

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

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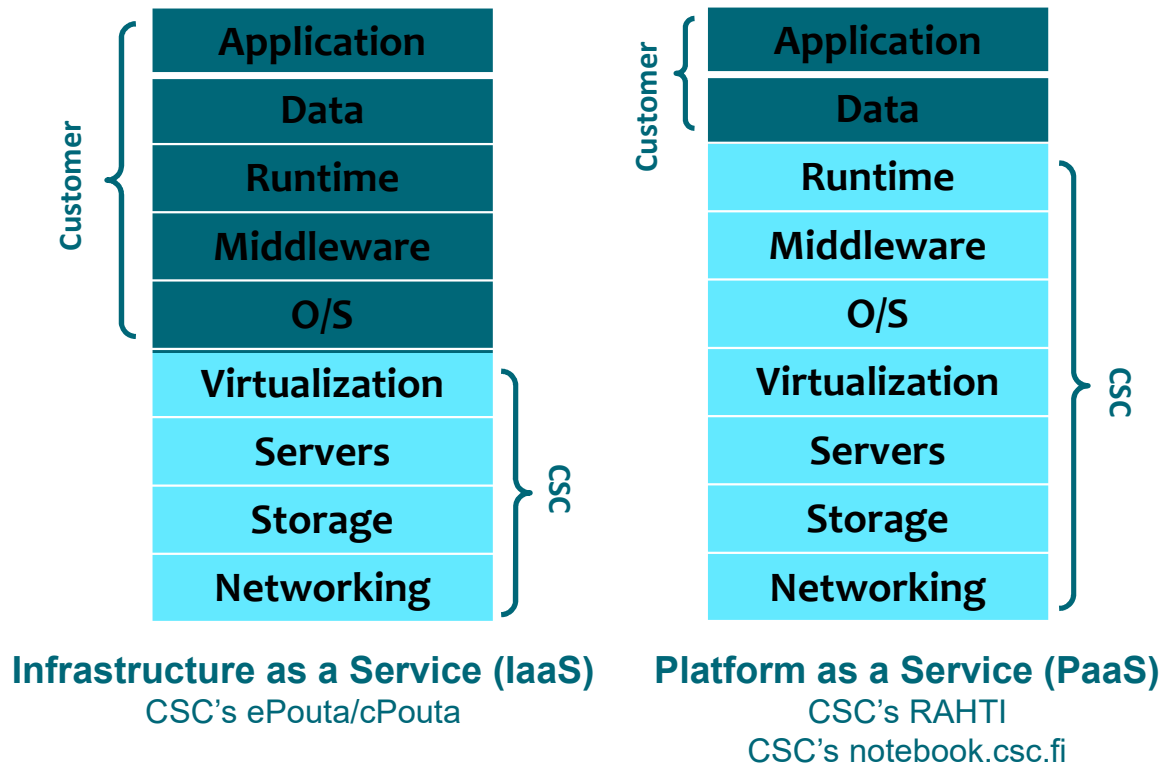


*CSC – Finnish expertise in ICT for research, education, culture and public administration*

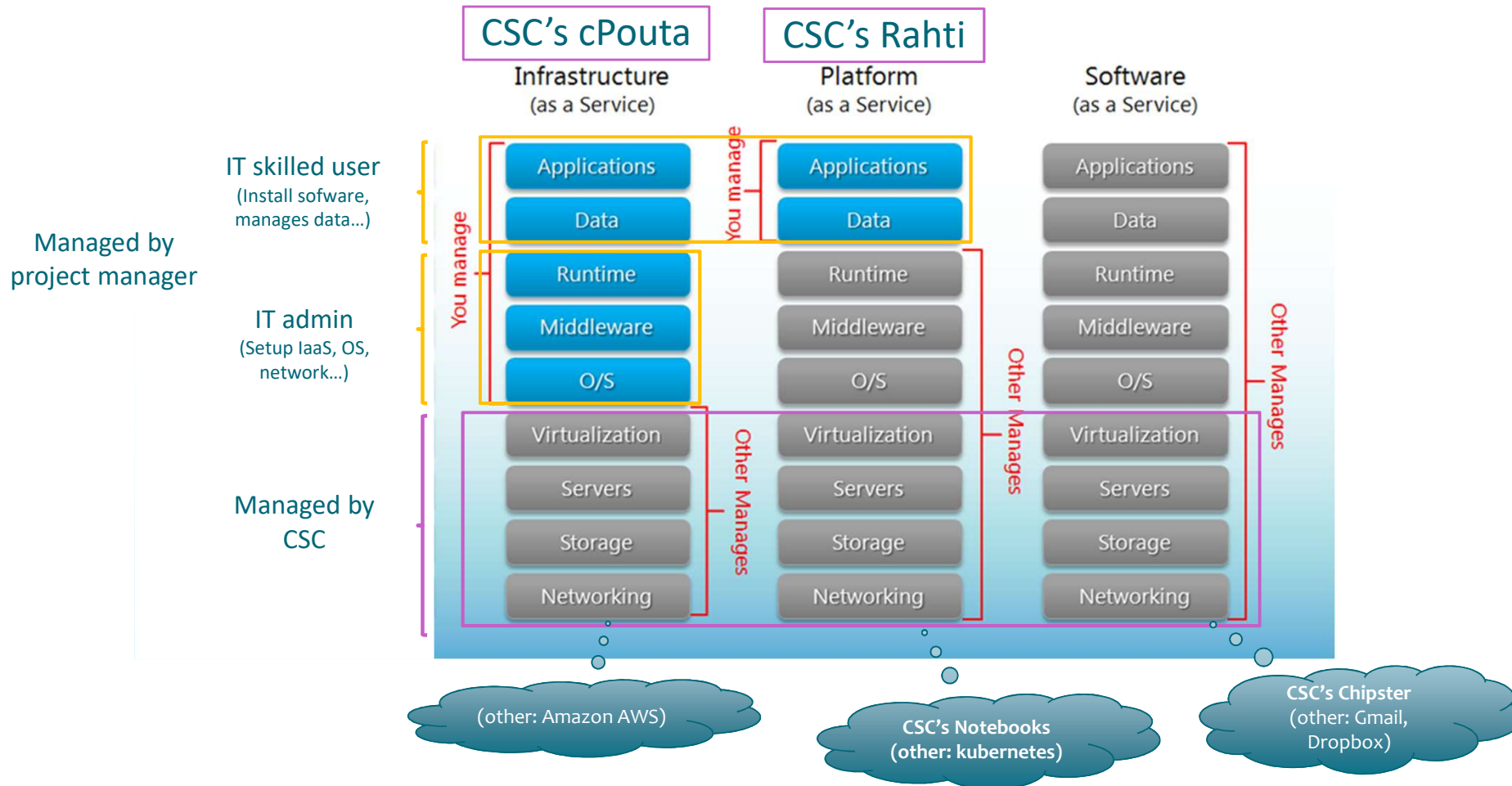
# Using CSC's cloud services cPouta and Rahti for GIS

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

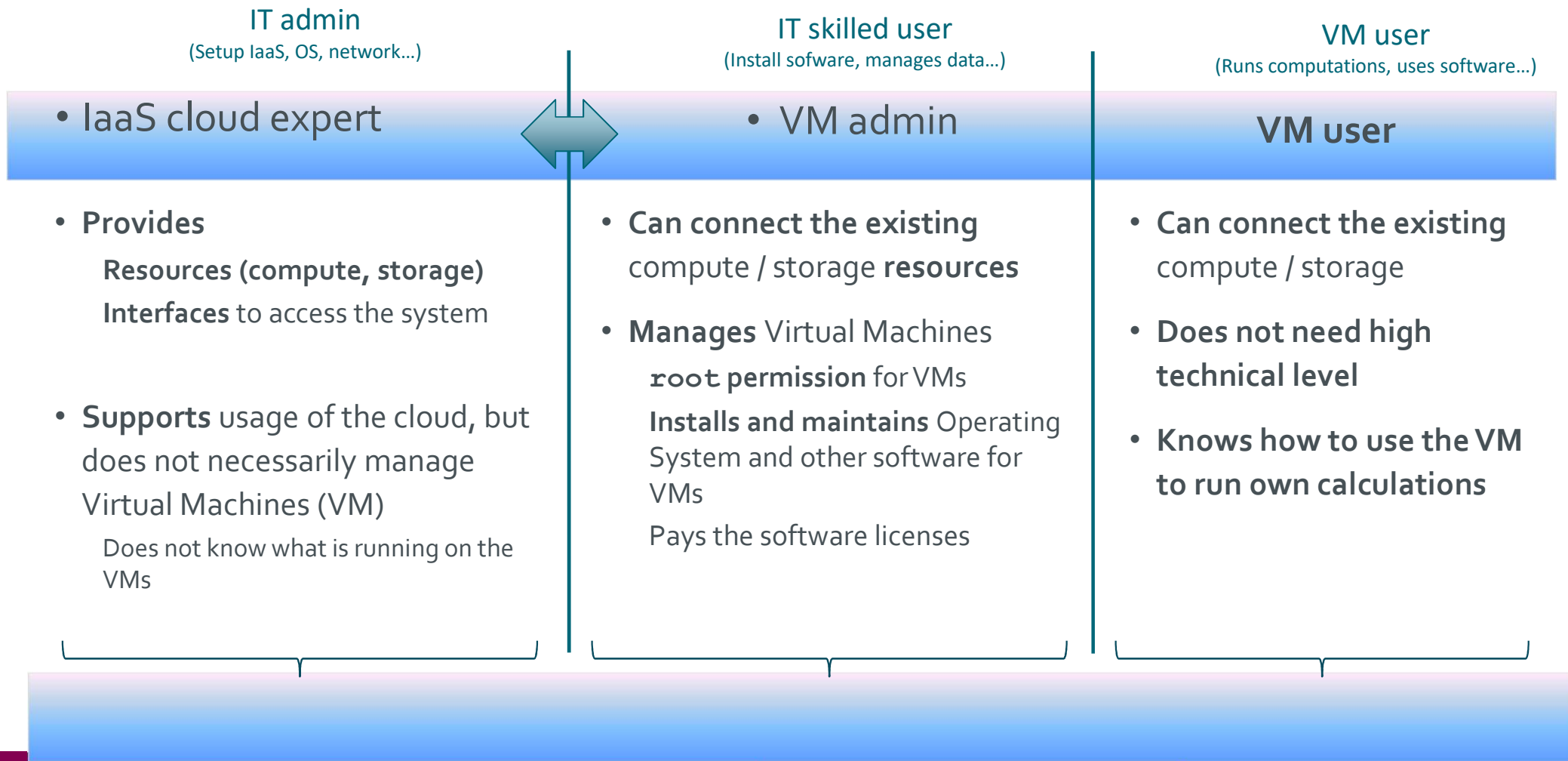
# CSC's Cloud Services



# 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 / 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

[Download CSV Summary](#)

Project / Compute / Instances

## Instances

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 / Compute / Images

## Images

Name	Type	Status	Visibility	Protected	Disk Format	Size	Actions
CentOS-6	Image	Active	Public	No	QCOW2	448.25 MB	Launch
CentOS-7	Image	Active	Public	No	QCOW2	512.30 MB	Launch
demo_snapshot	Image	Active	Private	No	RAW	80.00 GB	Launch
Fedora-Atomic-25	Image	Active	Public	No	QCOW2	669.38 MB	Launch
ScientificLinux-6	Image	Active	Public	No	QCOW2	483.34 MB	Launch
ScientificLinux-7	Image	Active	Public	No	QCOW2	877.32 MB	Launch
Ubuntu-14.04	Image	Active	Public	No	QCOW2	389.35 MB	Launch
Ubuntu-16.04	Image	Active	Public	No	QCOW2	483.81 MB	Launch

Displaying 8 items

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](#)



# 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 |
+-----+-----+-----+-----+-----+
| 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 |
| 58bbb4c-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 6cd4788e-fcb0-4dbc-92f5-faf4e9aa7424 --key-name kapoor_shubham kapoor_shubham_instance_2
+-----+-----+
| Field | Value |
+-----+-----+
| OS-DCF:diskConfig | MANUAL |
| OS-EXT-AZ:availability_zone | NOSTATE |
| OS-EXT-STS:power_state | scheduling |
| OS-EXT-STS:task_state | building |
| OS-EXT-STS:vm_state | None |
| OS-SRV-USG:launched_at | None |
| OS-SRV-USG:terminated_at | None |
| accessIPv4 | |
| accessIPv6 | |
| addresses | |
| adminPass | VAYj6Q1SnN7t |
| 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 (6cd4788e-fcb0-4dbc-92f5-faf4e9aa7424) |
| key_name | kapoor_shubham |
| name | kapoor_shubham_instance_2 |
| progress | 0 |
| project_id | 2d9e321be82f4066a3824284ce47b17d |
| properties | |
| security_groups | names='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 maintaining 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



OPENSIFT



## 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



okd Application Console

my-rahti-project

Search Catalog Add to Project

## Deployments [Learn More](#)

Filter by label Add

Name	Last Version	Status	Created	Trigger
<a href="#">newgeoserver</a>	#1	Active, 1 replica	6 days ago	Config change
<a href="#">newgeoserver-minio</a>	#1	Active, 1 replica	6 days ago	Config change

Overview Applications Builds Resources Storage Monitoring Catalog

## 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



GeoServer

Logged in as admin. [Logout](#)

## Welcome

Welcome

This GeoServer belongs to The Ancient Geographers.

- 38 Layers [Add layers](#)
- 21 Stores [Add stores](#)
- 17 Workspaces [Create workspaces](#)

**Strong cryptography available**

This GeoServer instance is running version **2.13.1**. For more information please contact the administrator.

### Service Capabilities

- TMS**
  - 1.0.0
- WMS-C**
  - 1.1.1
- WMTS**
  - 1.0.0
- WCS**
  - 1.1.0
  - 1.1.1
  - 1.1
  - 2.0.1
  - 1.0.0
- WFS**
  - 1.0.0
  - 1.1.0
  - 1.1.0
  - 2.0.0
- WMS**
  - 1.1.1
  - 1.3.0

# cPouta examples: Web Applications



The screenshot shows a web browser window displaying a web application titled "Valuma-alueanalyysi". The browser's address bar shows a URL ending in "/wt/". The application interface is divided into a sidebar on the left and a main map area on the right.

**Sidebar (Left):**

- Valuma-alueanalyysi** (Header)
- Parametrit** (Section Header)
- Keskihajonta:** A slider control set to 1.4 m.
- Iteraatioiden lukumäärä:** A set of buttons for 10, 50, 100, 500, and 1000.
- Purkupisteen sijainti:** A dropdown menu currently showing "Uomasegmentin alku".
- Laskennat (max 10)** (Section Header)
- Lataus Kesto Iter Keskih Esikatselu** (Table Headers)

**Main Map Area (Right):**

- A map showing a complex network of blue lines representing a watershed or stream network.
- Geographical labels for various locations are visible, including Kokkola, Nivala, Luukka, Imatra, and Kotka.
- A green button labeled "Palvelin päällä" (Server online) is located in the top right corner of the map area.
- At the bottom right of the map, there is a footer: "Leaflet | Kartta: Maanmittauslaitos".

# Rahti example: Geo training with Notebooks



Notebooks: <https://notebooks.csc.fi>

**Notebooks** by CSC

Dashboard Groups Blueprints Account ip-10-10-10-10 [Log out](#)

## Environments

### JupyterLab

JupyterLab Notebook for interactive lesson materials in Geo-Python course, University of Helsinki.

**Lifetime:** 6h

State	Name	Time Left	Access	Actions	Details
✓	pb-brent-the-red	5h 59m	<a href="#">Open in browser</a>	<a href="#">✕ Destroy</a>	<a href="#">Details</a>

[▶ Launch new](#)

[?](#)

### Course Introduction to Python (self-study)

Course environment with Jupyter and Python. To be used on [CSC Introduction to Python](#) for self study.

The environment is short-lived and all data is destroyed at the end of the session. Download your results!

**Lifetime:** 5h

[▶ Launch new](#)

### Rahti Jupyter

Jupyter Minimal

**Lifetime:** 4h

[▶ Launch new](#)

### Course Introduction to R (self-study)

Course environment with Jupyter and R. To be used on [R for beginners](#) for self study.

The environment is short-lived and all data is destroyed at the end of the session. Download your results!

**Note:** A bug in Jupyter (<https://github.com/jupyter/docker-stacks/issues/679>), causes "dead kernel" when running R at present. Until it is resolved, use "RStudio Server" for R.

**Lifetime:** 10h

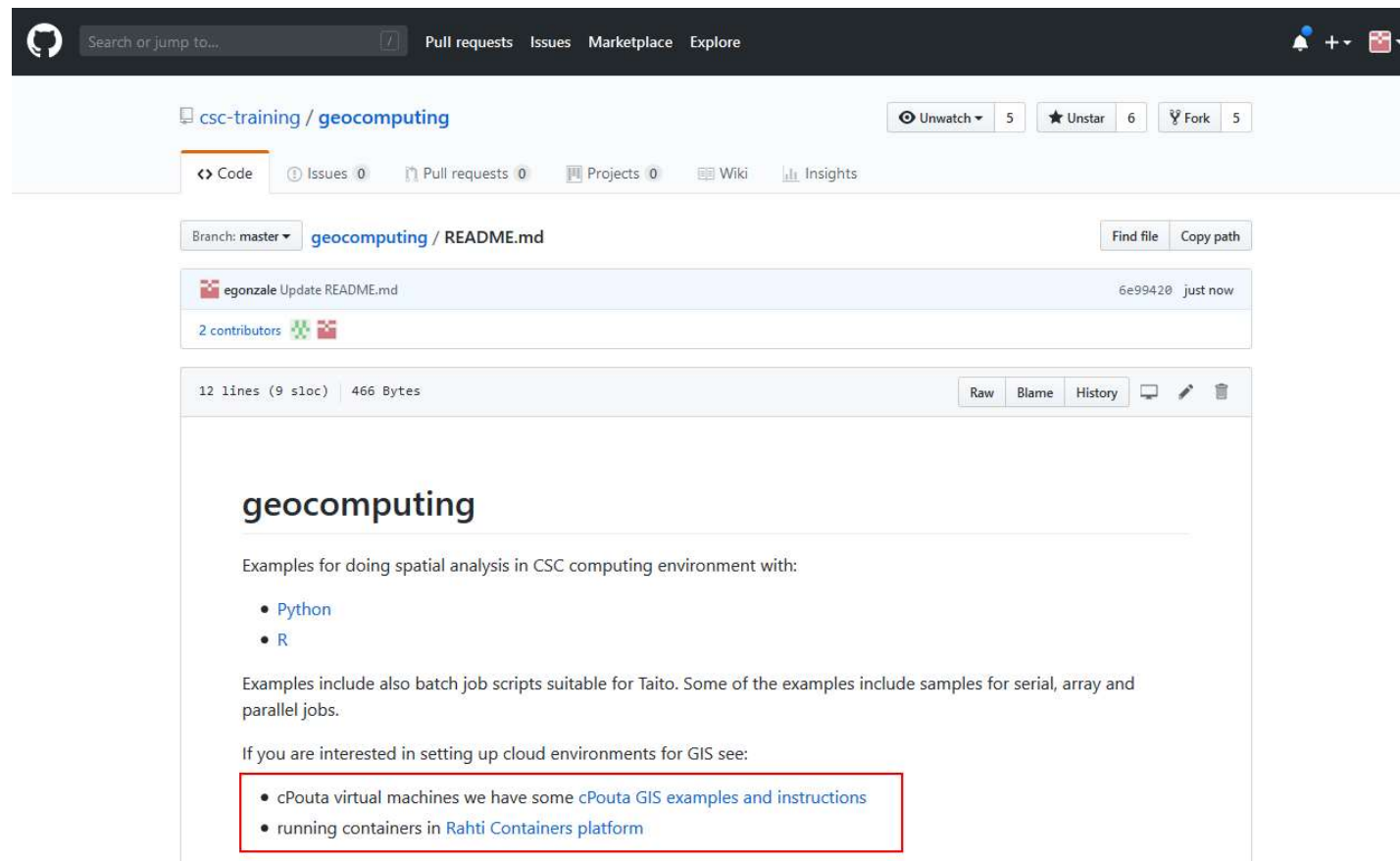
[▶ Launch new](#)

### Jupyter Datascience

General-purpose environment with Jupyter and data science packages.

# CSC's Geocomputing Training GitHub repository

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



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csc-training / geocomputing Unwatch 5 Unstar 6 Fork 5

Code Issues 0 Pull requests 0 Projects 0 Wiki Insights

Branch: master geocomputing / README.md Find file Copy path

egonzale Update README.md 6e99420 just now

2 contributors

12 lines (9 sloc) | 466 Bytes Raw Blame History

## geocomputing

Examples for doing spatial analysis in CSC computing environment with:

- [Python](#)
- [R](#)

Examples include also batch job scripts suitable for Taito. Some of the examples include samples for serial, array and parallel jobs.

If you are interested in setting up cloud environments for GIS see:

- [cPouta virtual machines we have some cPouta GIS examples and instructions](#)
- [running containers in Rahti Containers platform](#)