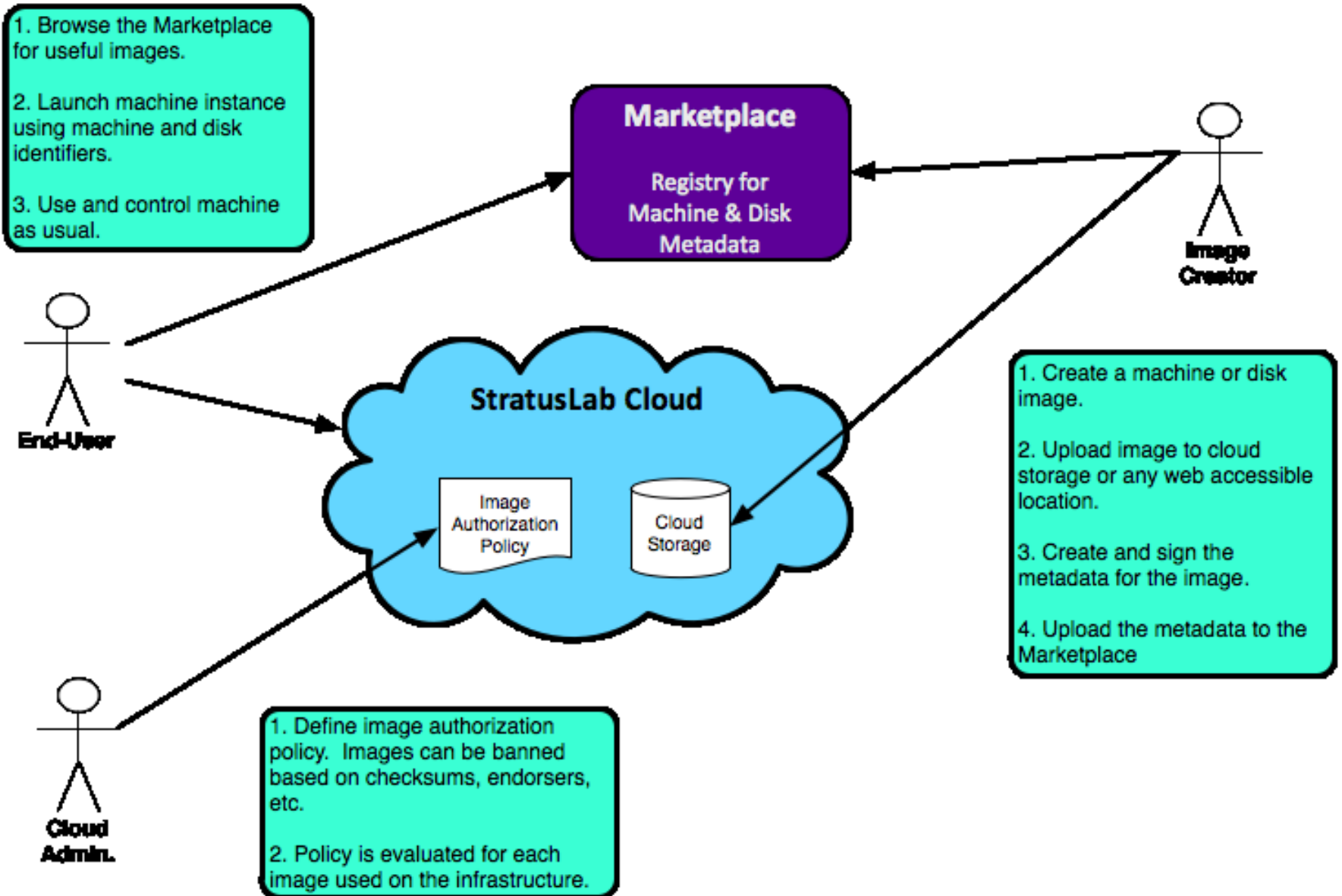
  <slreq:bytes>100</slreq:bytes>
  <slreq:checksum rdf:parseType="Resource">
    <slreq:algorithm>SHA-1</slreq:algorithm>
    <slreq:value>c319bbd5afc. . .</slreq:value>
  </slreq:checksum>

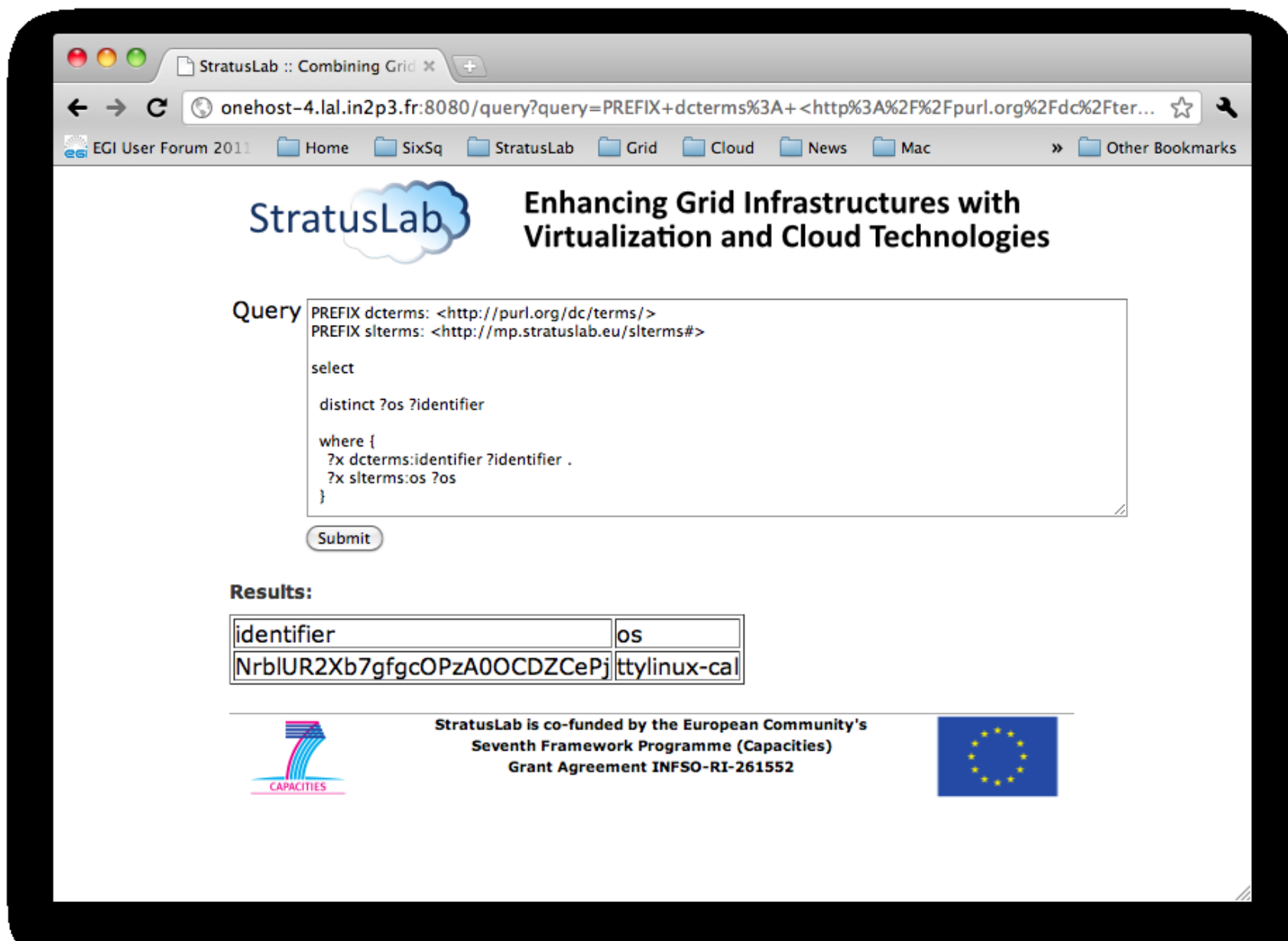
  <slreq:endorsement rdf:parseType="Resource">
    . . .
  </slreq:endorsement>

  <dcterms:type>machine</dcterms:type>

  <dcterms:valid>2011-07-23T10:59:42Z</dcterms:valid>

  <dcterms:publisher>StratusLab</dcterms:publisher>
  . . .
</rdf:Description>
</rdf:RDF>
```





The screenshot shows a web browser window with the following details:

- Browser title: StratusLab :: Combining Grid
- Address bar: onehost-4.lal.in2p3.fr:8080/query?query=PREFIX+dcterms%3A+<http%3A%2F%2Fpurl.org%2Fdc%2Fter...
- Navigation bar: EGI User Forum 2011, Home, SixSq, StratusLab, Grid, Cloud, News, Mac, Other Bookmarks
- Header: StratusLab logo and text "Enhancing Grid Infrastructures with Virtualization and Cloud Technologies"
- Query input field:

```
Query PREFIX dcterms: <http://purl.org/dc/terms/>
PREFIX slterms: <http://mp.stratuslab.eu/slterms#>

select

distinct ?os ?identifier

where {
  ?x dcterms:identifier ?identifier .
  ?x slterms:os ?os
}
```
- Submit button
- Results section:

identifier	os
NrblUR2Xb7gfgcOPzA0OCDZCePj	ttlinux-cal
- Footer: CAPACITIES logo, text "StratusLab is co-funded by the European Community's Seventh Framework Programme (Capacities) Grant Agreement INFSO-RI-261552", and the European Union flag.

```
PREFIX dcterms: <http://purl.org/dc/terms/>
PREFIX slterms: <http://mp.stratuslab.eu/slterms#>

select

  distinct ?os ?identifier

where {
  ?x dcterms:identifier ?identifier .
  ?x slterms:os ?os
}
```

```
PREFIX dcterms: <http://purl.org/dc/terms/>
PREFIX slreq: <http://mp.stratuslab.eu/slreq#>

select
  distinct ?identifier ?email ?created
where
{
  ?x dcterms:identifier ?identifier;

  slreq:endorsement ?endorsement .
  ?endorsement slreq:endorser ?endorser;

  dcterms:created ?created .
  ?endorser slreq:email ?email .
  FILTER (?email = "me@example.com")
}
```

Pass the URL for metadata entry when starting instance.

- `stratus-run-instance ... MMZu9WvwKIro-rtBQfDk4PsKO7_`
- Use normal machine lifecycle commands to control machine.

StratusLab cloud will validate image before running it:

- `stratus-policy-image`: invokes site policy to determine if the referenced image can be used; includes endorser white lists, checksum black lists, etc.
- `stratus-download-image`: will download (and cache) a validated image to be used by a VM instance; uses the location URL(s) in the metadata entry

Upload Workflow

1. Creator/endorser uploads signed metadata file to server
2. Server validates the structure/content of metadata
3. Server validates that the signature is valid
4. Server ensures date is within acceptable time window
5. Server confirms (optionally) email address in metadata
6. Metadata entry is made visible in the Marketplace

Features

- An image may have multiple entries (e.g. deprecating an image)
- An image may be endorsed by multiple people (e.g. validation by different projects, groups)
- Entries are never deleted (i.e. complete history is available)
- Only latest entry for each endorser is visible by default

Marketplace

- Registry of metadata for machine and disk images
- Works with cloud, grid, and web storage to make images available
- Facilitates the trusted sharing of images between sites, users, ...
- Fully integrated with StratusLab VM deployment
- Production release with StratusLab 1.0 around 10 June 2011

Future Work

- Federation of independent Marketplace instances
- Continued discussions for interoperability and adoption
- Developing conventions for additional metadata in entries

Thanks to HEPiX Virtual. WG for previous discussions!

Copyright © 2011, Members of the StratusLab collaboration: Centre National de la Recherche Scientifique, Universidad Complutense de Madrid, Greek Research and Technology Network S.A., SixSq Sàrl, Telefónica Investigación y Desarrollo SA, and The Provost Fellows and Scholars of the College of the Holy and Undivided Trinity of Queen Elizabeth Near Dublin.

**This work is licensed under the Creative Commons
Attribution 3.0 Unported License
<http://creativecommons.org/licenses/by/3.0/>**

