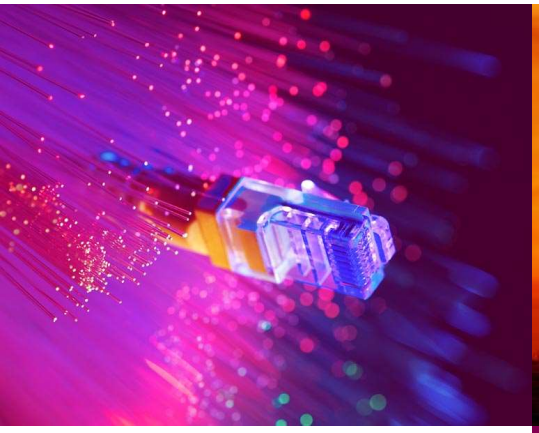


Webinar: Using CSC's cloud services cPouta and Rahti for GIS

24.4.2019

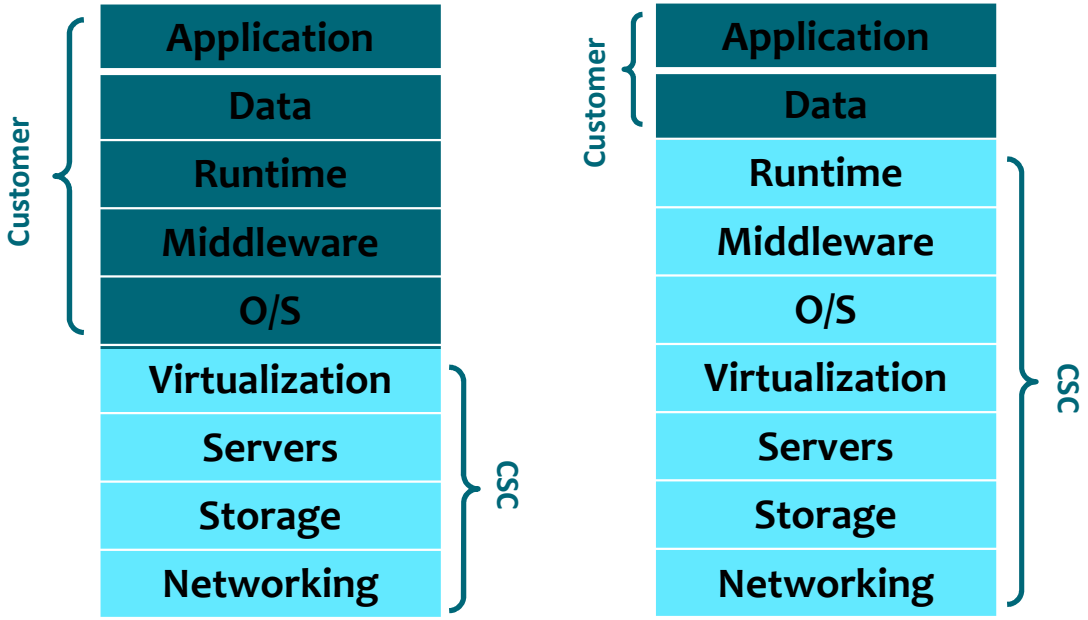
Eduardo Gonzalez (CSC)

CSC – Finnish expertise in ICT for research, education, culture and public administration

Using CSC's cloud services cPouta and Rahti for GIS

- cPouta
- Rahti
- CSC’s Geocomputing Training GitHub repository
- Demo use cases:
  - Setting up GeoServer in cPouta
  - Setting up Rahti use case in detail:

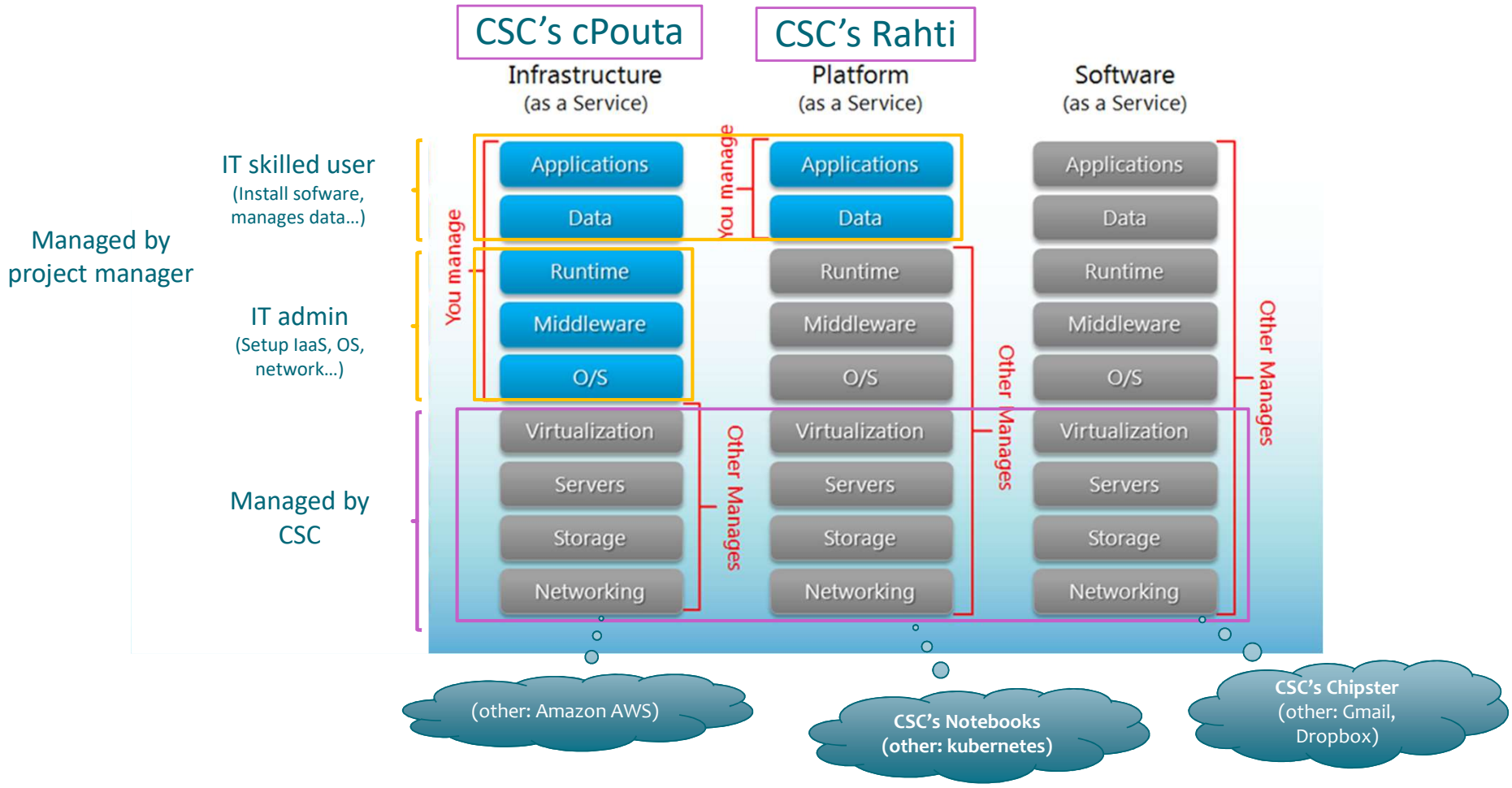
CSC's Cloud Services



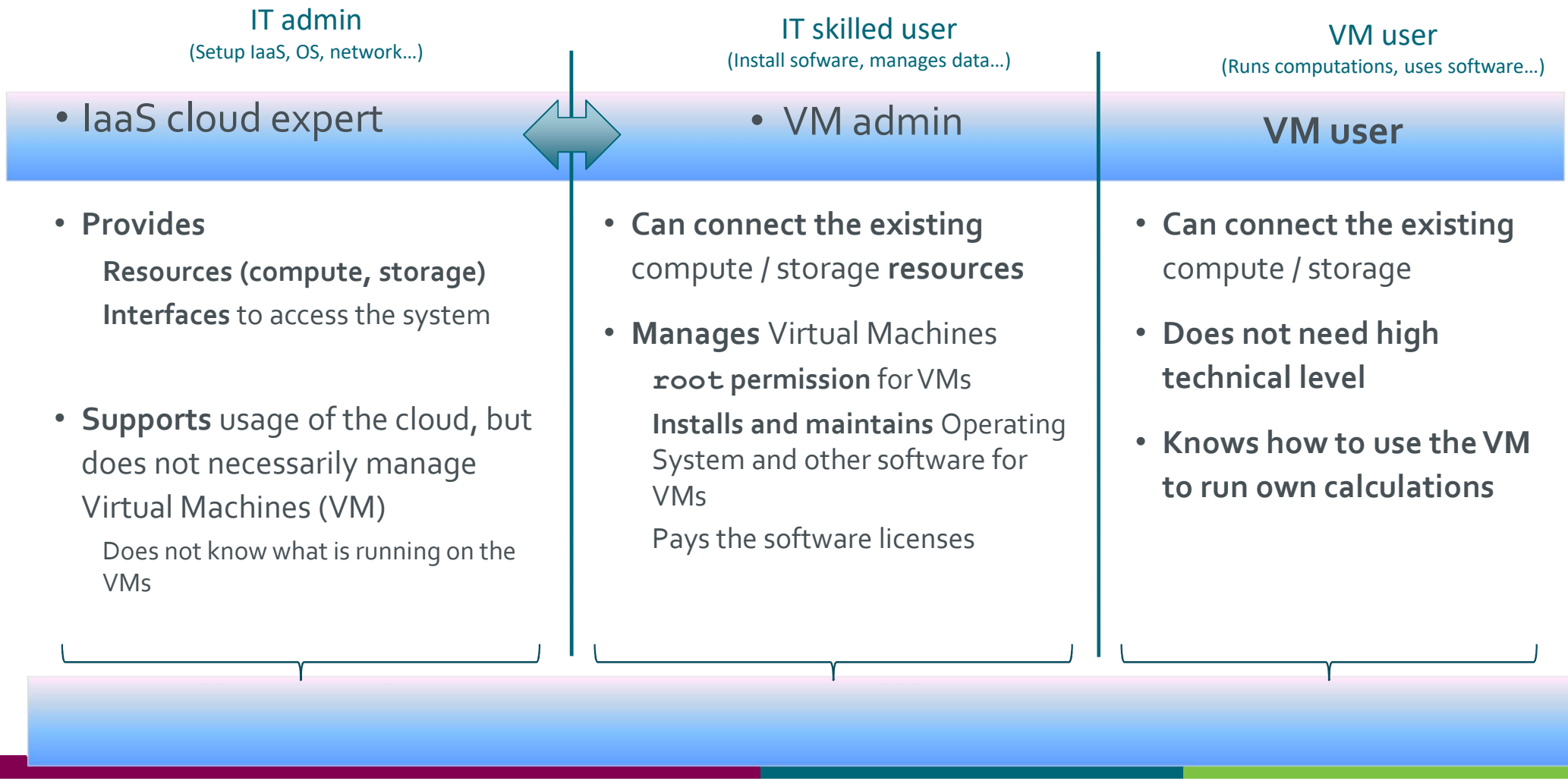
Infrastructure as a Service (IaaS)
CSC's ePouta/cPouta

Platform as a Service (PaaS)
CSC's RAHTI
CSC's notebook.csc.fi

Cloud services at CSC



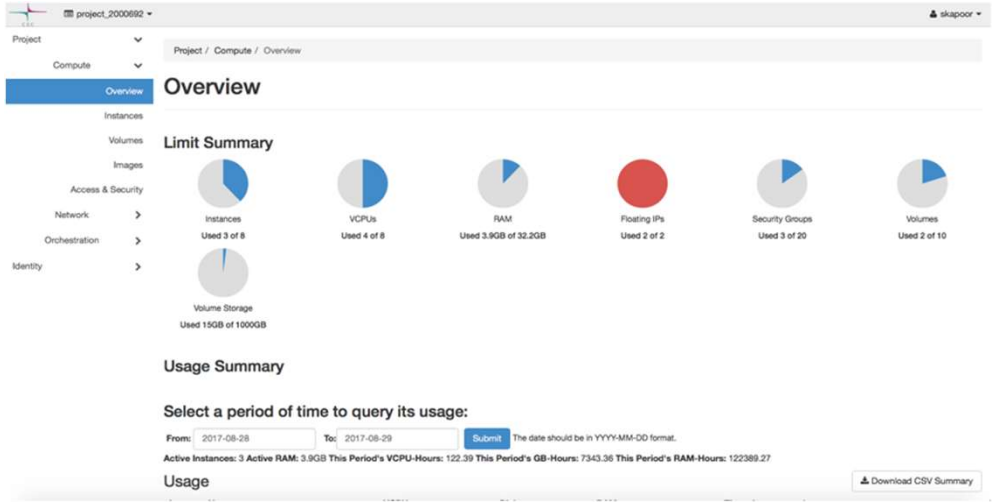
Separation of Responsibilities

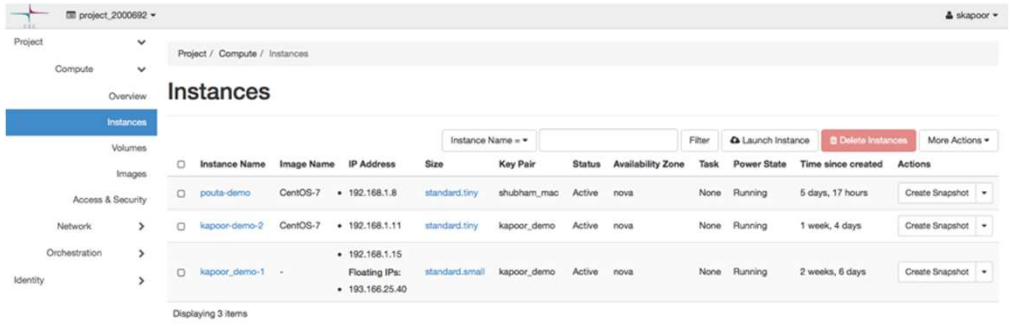


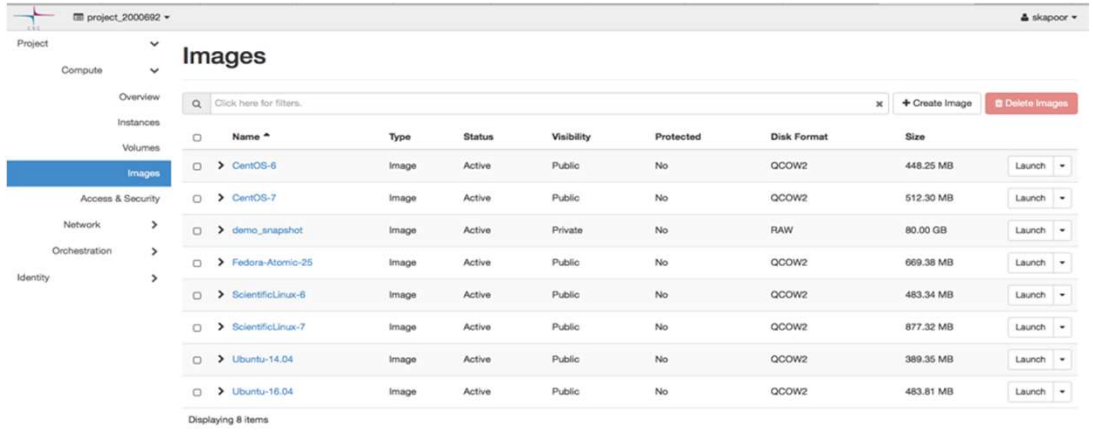
Pouta: CSC's IaaS offering

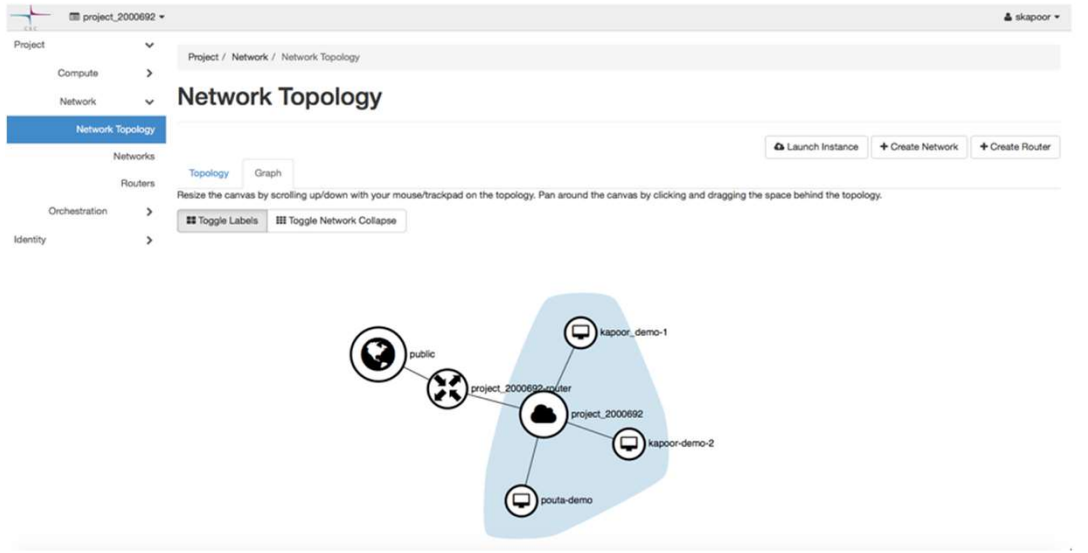
- CSC provides two Infrastructure as a Service (IaaS) cloud services for research and education:
  - cPouta
  - ePouta
- Community Clouds, in production since 2013. Powered by OpenStack.
- ISO27001 and VAHTI 2010 certified.
- Deploy your own Virtual Machine.
  - Decide your own OS, Middleware & Runtime environment.
  - Design your own Network, Deployment models & Storage …
  - Simple to use: Web UI, CLI and REST API interfaces supported.

Pouta WebUI


project_2000692
skapoor
Project
Compute
Overview
Instances
Volumes
Images
Access & Security
Network
Orchestration
Identity
Project / Compute / Overview
Overview
Limit Summary
Instances
Used 3 of 8
VCPUs
Used 4 of 8
RAM
Used 3.9GB of 32.2GB
Floating IPs
Used 2 of 2
Security Groups
Used 3 of 20
Volumes
Used 2 of 10
Volume Storage
Used 15GB of 1000GB
Usage Summary
Select a period of time to query its usage:
From: 2017-08-28
To: 2017-08-29
Submit
The date should be in YYYY-MM-DD format.
Active Instances: 3 Active RAM: 3.9GB This Period's VCPU-Hours: 122.39 This Period's GB-Hours: 7343.36 This Period's RAM-Hours: 122389.27
Usage
Download CSV Summary


project_2000692
skapoor
Project / Compute / Instances
Instances
Instance Name =
Filter
Launch Instance
Delete Instances
More Actions
Instance Name
Image Name
IP Address
Size
Key Pair
Status
Availability Zone
Task
Power State
Time since created
Actions
pouta-demo
CentOS-7
192.168.1.8
standard.tiny
shubham_mac
Active
nova
None
Running
5 days, 17 hours
Create Snapshot
kapoor-demo-2
CentOS-7
192.168.1.11
standard.tiny
kapoor_demo
Active
nova
None
Running
1 week, 4 days
Create Snapshot
kapoor_demo-1
192.168.1.15
Floating IPs:
193.166.25.40
standard.small
kapoor_demo
Active
nova
None
Running
2 weeks, 6 days
Create Snapshot
Displaying 3 items


project_2000692
skapoor
Images
Click here for filters.
+ Create Image
Delete Images
Name
Type
Status
Visibility
Protected
Disk Format
Size
CentOS-6
Image
Active
Public
No
QCOW2
448.25 MB
CentOS-7
Image
Active
Public
No
QCOW2
512.30 MB
demo_snapshot
Image
Active
Private
No
RAW
80.00 GB
Fedora-Atomic-25
Image
Active
Public
No
QCOW2
669.38 MB
ScientificLinux-6
Image
Active
Public
No
QCOW2
483.34 MB
ScientificLinux-7
Image
Active
Public
No
QCOW2
877.32 MB
Ubuntu-14.04
Image
Active
Public
No
QCOW2
389.35 MB
Ubuntu-16.04
Image
Active
Public
No
QCOW2
483.81 MB
Launch
Displaying 8 items


project_2000692
skapoor
Project / Network / Network Topology
Network Topology
Launch Instance
+ Create Network
+ Create Router
Topology
Graph
Resize the canvas by scrolling up/down with your mouse/trackpad on the topology. Pan around the canvas by clicking and dragging the space behind the topology.
Toggle Labels
Toggle Network Collapse
public
project_2000692-router
project_2000692
kapoor_demo-1
kapoor-demo-2
pouta-demo

Pouta CLI

```
(osclient) skapoor-air13:python_virtualenvs skapoor$ openstack image list
+--------------------------------------+--------------------+--------+
| ID                                   | Name               | Status |
+--------------------------------------+--------------------+--------+
| 4a36f474-4ffe-4f88-bc9f-dad674ef48d2 | CentOS-6           | active |
| 7add5463-20a9-4d2e-8bd8-b38d959aa83f | CentOS-7           | active |
| 5ad9d51b-b6eb-44e8-98b6-9d7f69cac5df | Fedora-Atomic-25   | active |
| c42266c9-7e05-45bd-a434-287539c0dc90 | ScientificLinux-6  | active |
| 1d9a34dc-2a79-41c2-b787-4193a9c5b726 | ScientificLinux-7  | active |
| 669bef35-f60a-4bea-93cc-a57348af2ff1 | Ubuntu-14.04       | active |
| 6cd4708e-fcb0-4dbc-92f5-faf4e9aa7424 | Ubuntu-16.04       | active |
| be8c32a5-e1c2-4584-b79c-1fb6caaf4501 | demo_snapshot      | active |
+--------------------------------------+--------------------+--------+
```

```
(osclient) skapoor-air13:python_virtualenvs skapoor$ openstack server list
+--------------------------------------+-----------------------+--------+-----------------------------------+--------------+
| ID                                   | Name                  | Status | Networks                          | Image        |
| Flavor                               |
+--------------------------------------+-----------------------+--------+-----------------------------------+--------------+
| a8d5f4f8-5659-4599-93ef-c32a2c96ddf8 | kapoor_shubham_instance | ACTIVE | project_2000692=192.168.1.8       | Ubuntu-16.04 |
(osclient) skapoor-air13:python_virtualenvs skapoor$ openstack keypair show kapoor_shubham
+-------------+-------------------------------------------------+
| Field       | Value                                           |
+-------------+-------------------------------------------------+
| created_at  | 2017-09-15T09:24:15.000000                      |
| deleted     | False                                           |
| deleted_at  | None                                            |
| fingerprint | ad:3f:45:ff:de:09:65:be:84:f3:e7:ab:22:36:57:9e |
| id          | 183015                                          |
| name        | kapoor_shubham                                  |
| updated_at  | None                                            |
| user_id     | skapoor                                         |
+-------------+-------------------------------------------------+
```

```
(osclient) skapoor-air13:python_virtualenvs skapoor$ openstack flavor list
+--------------------------------------+----------------+--------+------+-----------+-------+-----------+
| ID                                   | Name           |    RAM | Disk | Ephemeral | VCPUs | Is Public |
+--------------------------------------+----------------+--------+------+-----------+-------+-----------+
| 0143b0d1-4788-4d1f-aa04-4473e4a7c2a6 | standard.tiny  |   1000 |   80 |         0 |     1 | True      |
| 053c4852-dd1e-42dc-947a-fe4263548fa9 | hpc-gen2.48core| 240000 |   80 |         0 |    48 | True      |
| 110eb004-f7cc-474b-8158-14bb244cb05e | hpc-gen2.24core| 120000 |   80 |         0 |    24 | True      |
| 1792db39-f38e-43ba-ae95-96b7549b4f84 | standard.xlarge|  16000 |   80 |         0 |     6 | True      |
| 27d232d6-d245-4cf4-8ab9-a0424005184b | hpc-gen2.8core |  40000 |   80 |         0 |     8 | True      |
| 2f24b080-287f-49a9-8219-2295cde364c3 | hpc-gen2.16core|  80000 |   80 |         0 |    16 | True      |
| 41ec2177-604b-492c-8f19-f2d7c2bc8c07 | io.70GB        |  10000 |   20 |        70 |     2 | True      |
| 544e940c-4b9b-4f54-ab6f-f1ee1792fe48 | hpc-gen2.2core |  10000 |   80 |         0 |     2 | True      |
| 58bbbf4c-e174-485f-b050-b0cc86c0f677 | hpc-gen1.16core|  60000 |   80 |         0 |    16 | True      |
| a82b2b5f-6788-41fd-80cb-ed7576ee1e7c | hpc-gen1.8core |  30000 |   80 |         0 |     8 | True      |
| af9fa76e-818a-421e-9142-0341e7818d90 | io.340GB       |  40000 |   20 |       340 |     8 | True      |
| ba8f9270-93fe-47ee-b402-714a1352f190 | hpc-gen1.1core |   3750 |   80 |         0 |     1 | True      |
| c0c7bb30-2679-4e0d-94ab-4395237f505e | hpc-gen1.4core |  15000 |   80 |         0 |     4 | True      |
| c1da3536-f22d-426e-bc14-ef994f1bfaa7 | io.700GB       |  80000 |   20 |       700 |    16 | True      |
| c5ffaed0-6707-4a99-9498-9ef6d34c8add | io.160GB       |  20000 |   20 |       160 |     4 | True      |
| d4a2cb9c-99da-4e0f-82d7-3313cca2b2c2 | standard.small |   2000 |   80 |         0 |     2 | True      |
| e7b3364e-f70c-4e3b-8e5a-fa249759d14c | standard.large |   8000 |   80 |         0 |     4 | True      |
| f363d088-4967-48ff-bc80-86c0d05ff418 | standard.medium|   4000 |   80 |         0 |     3 | True      |
+--------------------------------------+----------------+--------+------+-----------+-------+-----------+
```

```
(osclient) skapoor-air13:python_virtualenvs skapoor$ openstack server create --flavor standard.tiny --image 6cd4708e-fcb0-4dbc-92f5-faf4e9aa7424 --key-name kapoor_shubham kapoor_shubham_instance_2
+-------------------------+-----------------------------------------------------------+
| Field                   | Value                                                     |
+-------------------------+-----------------------------------------------------------+
| OS-DCF:diskConfig       | MANUAL                                                    |
| OS-EXT-AZ:availability_zone |                                                       |
| OS-EXT-STS:power_state  | NOSTATE                                                   |
| OS-EXT-STS:task_state   | scheduling                                                |
| OS-EXT-STS:vm_state     | building                                                  |
| OS-SRV-USG:launched_at  | None                                                      |
| OS-SRV-USG:terminated_at| None                                                      |
| accessIPv4              |                                                           |
| accessIPv6              |                                                           |
| addresses               |                                                           |
| adminPass               | VAYj6QiSnN7t                                              |
| config_drive            |                                                           |
| created                 | 2017-09-15T12:07:17Z                                      |
| flavor                  | standard.tiny (0143b0d1-4788-4d1f-aa04-4473e4a7c2a6)      |
| hostId                  |                                                           |
| id                      | 61076662-6ca5-44af-93b4-7b1b832a644a                      |
| image                   | Ubuntu-16.04 (6cd4708e-fcb0-4dbc-92f5-faf4e9aa7424)       |
| key_name                | kapoor_shubham                                            |
| name                    | kapoor_shubham_instance_2                                 |
| progress                | 0                                                         |
| project_id              | 2d9e321be82f4066a3824284ce47b17d                          |
| properties              |                                                           |
| security_groups         | name='default'                                            |
| status                  | BUILD                                                     |
| updated                 | 2017-09-15T12:07:18Z                                      |
| user_id                 | skapoor                                                   |
| volumes_attached        |                                                           |
+-------------------------+-----------------------------------------------------------+
```

Pouta service requirements

- You would need to know the basics of:
  - Manage creation of virtual machines (VMs), including firewalls
  - Install and set up connection to VM
  - Installing any software or component desired (mainly Linux distributions)
  - Managing own system/data backups
- How your organization's IT-support could help:
  - Whole workflow of creating and mantaining VMs in Pouta, specially for ePouta cases
  - Installing and maintaining software installation (depending on the researcher's skills)
- Pouta documentation: https://research.csc.fi/pouta-user-guide

Rahti Container Cloud

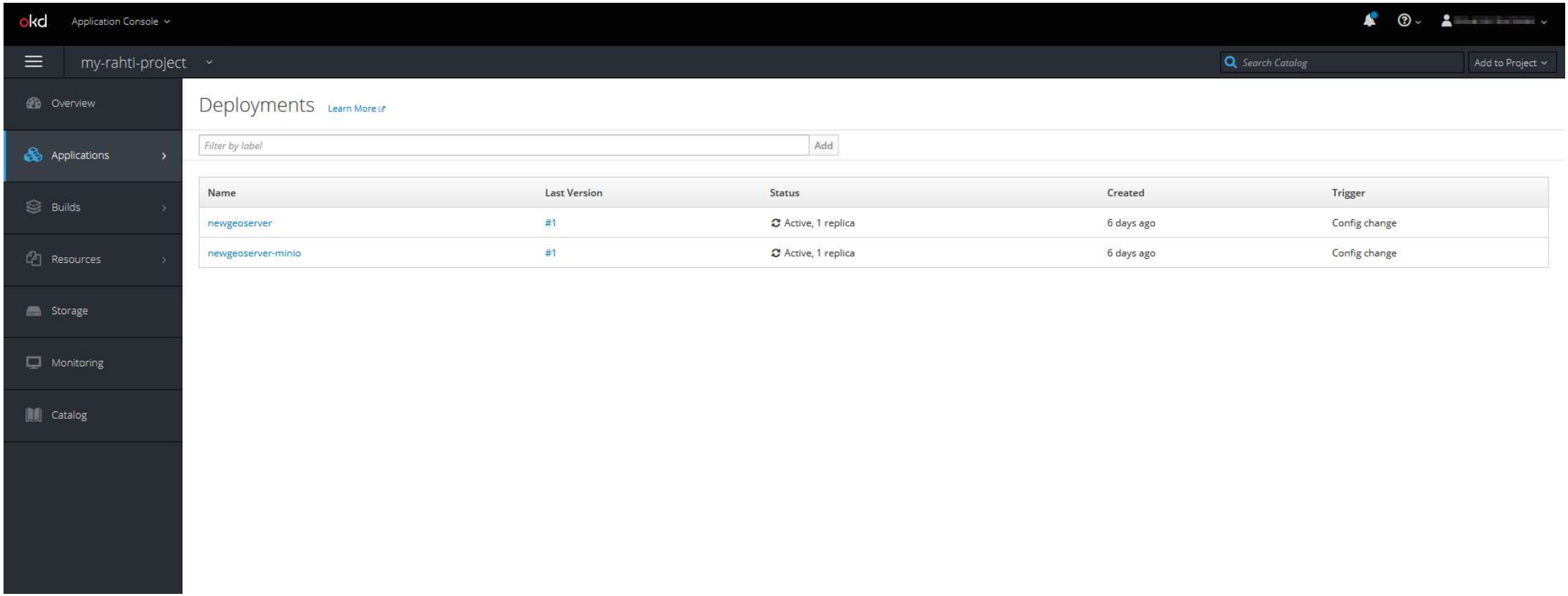
CSC's container cloud Platform as a Service (PaaS) based on OpenShift - Red Hat's distribution of Kubernetes

- Running in cPouta
- Command line and graphical web interfaces
- Currently in closed beta, in production later in 2019

Rahti Container Cloud

- Used for running and orchestrating **containers** that run **applications**
- Still you need to install your software and pack it as containers
- Same end goal as cPouta: **enable end users to run their own software in the cloud**
  - web applications
  - APIs/microservices for science
  - Apache Spark
  - Jupyter notebooks
- Compared to Pouta, you don't need to manage virtual machines but you need to manage containers

Rahti Web Interface



Rahti service requirements

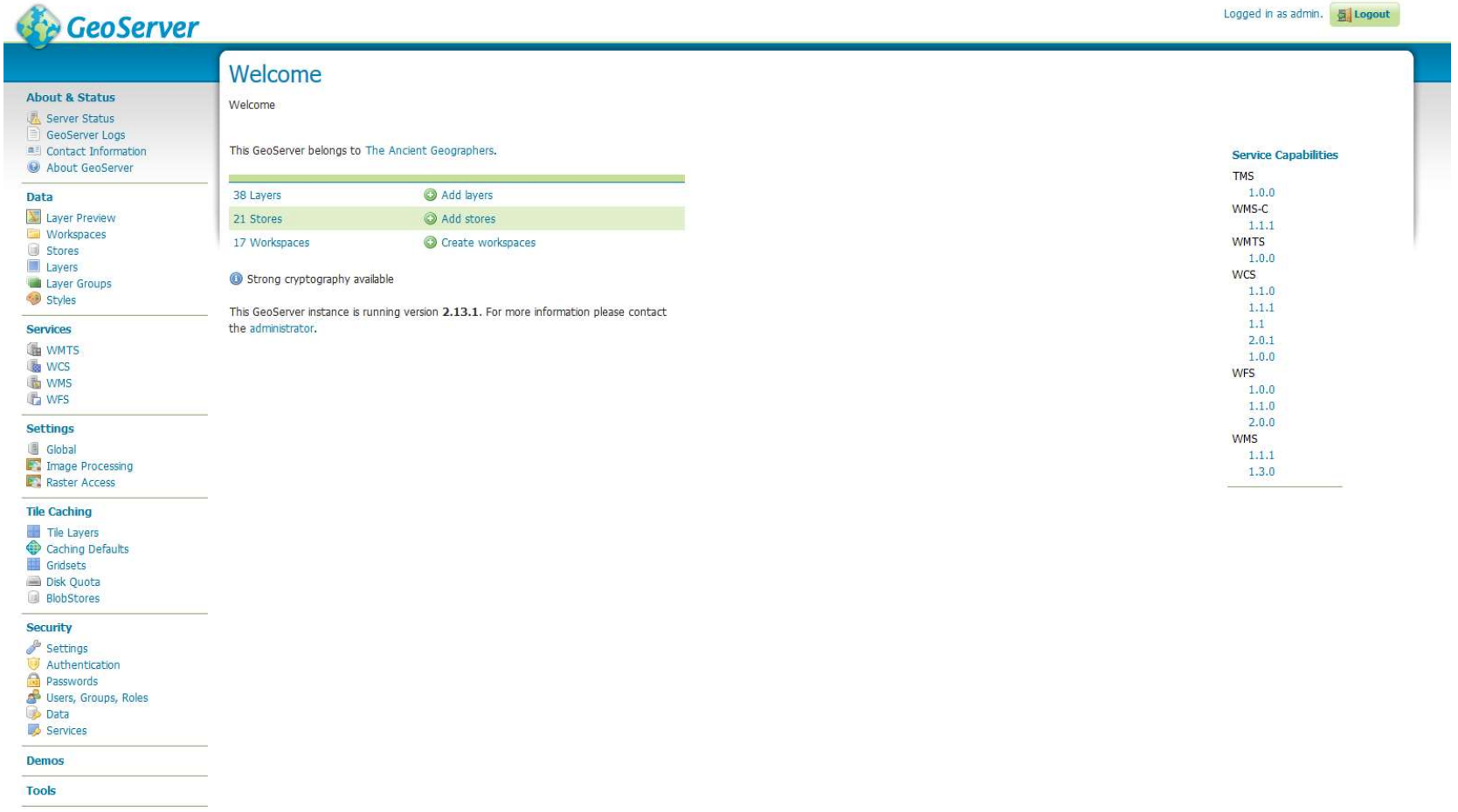
- You would need to know the basics of:
  - Custom Docker images creation (including Rahti customizations)
  - OpenShift platform management and use
  - For advanced users, application development

- How your organization's IT-support could help:
  - Setting up Docker environments
  - Fine tuning for Rahti
  - Implementing / tailoring existing web applications
  - Maintaining popular applications as templates
- Rahti platform: https://rahti.csc.fi/

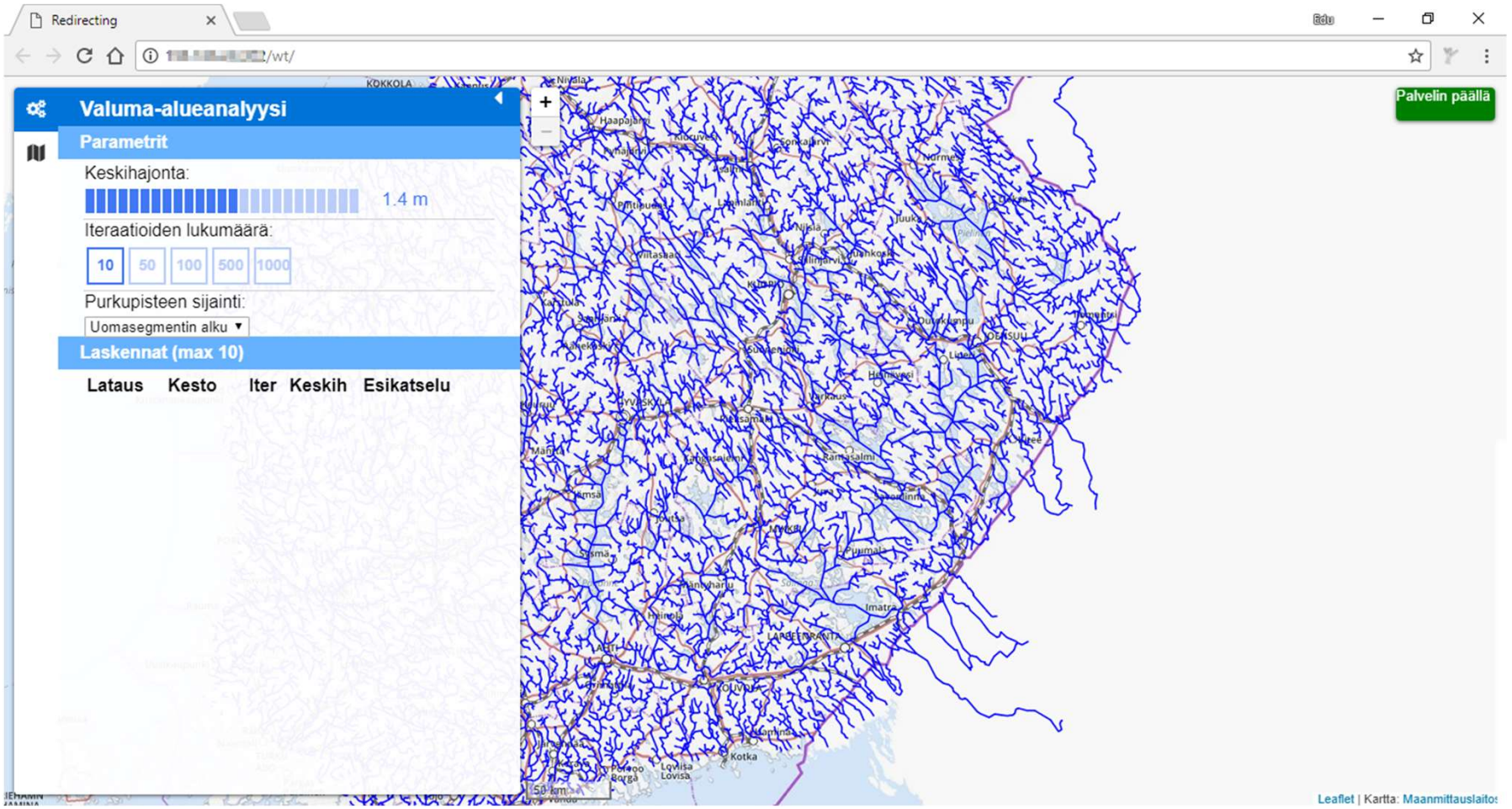
Cloud GIS use cases

- Running scientific applications
  - For example ESA's Snap software
- Running other types of software stacks
  - For example docker containers as OpenDroneMap
- Virtual computer class
  - Setting up full server machines with same setup
- Ad hoc research data/information sharing
  - You could set up your own NFS server or database
- Web map servers
  - GeoServer
  - MapServer
- Databases
  - PostgreSQL/PostGIS
- ArcPy
  - Using linux installer

cPouta example: GeoServer

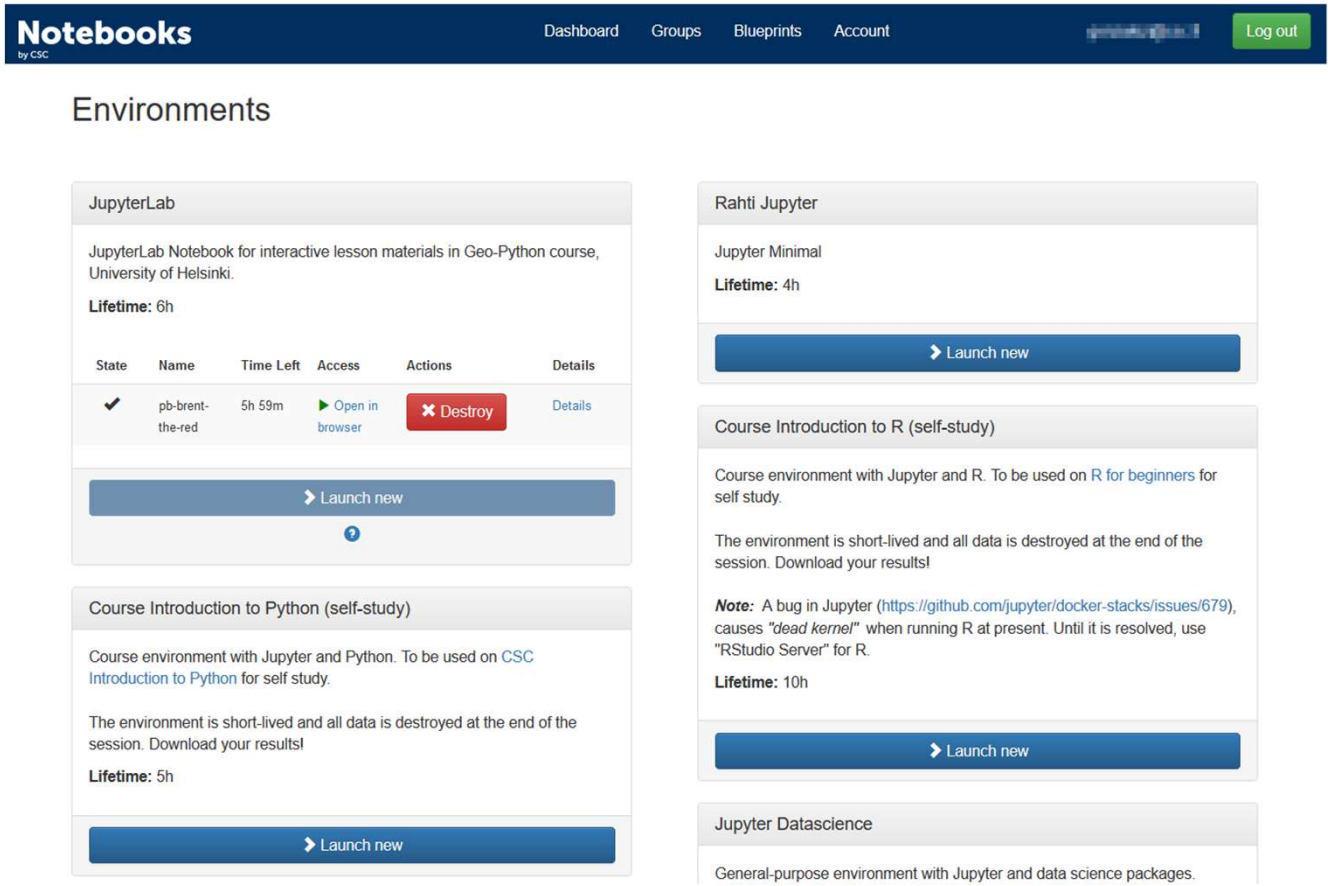


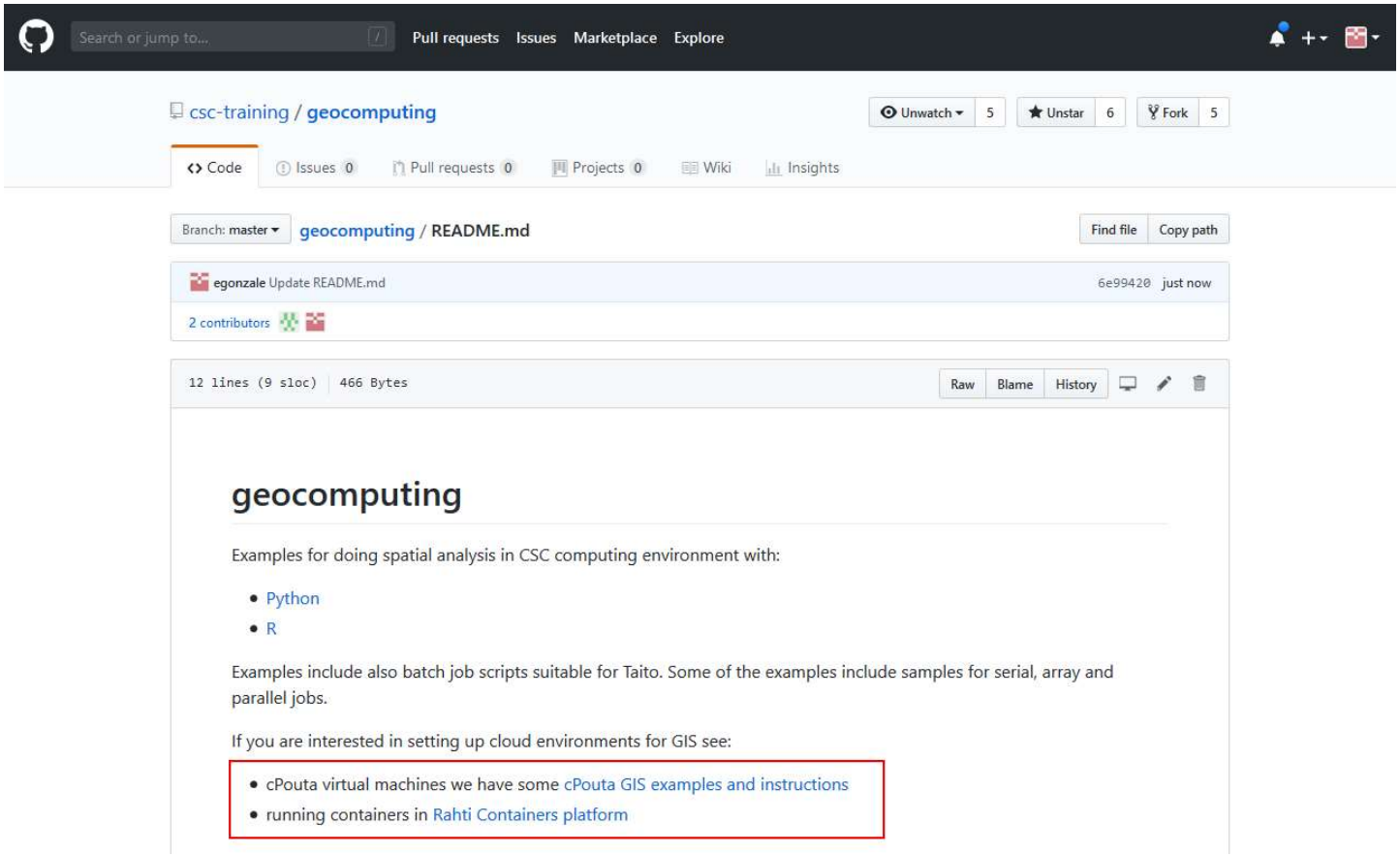
cPouta examples: Web Applications



Rahti example: Geo training with Notebooks

Notebooks: https://notebooks.csc.fi



CSC's Geocomputing Training GitHub repository

https://github.com/csc-training/geocomputing