



PEPS

Plateforme d'Exploitation des Produits Sentinel

Search
Visualize
Download
Process

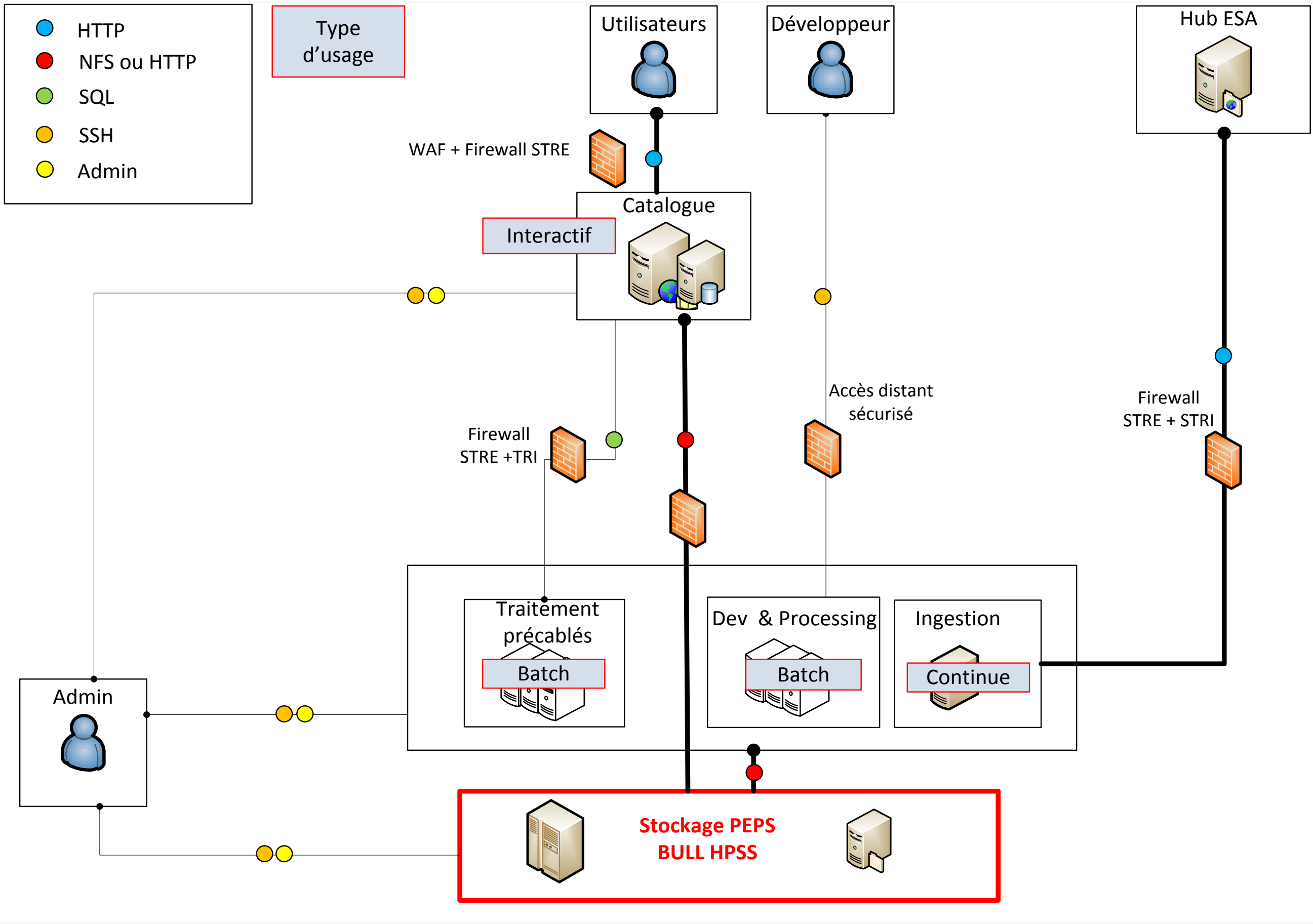


The PEPS platform is the french Collaborative Ground Segment for Sentinels data.

It would store and provide access to **all** Sentinel 1-2-3 products

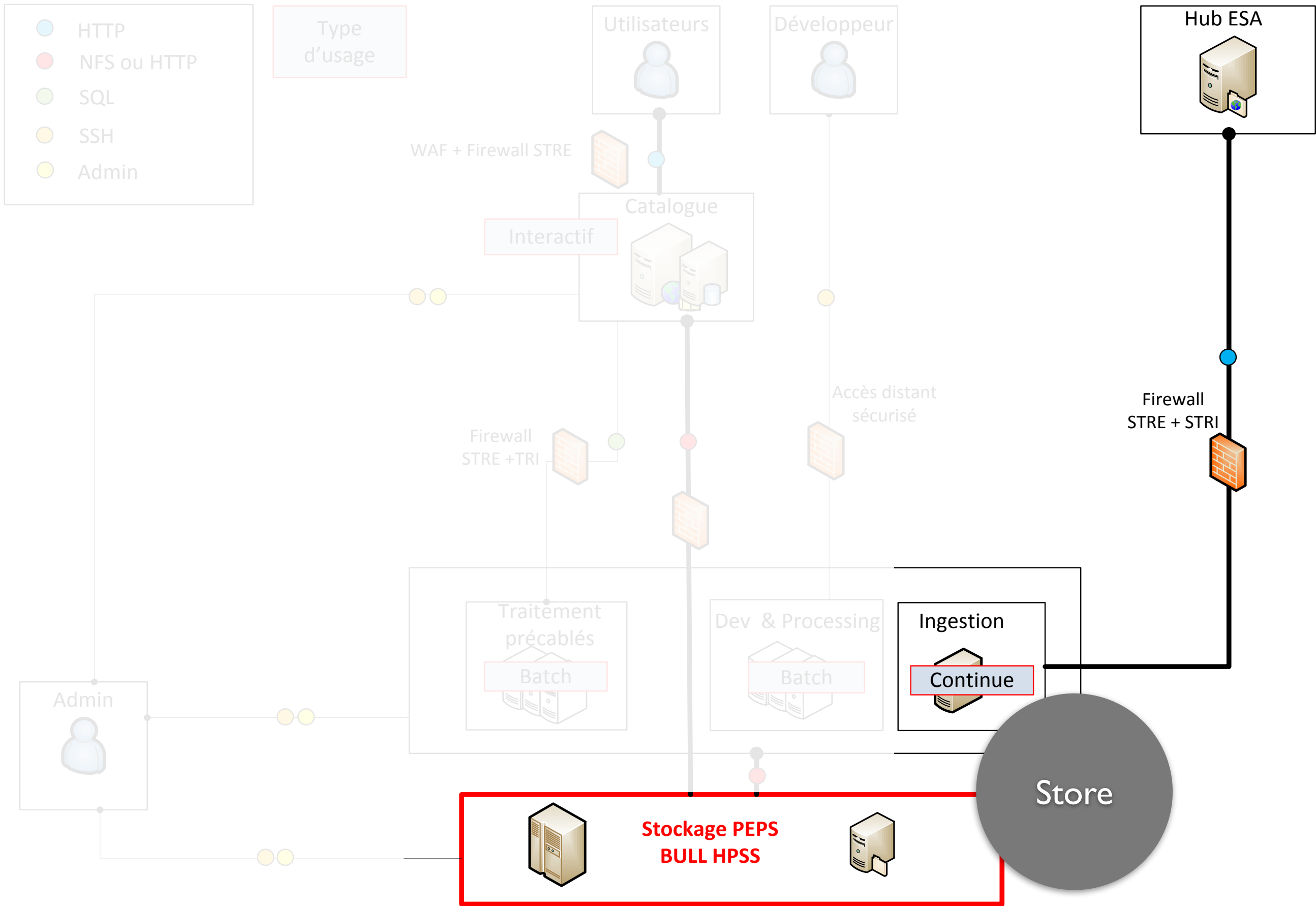
PEPS Phase 1

2015-2017





Store



Store

2017

7 PB

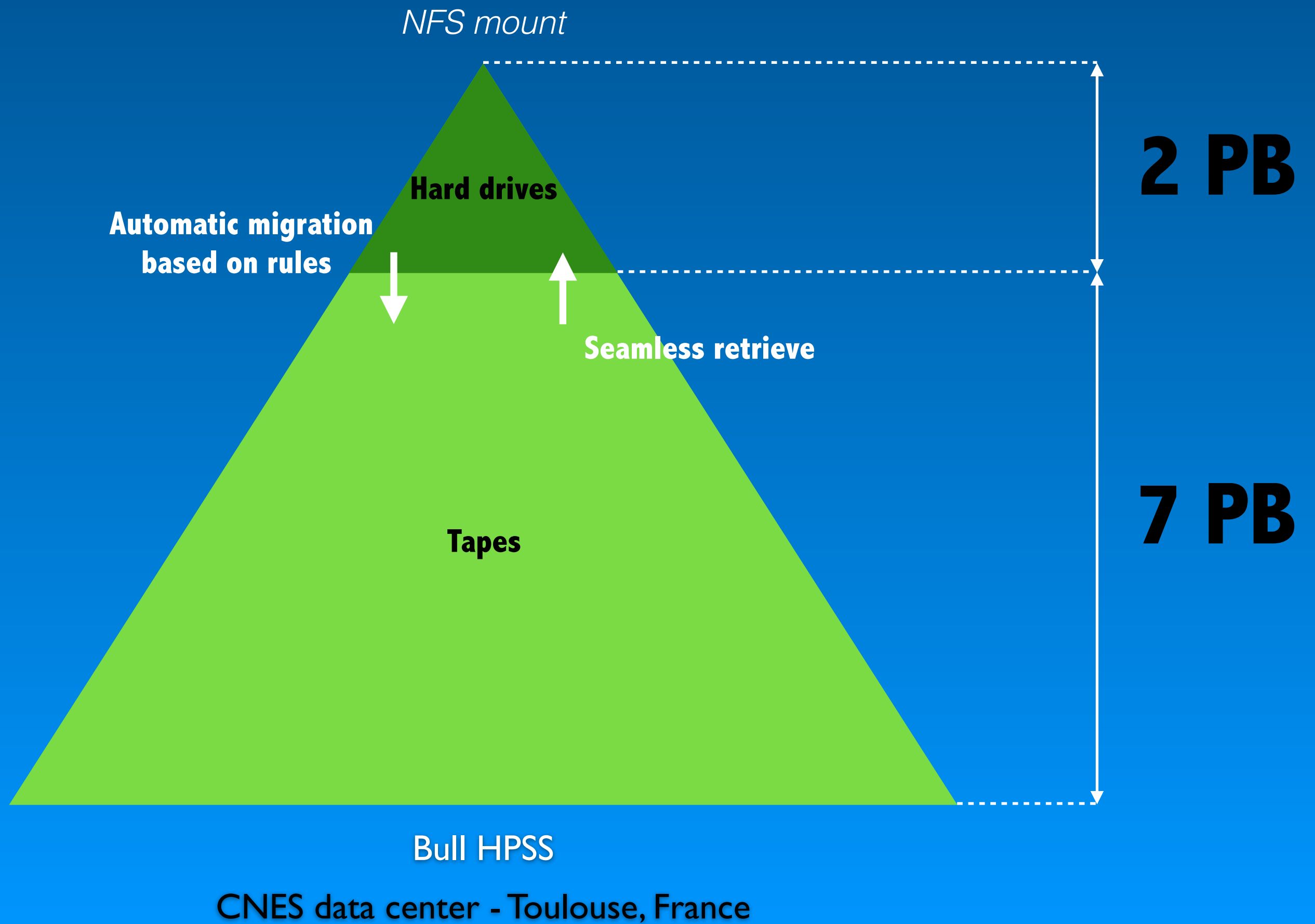
Store

2017

7 PB

DVDs







Store

During ingestion process, each product metadata is
semantically enhanced using **iTag** Web Service

Store

Image footprint



Store

Image footprint



World coast



Toponyms
(Countries, Regions, States)



Population density



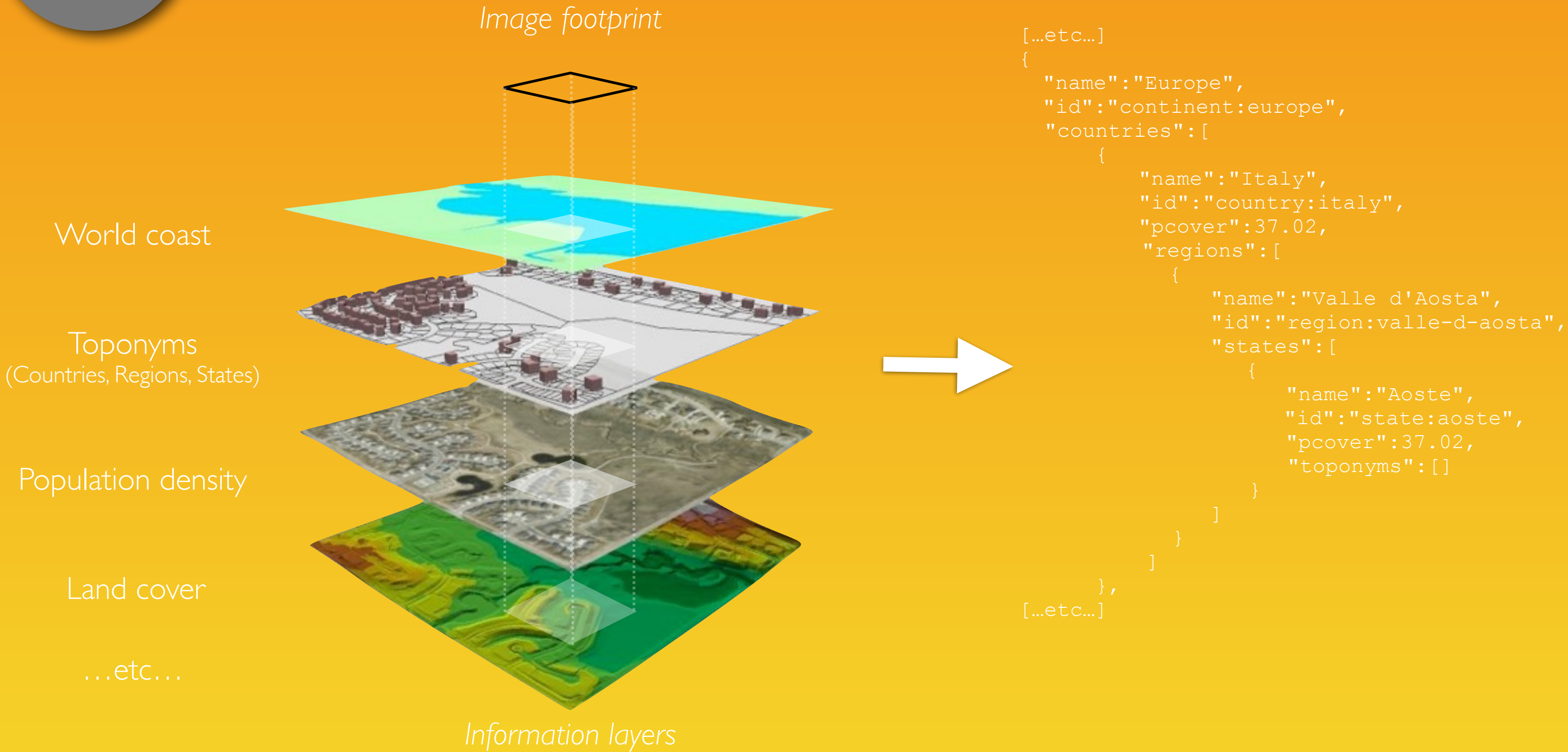
Land cover



...etc...

Information layers

Store





Descriptive keywords

🚩 Keywords

Northern hemisphere

🌍 Location

Europe
France
Rhône-Alpes
Savoie
Provence-Alpes-Côte-d'Azur
Hautes-Alpes
Italy
Piemonte
Turin
Valle d'Aosta
Aoste

« Human readable »
 location

Land cover

🌲 Land use

Forest 48.92%

Desert 31.74%

Herbaceous Area 15.92%



Store

Ingestion is a one line **REST** POST request

```
curl -X POST -d @metadata.xml https://admin:xxx@peps.cnes.fr/resto/collections/Sentinell1
```



Store

Ingestion is a one line **REST** POST request

```
curl -X POST -d @metadata.xml https://admin:xxx@peps.cnes.fr/resto/collections/Sentinell1
```

—
Action



Store

Ingestion is a one line **REST** POST request

```
curl -X POST -d @metadata.xml https://admin:xxx@peps.cnes.fr/resto/collections/Sentinell1
```

—
Action

—
Metadata path

Store

Ingestion is a one line **REST** POST request

```
curl -X POST -d @metadata.xml https://admin:xxx@peps.cnes.fr/resto/collections/Sentinell1
```

—
Action

—
Metadata path

—
Secured endpoint

Store

Ingestion is a one line **REST** POST request

```
curl -X POST -d @metadata.xml https://admin:xxx@peps.cnes.fr/resto/collections/Sentinell1
```

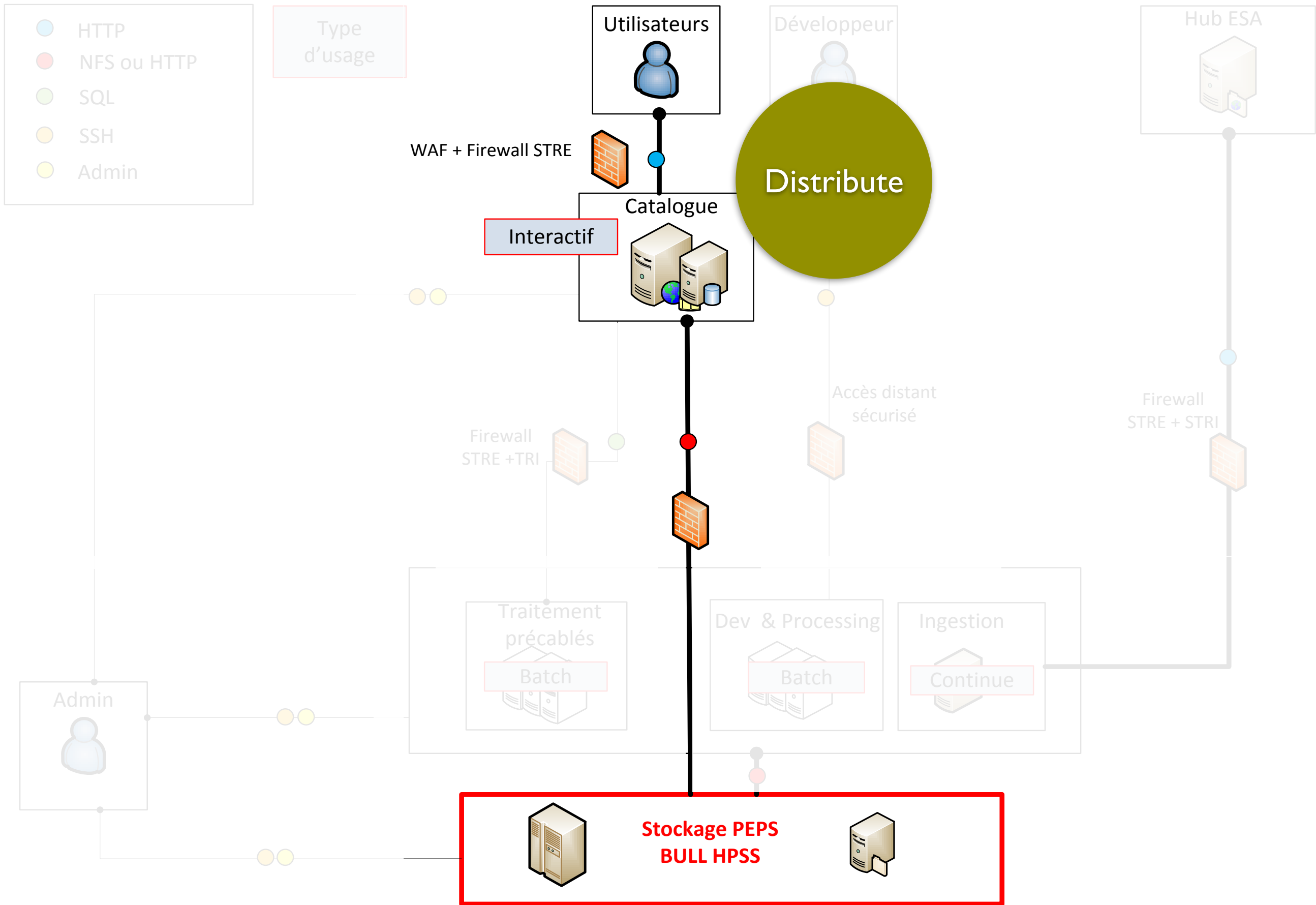
—
Action

—————
Metadata path

—————
Secured endpoint

—————
Target collection

Distribute



Distribute

PEPS distribution based on resto¹

¹ Same as in the THEIA CNES distribution center



Distribute

resto is an Earth Observation search engine compliant with OGC / WGISS EO OpenSearch standard

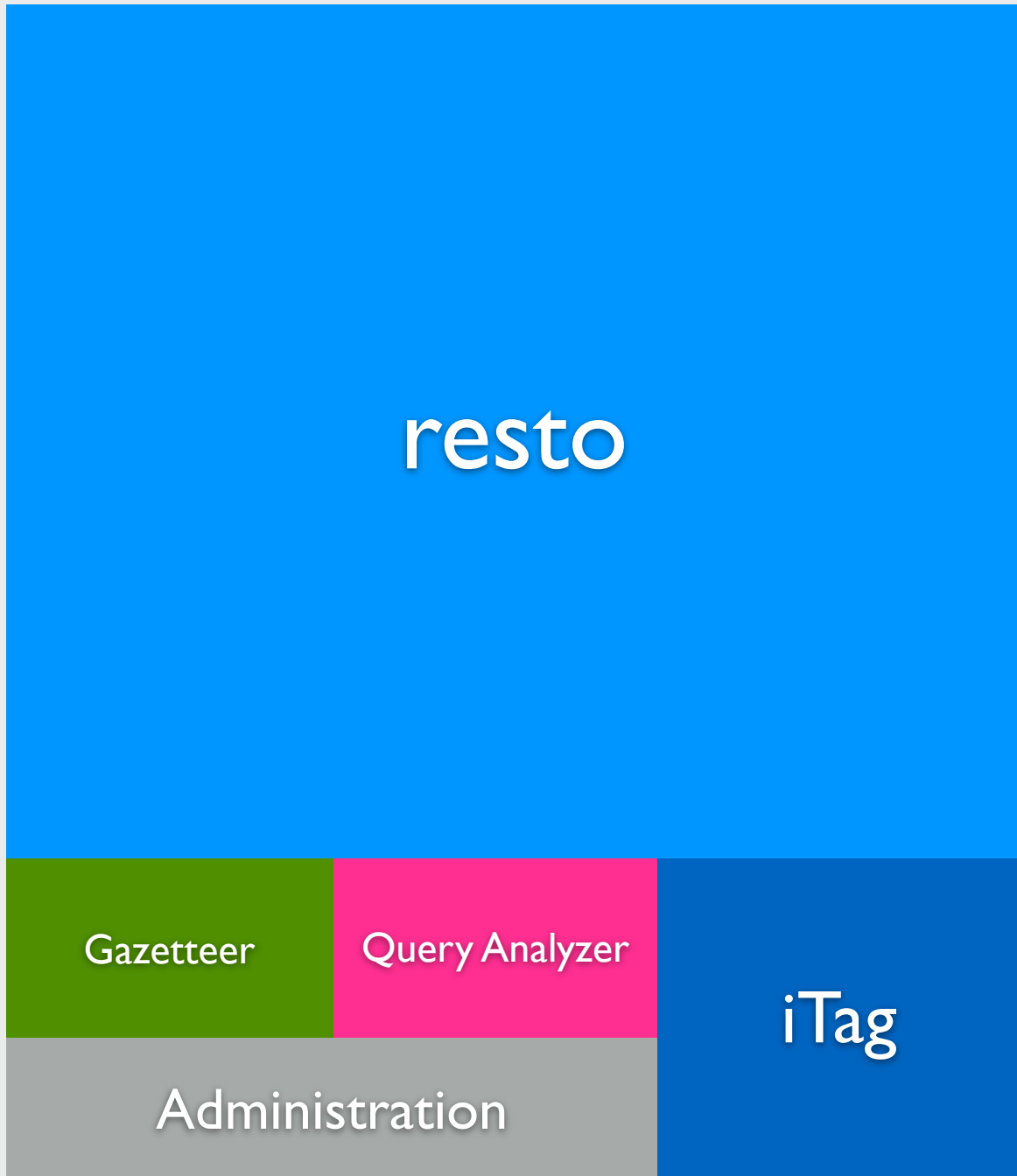
resto

PEPS

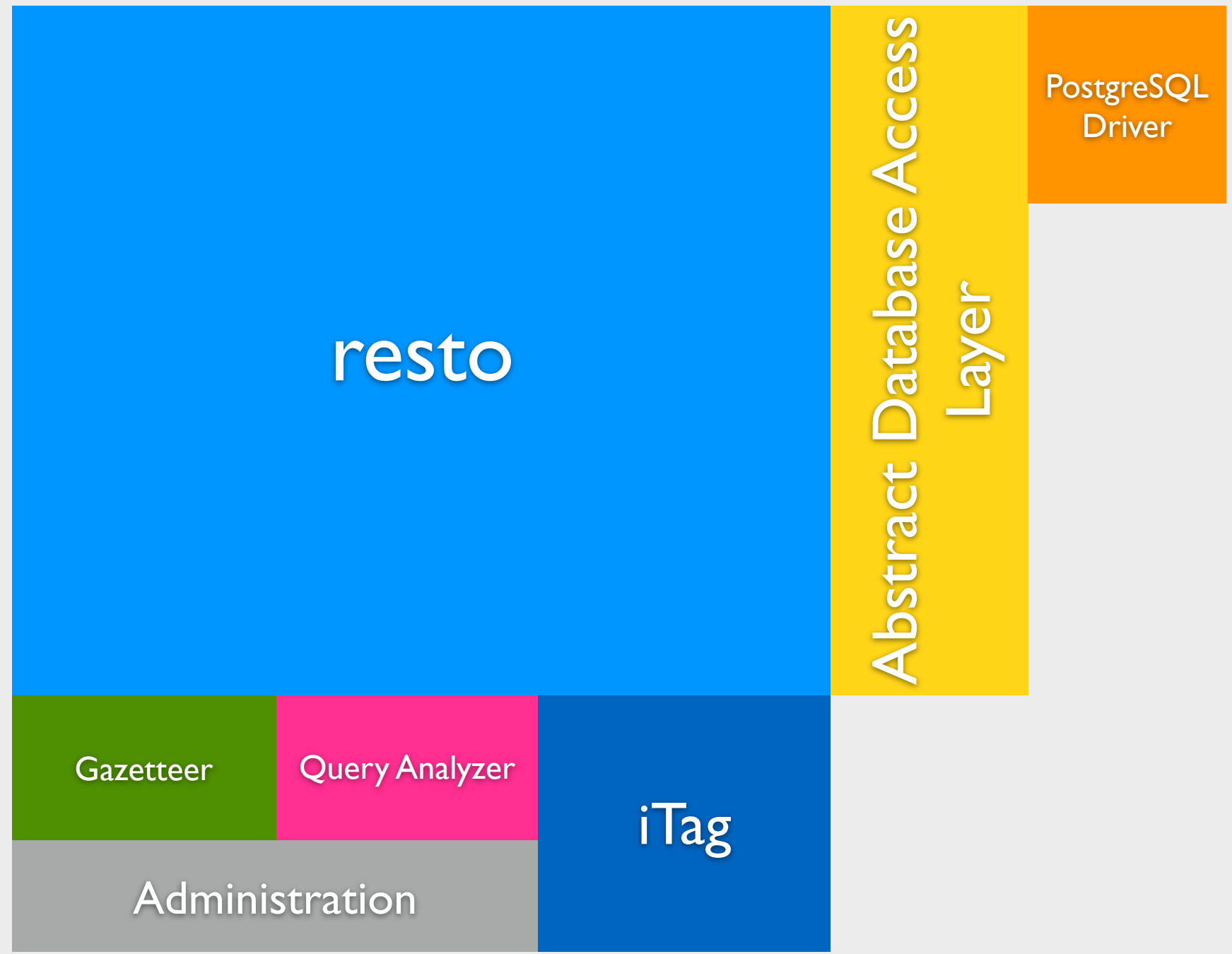
resto

iTag

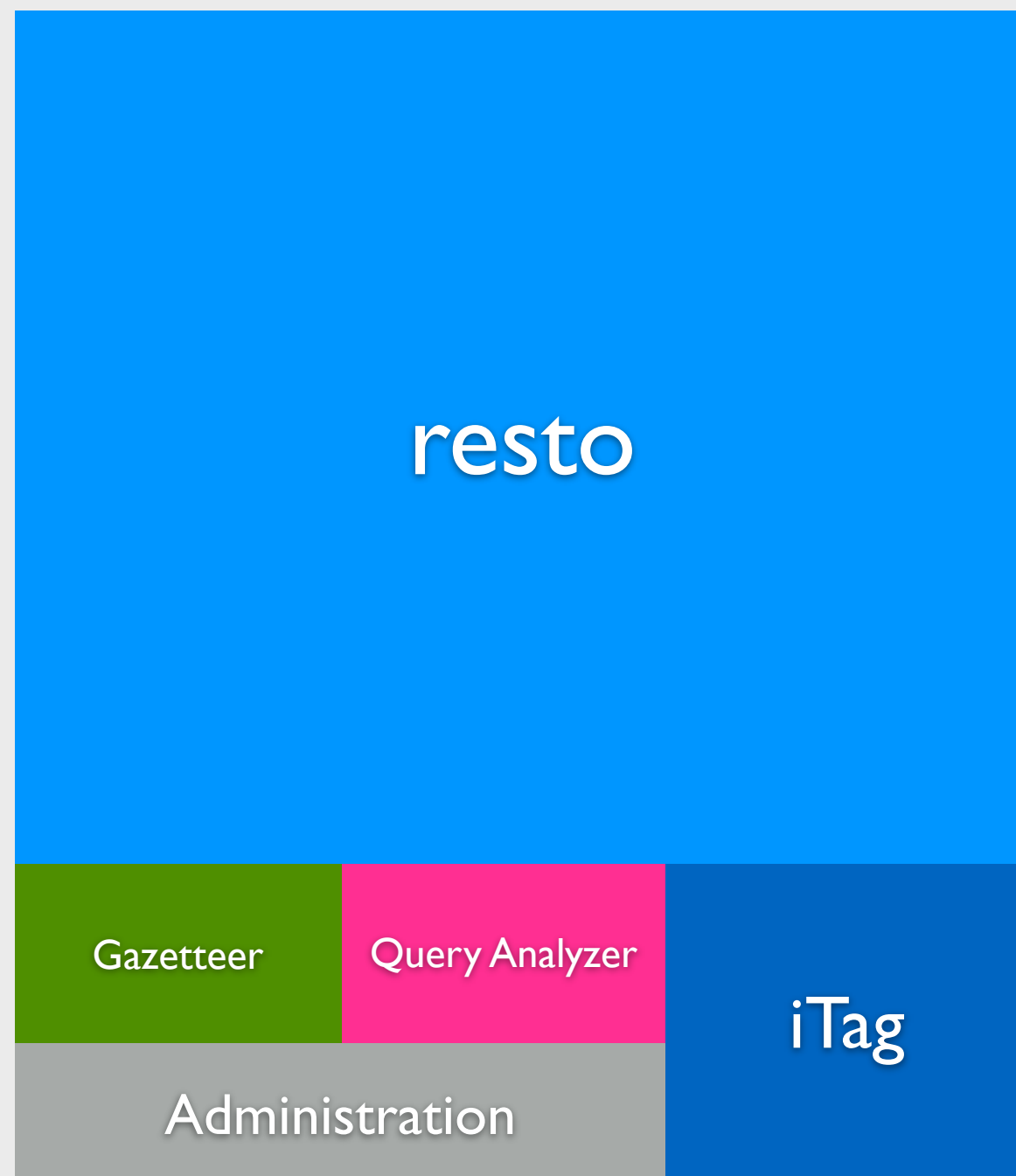
PEPS



PEPS

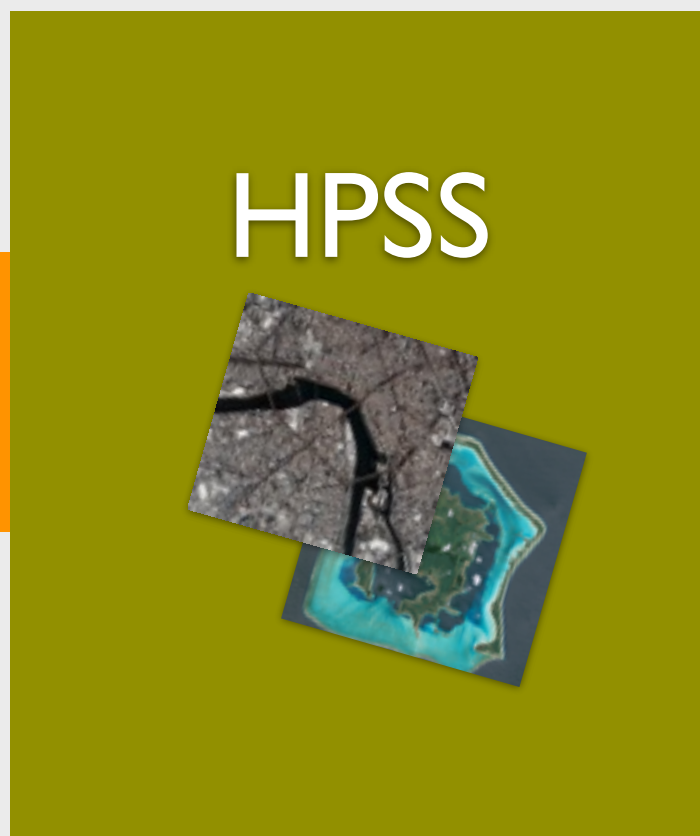


PEPS

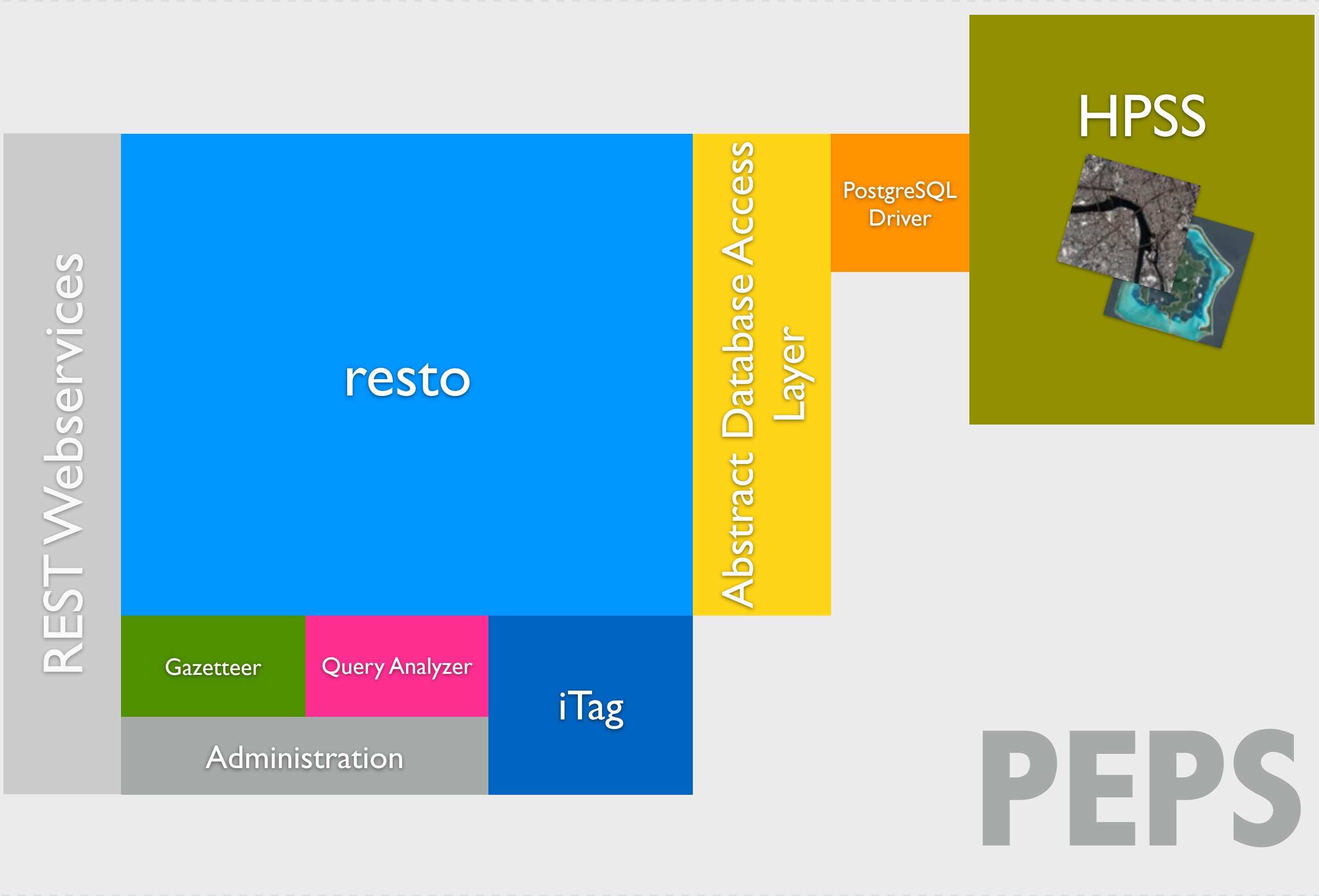


Abstract Database Access Layer

PostgreSQL Driver



PEPS



REST Webservices

resto

Abstract Database Access Layer

PostgreSQL Driver

HPSS



Gazetteer

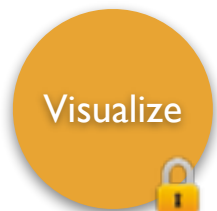
Query Analyzer

iTag

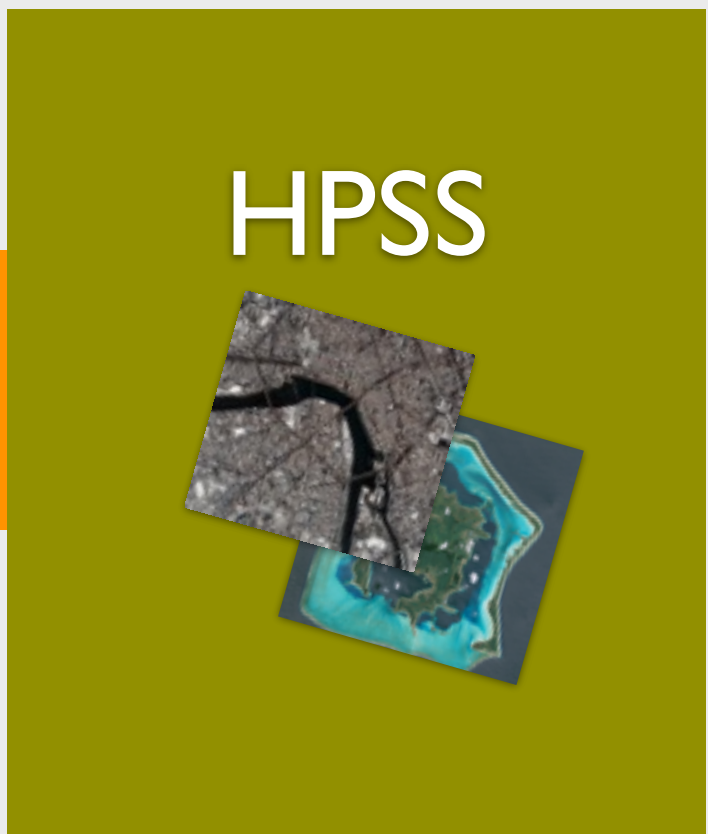
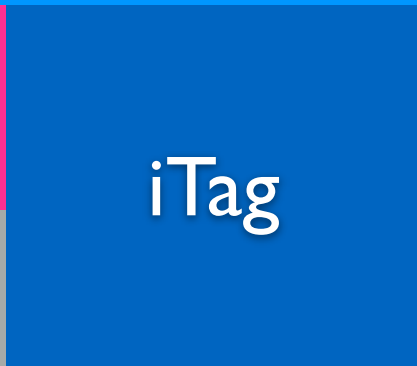
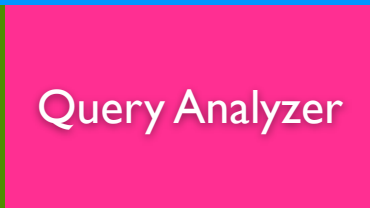
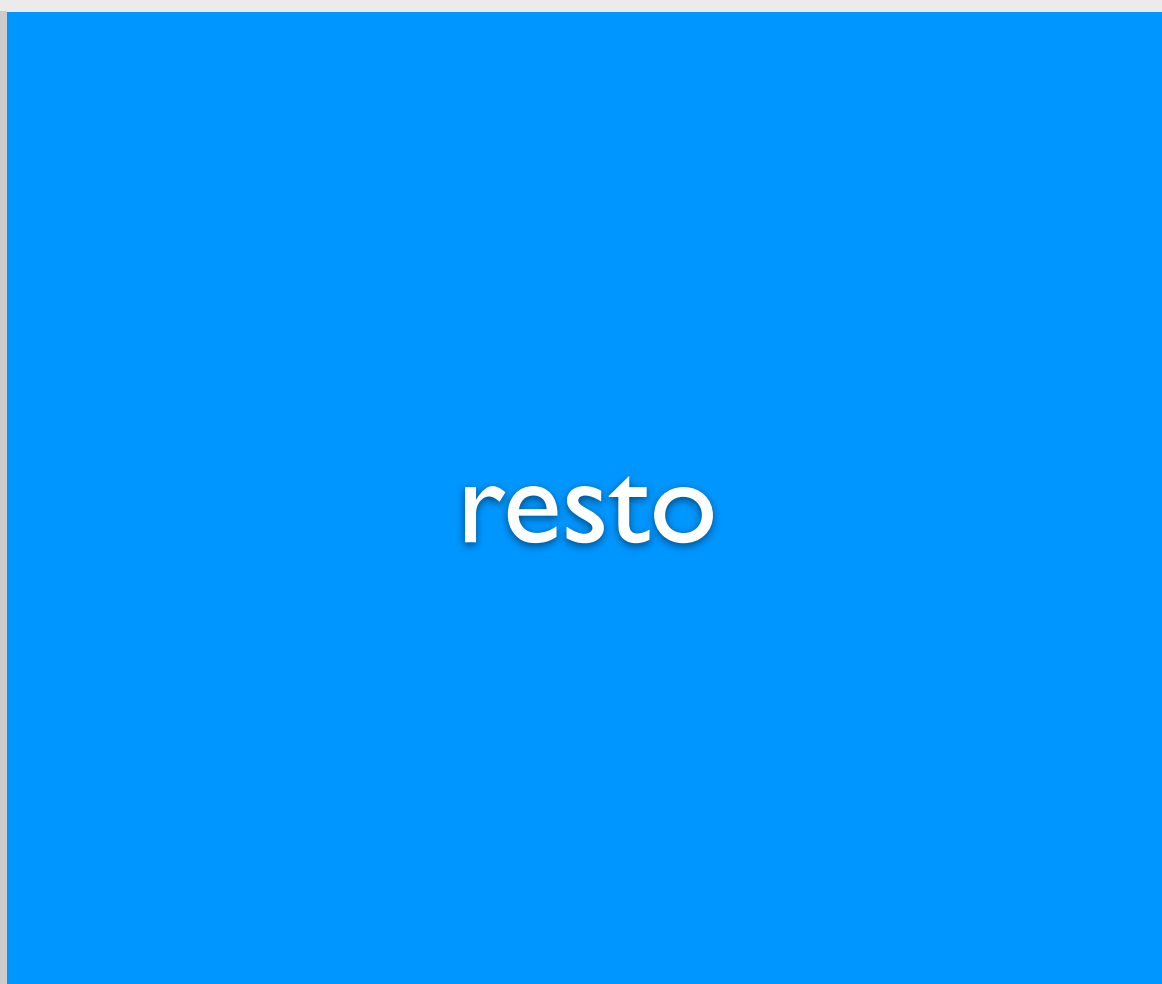
Administration

PEPS

Users



REST Webservices

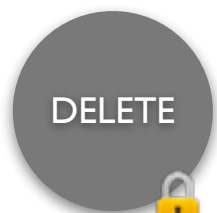


PEPS

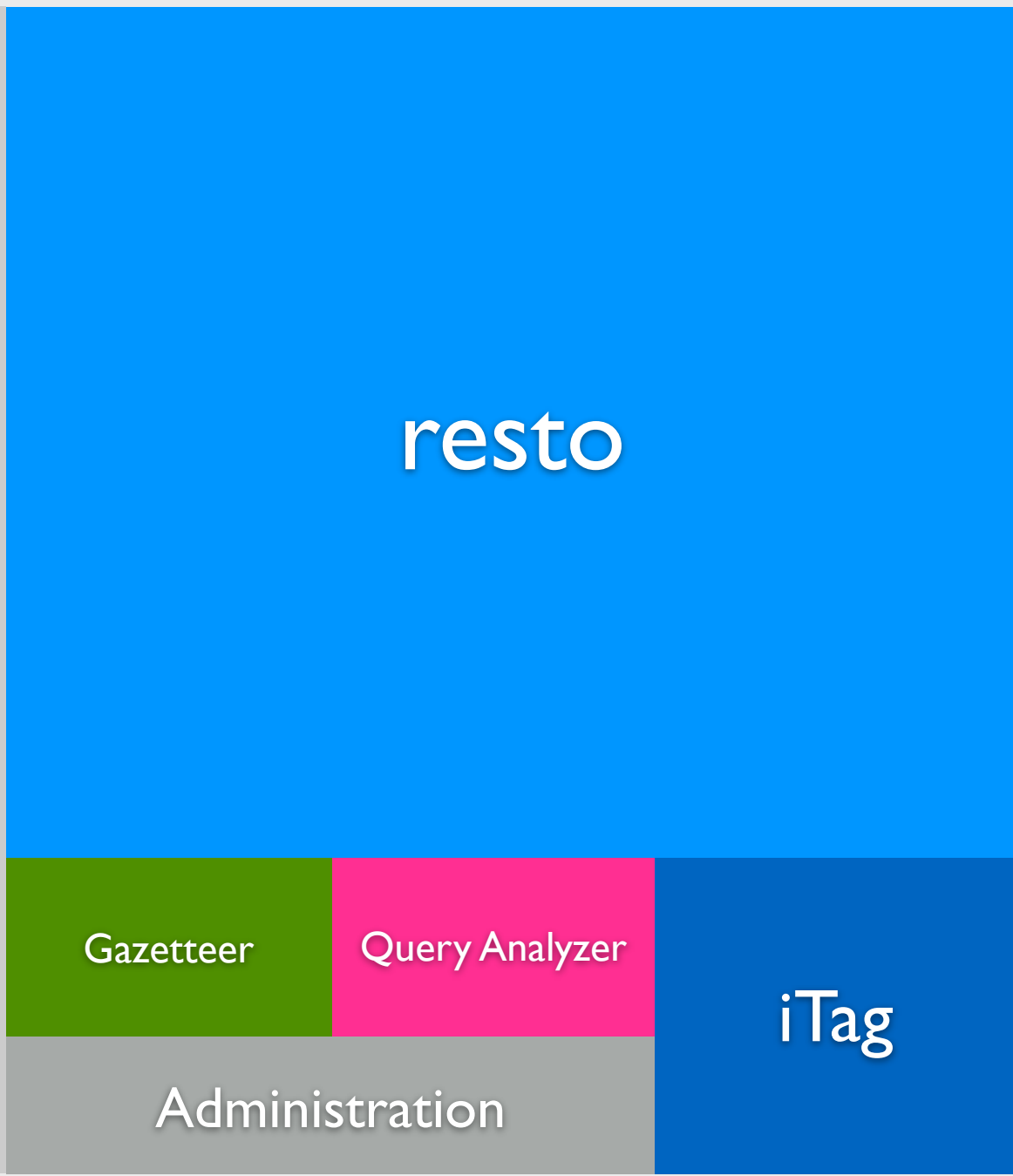
Users



Admin



REST Webservices



Abstract Database Access Layer

PostgreSQL Driver



PEPS

Distribute

Search

ROCKET

EXPLORE

Coastal town of California acquired in spring without clouds

SIGN IN

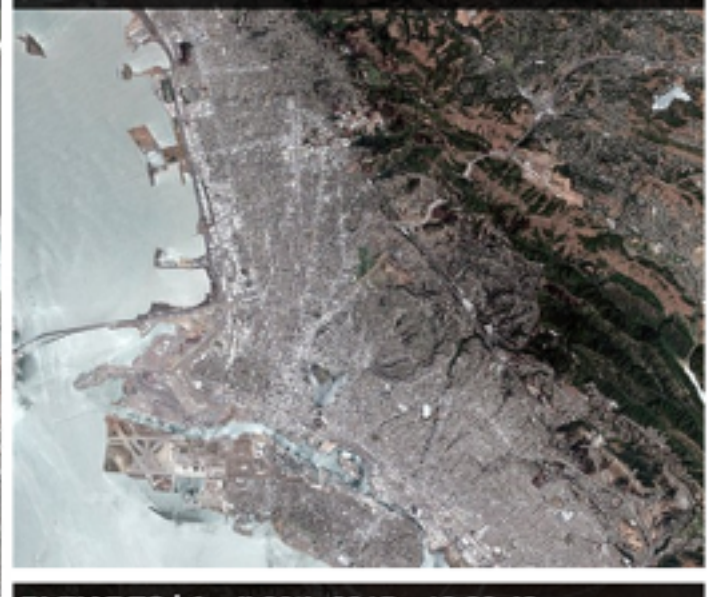
REGISTER



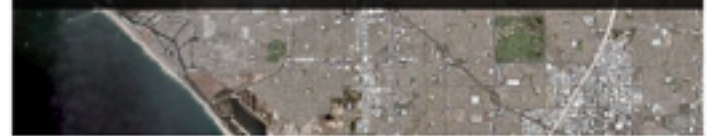
PLEIADES | June 4th 2015 - 19:08:40
United States of America



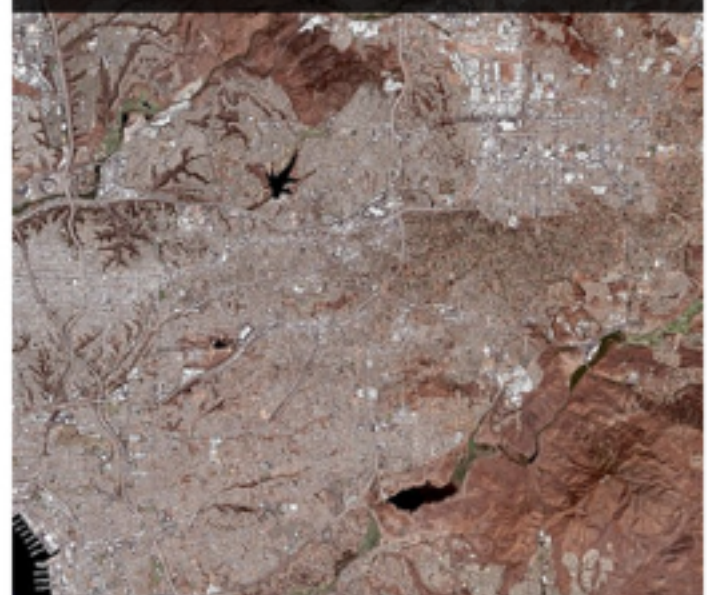
PLEIADES | June 4th 2015 - 19:08:31
United States of America



PLEIADES | June 1st 2015 - 18:44:05
United States of America



PLEIADES | April 30th 2015 - 18:39:52
United States of America



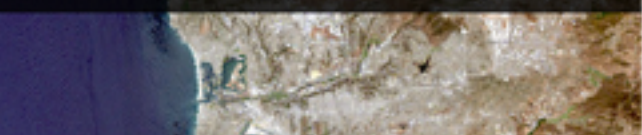
PLEIADES | May 3rd 2015 - 19:04:44
United States of America



PLEIADES | May 1st 2015 - 18:32:46
United States of America



ROCKET | April 30th 2015 - 18:12:02
United States of America



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ROCKET

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Coastal town of California acquired in spring without clouds

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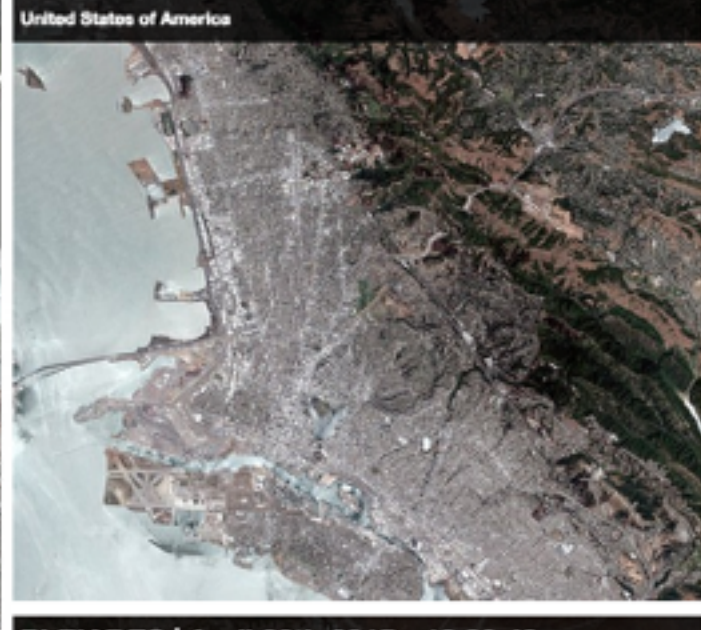
REGISTER



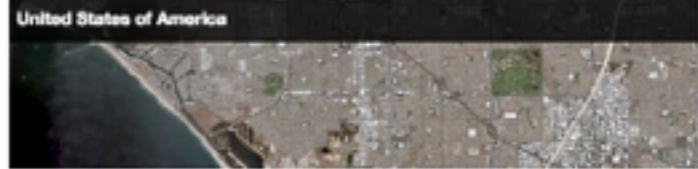
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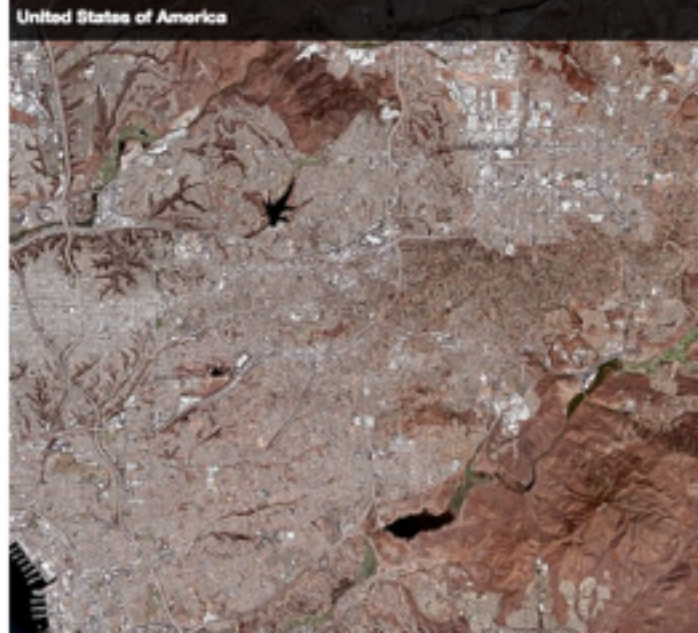
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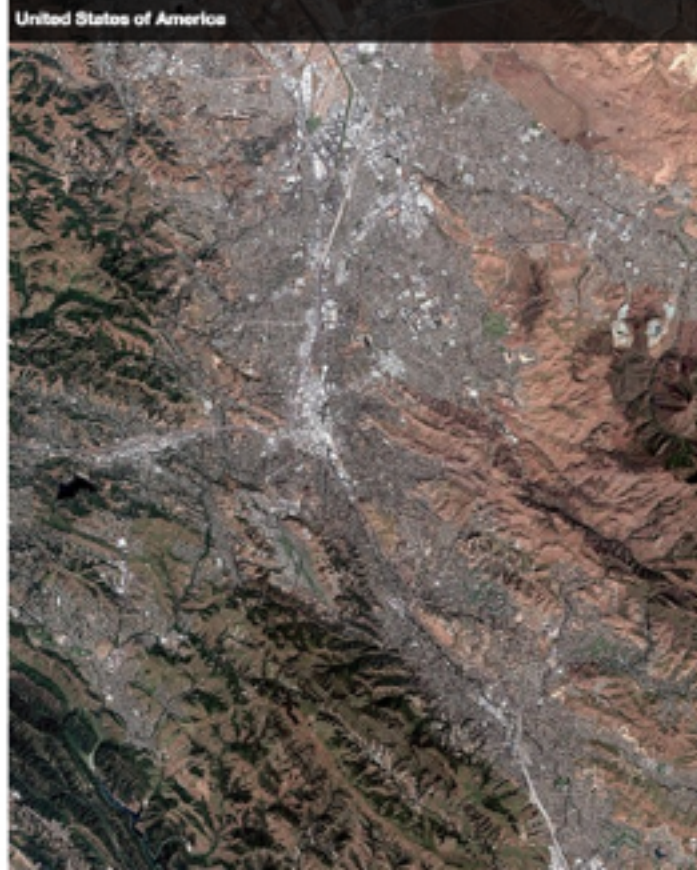
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REGISTER



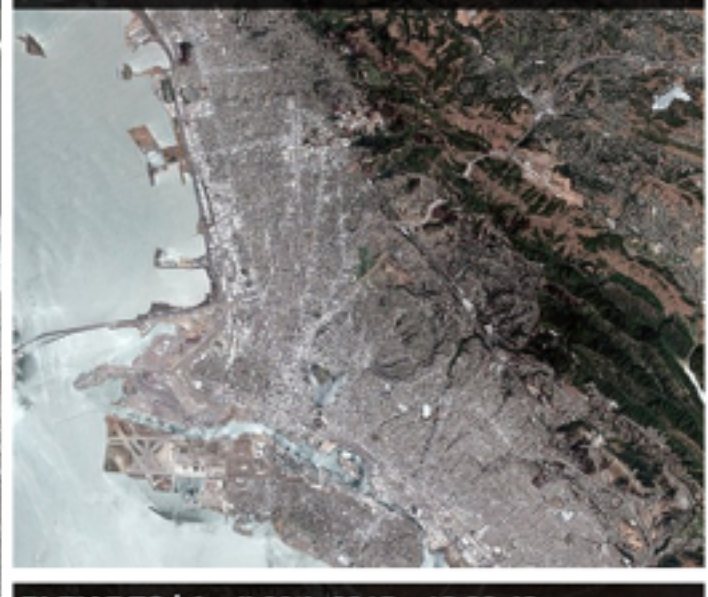
Coastal

town

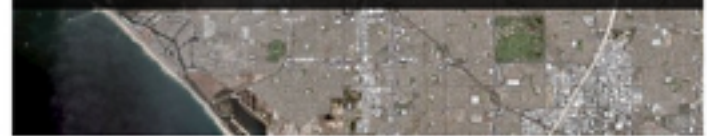
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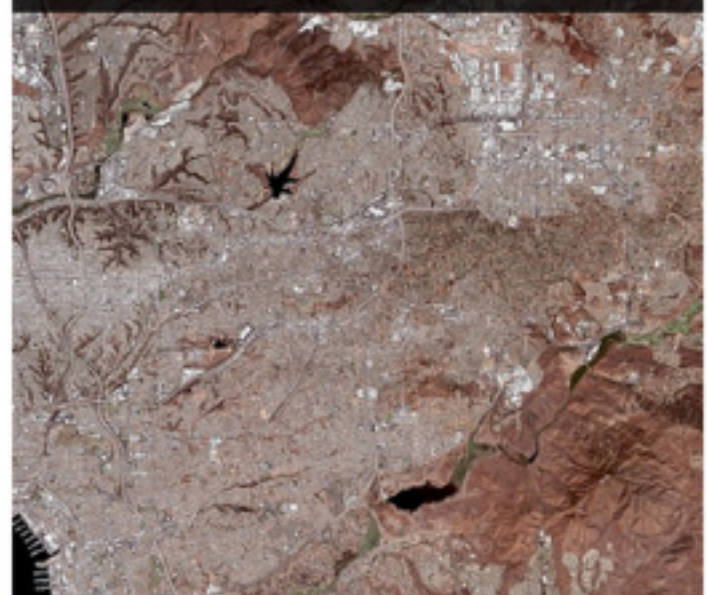
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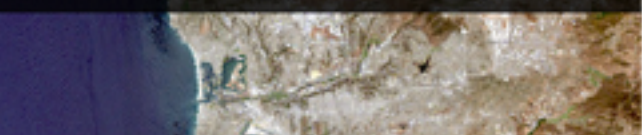
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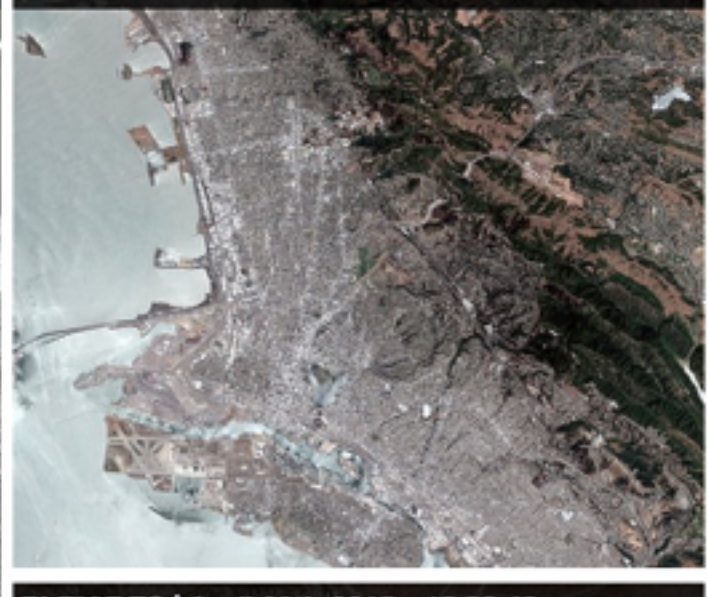
REGISTER



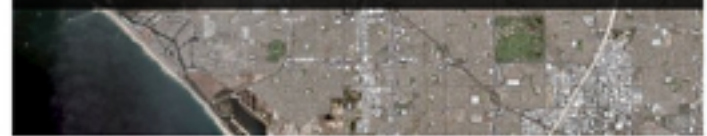
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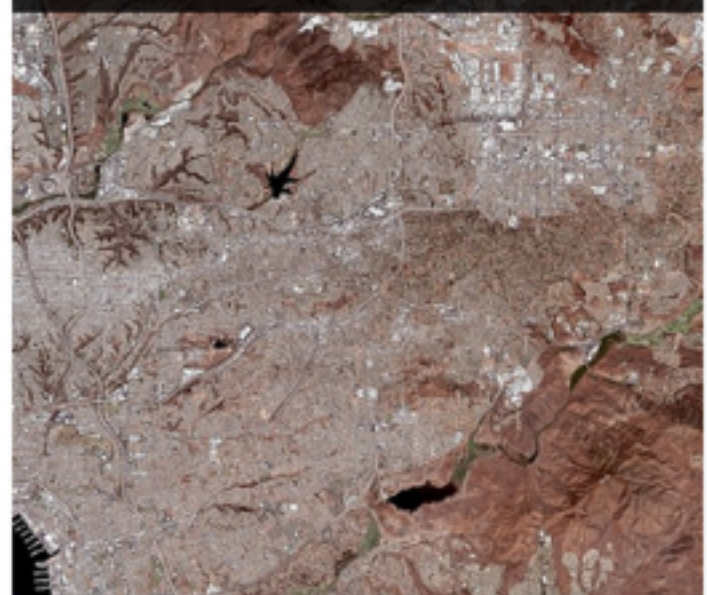
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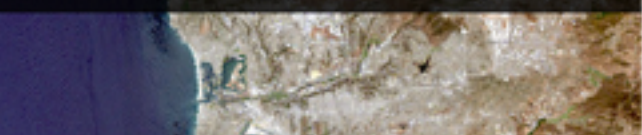
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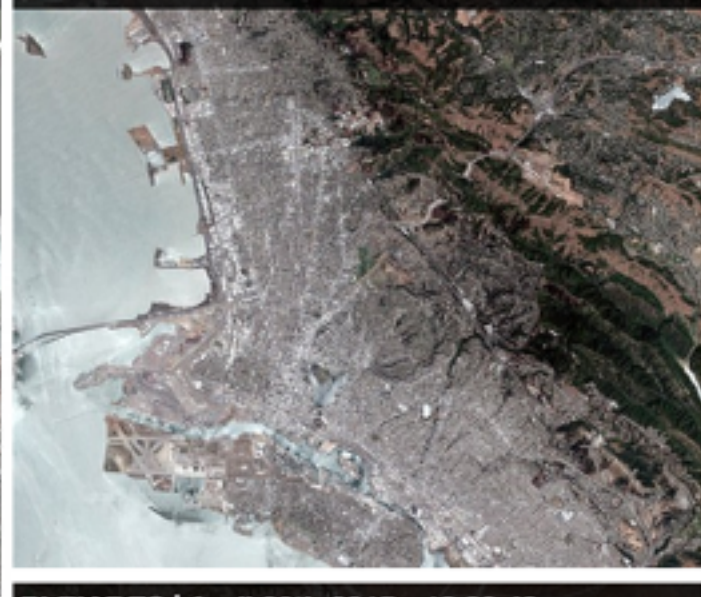
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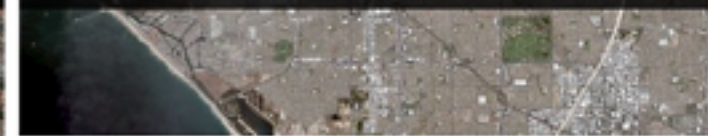
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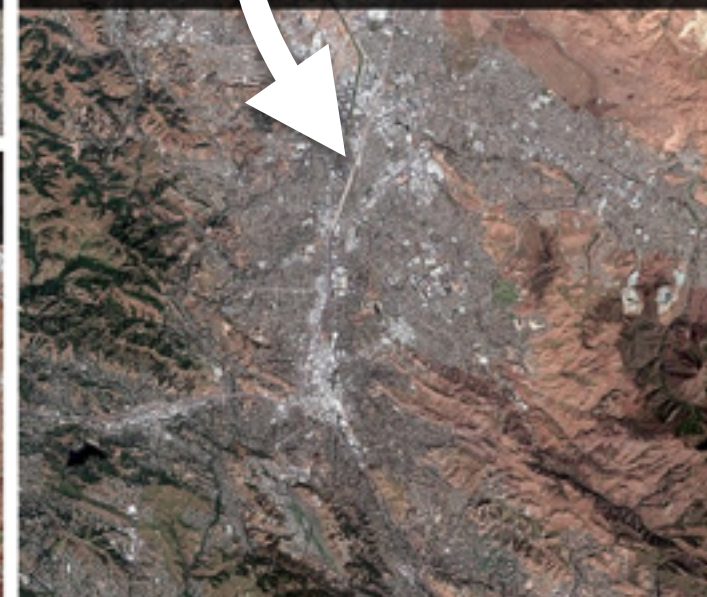
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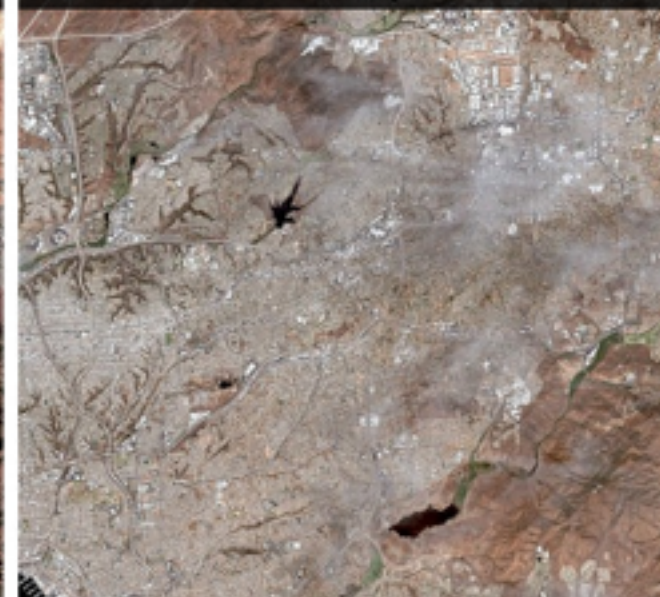
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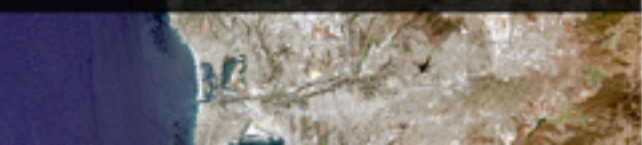
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United States of America



PLEIADES | April 30th 2015 - 18:39:40
United States of America



spring

ROCKET

EXPLORE

Coastal town of California acquired in spring without clouds

SIGN IN

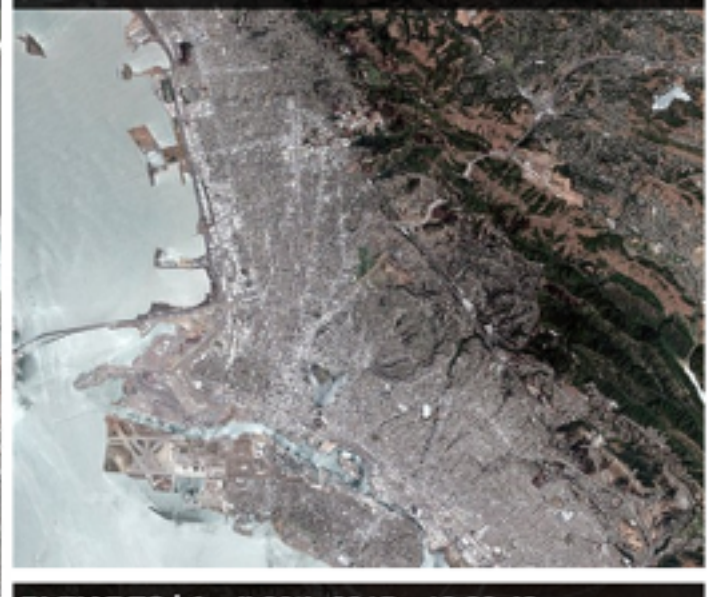
REGISTER



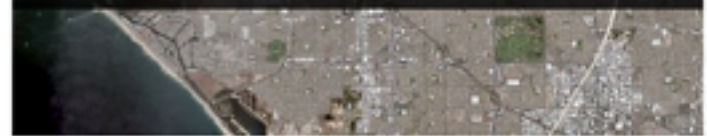
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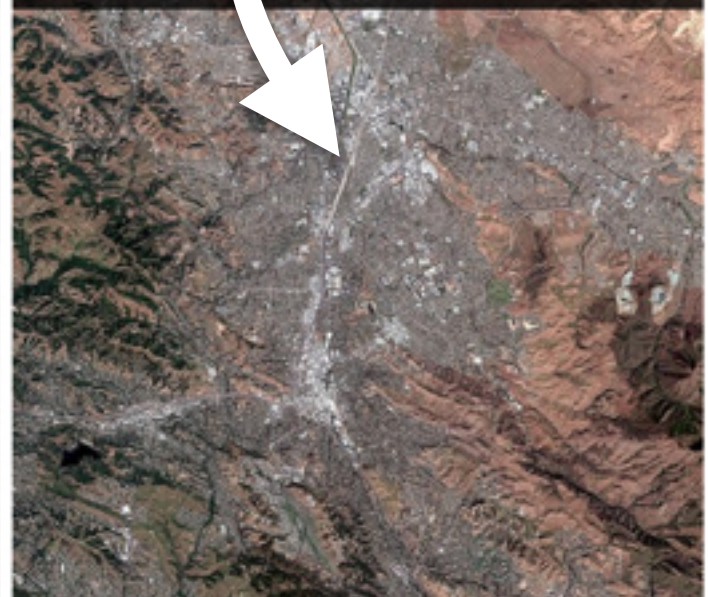
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spring

Query Analyzer is a standalone Web Service

<http://goo.gl/BFVuLL>



Distribute



Distribute

12 000 000

Sentinel2 simulated granules metadata

Distribute

12 000 000

Sentinel2 simulated granules metadata

0.4s

INGEST TIME

i.e. rate of 150 products per minute

Distribute

12 000 000

Sentinel2 simulated granules metadata

0.4s

INGEST TIME

i.e. rate of 150 products per minute

0.2s

1 user

0.6s

100 concurrent users

SEARCH TIME

Mix of geo-temporal and keywords queries



Distribute

Download



SSO

(Not activated yet)



SSO

(Not activated yet)



Rights



SSO

(Not activated yet)



Rights



One click



SSO

(Not activated yet)



Rights



One click



Cart



SSO

(Not activated yet)



Rights



One click



Cart

Simple HTTP GET
Recovery on error
Apache direct serve - X-Sendfile
Metalink support

Bandwith 1 Gb/s shared among all users and CNES projects
(to be upgrade to 10 Gb/s in 2016)



SSO

(Not activated yet)



Rights



One click



Cart

Simple HTTP GET
Recovery on error
Apache direct serve - X-Sendfile
Metalink support

Metalink

```
<?xml version="1.0" encoding="UTF-8"?>
<metalink xmlns="urn:ietf:params:xml:ns:metalink">
  <published>2015-05-30T19:31:56+0200</published>
  <file name="0f99edd2-f18b-5b80-b4a2-d021d76c20d0.zip">
    <version>1.0</version>
    <language>en</language>
    <url priority="1">https://peps.cnes.fr/resto/collections/S1/0f99edd2-f18b-5b80-b4a2-d021d76c20d0/download?\_tk=cf55e9902f511e65711ea623d2ebcf249d99780</url>
  </file>
  ...etc...
</metalink>
```

Metalink

REST GET url

```
<?xml version="1.0" encoding="UTF-8"?>
<metalink xmlns="urn:ietf:params:xml:ns:metalink">
  <published>2015-05-30T19:31:56+0200</published>
  <file name="0f99edd2-f18b-5b80-b4a2-d021d76c20d0.zip">
    <version>1.0</version>
    <language>en</language>
    <url priority="1">https://peps.cnes.fr/resto/collections/S1/0f99edd2-f18b-5b80-b4a2-d021d76c20d0/download?\_tk=cf55e9902f511e65711ea623d2ebcf249d99780</url>
  </file>
  ...etc...
</metalink>
```



Metalink

REST GET url

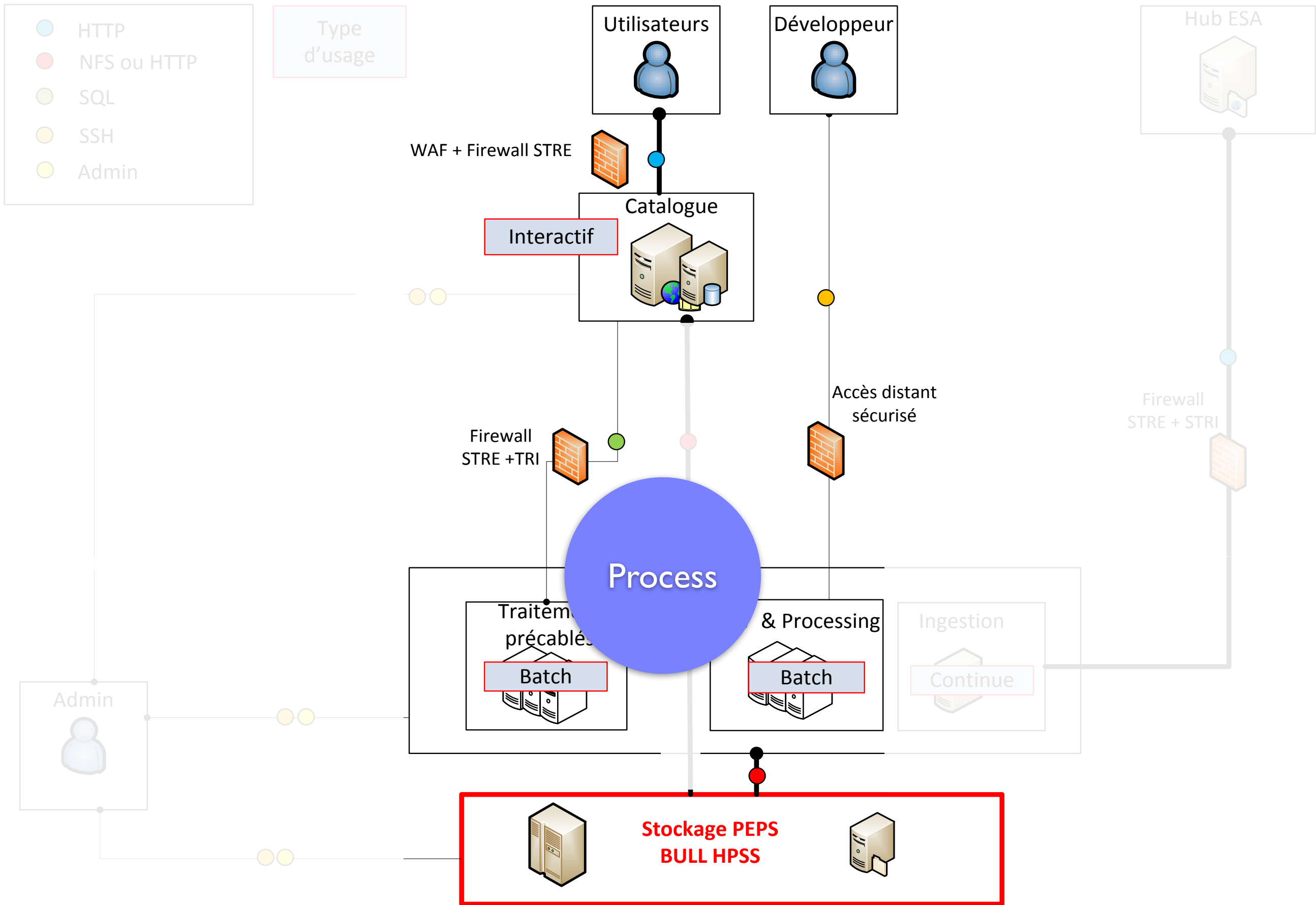
```
<?xml version="1.0" encoding="UTF-8"?>
<metalink xmlns="urn:ietf:params:xml:ns:metalink">
  <published>2015-05-30T19:31:56+0200</published>
  <file name="0f99edd2-f18b-5b80-b4a2-d021d76c20d0.zip">
    <version>1.0</version>
    <language>en</language>
    <url priority="1">https://peps.cnes.fr/resto/collections/S1/0f99edd2-f18b-5b80-b4a2-d021d76c20d0/download?_tk=cf55e9902f511e65711ea623d2ebcf249d99780</url>
  </file>
  ...etc...
</metalink>
```

Volatile magic token
(bypass authentication)

<https://vimeo.com/122638288>



(2016)



Process

HPC

50 Teraflops



Two kind of processing for two kind of users
« Developers » vs. « Normal Users »

Developers

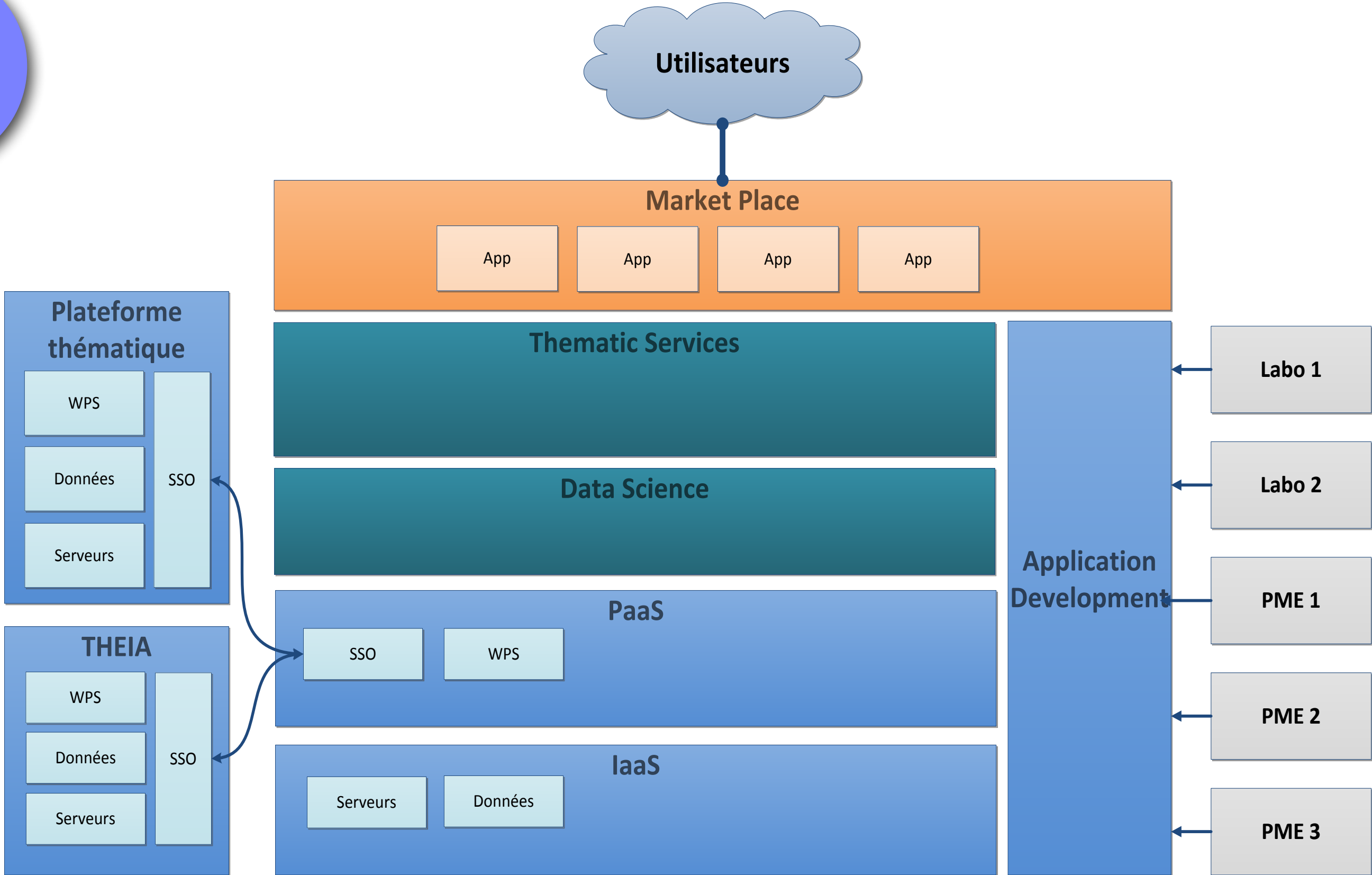
- + Have access to a unix account (VMs)
- + Have read access to data (i.e. filesystem)
- + Can deploy their processes (docker, SPARK)
- + Can launch massive processing
- + Can ~~magically~~ bind their process to WPS

Normal users

- + Know nothing about VMs !
- + Have read access to data from either from HTML client or from Web Services
- + Can launch pre-existing processes provided by the platform either from the HTML client or from WPS endpoints

PEPS to integrate multiple initiatives
ESA Coastal TEP, SparkInData, etc.

Process



Foreseen architecture



Apache
MESOS™



PEPS and interoperability

Focus on « pragmatic » interoperability

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Major functionalities are built as standalone Web Services so they can be used in/by other projects (e.g. iTag, QueryAnalyzer)

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Keep simple REST Web Service

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Keep simple REST Web Service

Use JSON for Web Services (e.g. search service provides ATOM output only for standard conformity ... but GeoJSON output is the default).

Focus on « pragmatic » interoperability

Major functionalities are built as standalone Web Services so they can be used in/by other projects (e.g. iTag, QueryAnalyzer)

Keep simple REST Web Service

Use JSON for Web Services (e.g. search service provides ATOM output only for standard conformity ... but GeoJSON output is the default).

Next step would be to move to (Geo)JSON-LD (i.e. linked data) and ... to standardize JSON output in OpenSearch (?)

Example

GeoJSON output
from EO search

```
{
  "type": "FeatureCollection",
  "properties": {
    "title": "frascati in june",
    "id": "c527d182-15eb-5e9d-90f8-87e60dae11c6",
    "totalResults": null,
    "startIndex": 1,
    "itemsPerPage": 0,
    "query": {
      "searchFilters": {
        "searchTerms": "month:06",
        "geo:lon": 12.66294,
        "geo:lat": 41.82124
      },
      "analysis": {
        "query": "frascati in june",
        "language": "en",
        "analyze": {
          "What": [],
          "When": {
            "month": "06"
          }
        },
        "Where": [
          {
            "name": "Frascati",
            "type": "toponym",
            "country": "Italy",
            "geo:lon": 12.66294,
            "geo:lat": 41.82124,
            "code": "IT",
            "admin:PLA": "7",
            "admin": "M",
            "population": 20036,
            "elevation": 320,
            "gtopo30": "165",
            "timezone": "Europe/Rome",
            "SeeAlso": []
          }
        ],
        "Errors": []
      },
      "processingTime": 0.042708158493042
    },
    "processingTime": 0.064233064651489
  },
  "links": [
    {
      "rel": "self",
      "type": "application/json",
      "title": "self",
      "href": "http://localhost/resto/api/collections/search.json?&_pretty=true&q=frascati%20in%20june"
    },
    {
      "rel": "search",
      "type": "application/opensearchdescription+xml",
      "title": "OpenSearch Description Document",
      "href": "http://localhost/resto/api/collections/describe.xml"
    }
  ],
  "features": []
}
```

<http://goo.gl/fZFICy>

Paging

```
{
  "type": "FeatureCollection",
  "properties": {
    "title": "frascati in june",
    "id": "c527d182-15eb-5e9d-90f8-87e60dae11c6",
    "totalResults": null,
    "startIndex": 1,
    "itemsPerPage": 0,
    "query": {
      "searchFilters": {
        "searchTerms": "month:06",
        "geo:lon": 12.66294,
        "geo:lat": 41.82124
      },
      "analysis": {
        "query": "frascati in june",
        "language": "en",
        "analyze": {
          "What": [],
          "When": {
            "month": "06"
          }
        },
        "Where": [
          {
            "name": "Frascati",
            "type": "toponym",
            "country": "Italy",
            "geo:lon": 12.66294,
            "geo:lat": 41.82124,
            "code": "IT",
            "population": 20336,
            "elevation": 320,
            "gtopo30": 165,
            "timezone": "Europe/Rome",
            "SeeAlso": []
          }
        ]
      },
      "Errors": []
    },
    "processingTime": 0.042708158493042
  },
  "processingTime": 0.064233064651489
},
"links": [
  {
    "rel": "self",
    "type": "application/json",
    "title": "self",
    "href": "http://localhost/resto/api/collections/search.json?&_pretty=true&q=frascati%20in%20june"
  },
  {
    "rel": "search",
    "type": "application/opensearchdescription+xml",
    "title": "OpenSearch Description Document",
    "href": "http://localhost/resto/api/collections/describe.xml"
  }
]
},
"features": []
}
```

GeoJSON FeatureCollection

Example
GeoJSON output
from EO search

<http://goo.gl/fZFICy>

Paging

```
{
  "type": "FeatureCollection",
  "properties": {
    "title": "frascati in june",
    "id": "c527d182-15eb-5e9d-90f8-87e60dae11c6",
    "totalResults": null,
    "startIndex": 1,
    "itemsPerPage": 0,
    "query": {
      "searchFilters": {
        "searchTerms": "month:06",
        "geo:lon": 12.66294,
        "geo:lat": 41.82124
      },
      "analysis": {
        "query": "frascati in june",
        "language": "en",
        "analyze": {
          "What": [],
          "When": {
            "month": "06"
          }
        },
        "Where": [
          {
            "name": "Frascati",
            "type": "toponym",
            "country": "Italy",
            "geo:lon": 12.66294,
            "geo:lat": 41.82124,
            "code": "IT",
            "population": 20036,
            "elevation": 320,
            "gtopo30": 165,
            "timezone": "Europe/Rome",
            "SeeAlso": []
          }
        ]
      },
      "Errors": []
    },
    "processingTime": 0.042708158493042
  },
  "processingTime": 0.064233064651489
},
"links": [
  {
    "rel": "self",
    "type": "application/json",
    "title": "self",
    "href": "http://localhost/resto/api/collections/search.json?&_pretty=true&q=frascati%20in%20june"
  },
  {
    "rel": "search",
    "type": "application/opensearchdescription+xml",
    "title": "OpenSearch Description Document",
    "href": "http://localhost/resto/api/collections/describe.xml"
  }
]
},
"features": []
}
```

GeoJSON FeatureCollection

Example
GeoJSON output
from EO search

<http://goo.gl/fZFICy>

Each result is a GeoJSON Feature

Paging

{ "type": "FeatureCollection", GeoJSON FeatureCollection

Example
GeoJSON output
from EO search

```
"properties":{
  "title": "frascati in june",
  "id": "c527d182-15eb-5e9d-90f8-87e60dae11c6",
  "totalResults": null,
  "startIndex": 1,
  "itemsPerPage": 0,
  "query": {
    "searchFilters": {
      "searchTerms": "month:06",
      "geo:lon": 12.66294,
      "geo:lat": 41.82124
    },
    "analysis": {
      "query": "frascati in june",
      "language": "en",
      "analyze": {
        "What": [],
        "When": {
          "month": "06"
        }
      },
      "Where": [
        {
          "name": "Frascati",
          "type": "toponym",
          "country": "Italy",
          "geo:lon": 12.66294,
          "geo:lat": 41.82124,
          "code": "IT",
          "population": 20036,
          "elevation": 320,
          "gtopo30": "165",
          "timezone": "Europe/Rome",
          "SeeAlso": []
        }
      ]
    },
    "Errors": []
  },
  "processingTime": 0.042708158493042
},
"processingTime": 0.064233064651489
},
"links": [
  {
    "rel": "self",
    "type": "application/json",
    "title": "self",
    "href": "http://localhost/resto/api/collections/search.json?&_pretty=true&q=frascati%20in%20june"
  },
  {
    "rel": "search",
    "type": "application/opensearchdescription+xml",
    "title": "OpenSearch Description Document",
    "href": "http://localhost/resto/api/collections/describe.xml"
  }
]
},
"features": []
```

Computed by
Query Analyzer Web Service
<http://goo.gl/fZFICy>

Each result is a GeoJSON Feature

Paging

Example

GeoJSON output
from EO search

`"type": "FeatureCollection",` GeoJSON FeatureCollection

```
"properties": {
  "title": "frascati in june",
  "id": "c527d182-15eb-5e9d-90f8-87e60dae11c6",
  "totalResults": null,
  "startIndex": 1,
  "itemsPerPage": 0,
  "query": {
```

```
    "searchFilters": {
      "searchTerms": "month:06",
      "geo:lon": 12.66294,
      "geo:lat": 41.82124
```

What was searched by the server

```
    },
    "analysis": {
      "query": "frascati in june",
      "language": "en",
      "analyze": {
        "What": [],
        "When": {
          "month": "06"
        }
      },
      "Where": [
        {
          "name": "Frascati",
          "type": "toponym",
          "country": "Italy",
          "geo:lon": 12.66294,
          "geo:lat": 41.82124,
          "code": "IT",
          "population": 20036,
          "elevation": 320,
          "gtopo30": 165,
          "timezone": "Europe/Rome",
          "SeeAlso": []
        }
      ]
    },
    "Errors": []
  },
  "processingTime": 0.042708158493042
},
"processingTime": 0.064233064651489
```

Computed by
Query Analyzer Web Service

<http://goo.gl/fZFICy>

```
"links": [
  {
    "rel": "self",
    "type": "application/json",
    "title": "self",
    "href": "http://localhost/resto/api/collections/search.json?_pretty=true&q=frascati%20in%20june"
  },
  {
    "rel": "search",
    "type": "application/opensearchdescription+xml",
    "title": "OpenSearch Description Document",
    "href": "http://localhost/resto/api/collections/describe.xml"
  }
]
```

Paging

`"features": []` Each result is a GeoJSON Feature



De l'Espace pour la Terre

<https://peps.cnes.fr>