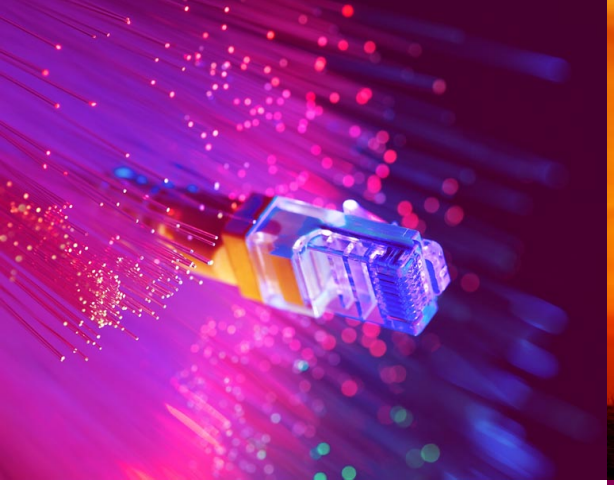
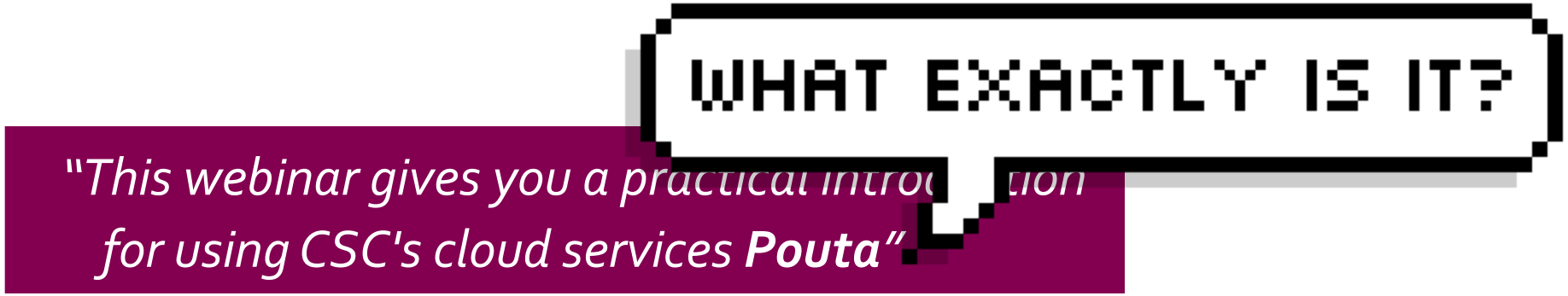


Webinar: Getting started with CSC's IaaS cloud computing services Pouta 16.10.2018

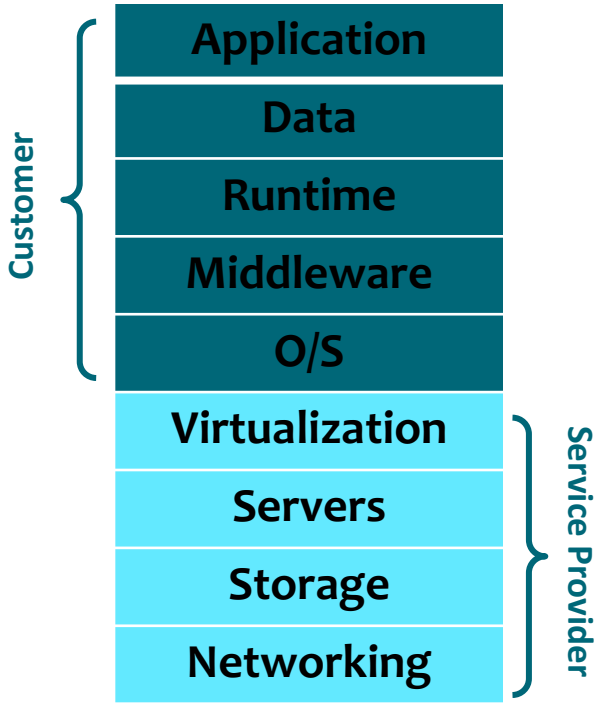
Shubham Kapoor, Cloud System Specialist

Webinar Introduction

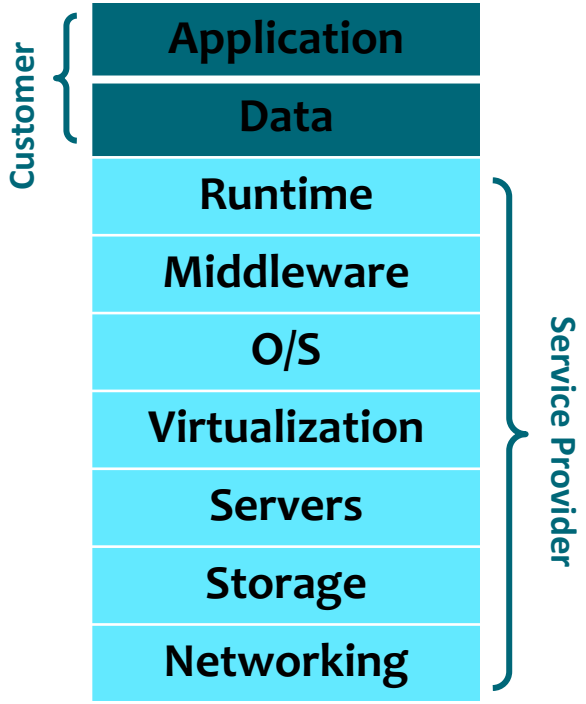


- CSC's Infrastructure as a Service (IaaS) Cloud offering based on OpenStack
- Allows running Virtual Machines (VMs) on CSC's Data Center infrastructure
- Grants users full control of OS, middleware & run time environments
  - On the flipside, users must manage and secure their VMs
- Provides VMs direct connection to the Internet/Intranet, allowing for new collaboration.
- Provides an IaaS cloud environment for your sensitive data processing (ePouta).

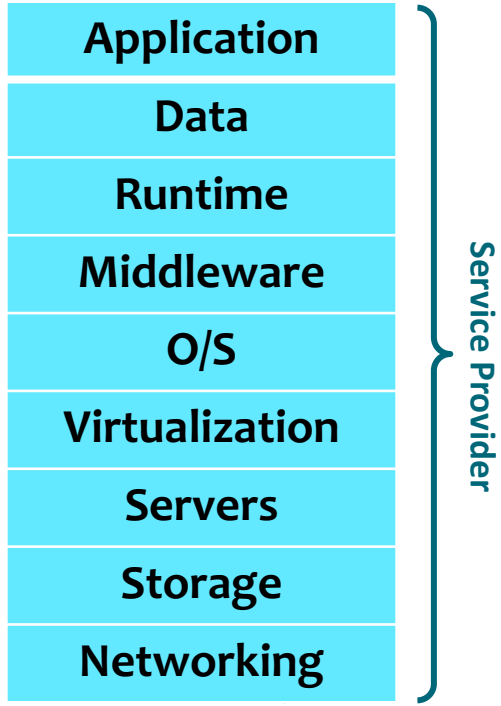
Cloud Computing Landscape



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



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



Software as a Service (SaaS)
CSC's Chipster,

CSC's IaaS Cloud Services: Pouta

- *IaaS Cloud services for research & educational use cases*
  - *Services accessible over internet*
- *Powered by OpenStack*
- *Processes ISO27001 Certified*
- *In Production since 2013*
- *Web UI, CLI & REST APIs supported*
- *~ 7500 Cores, ~ 2.7 PB Raw CEPH Storage, 24 GPGPUs*

cPouta

- *IaaS Cloud for research & educational use cases involving sensitive data processing*
  - *Services accessible only from customer network*
- *Powered by OpenStack*
- *Processes ISO 27001 Certified*
- *In Production since 2013*
- *Web UI, CLI & Rest APIs supported*
- *~ 11000 cores, 1.6 PB raw CEPH Storage, 1.5 PB NetApp & 4 GPGPUs*

ePouta

Typical Resources You get from Pouta Clouds

- VMs
- Oversubscribed or dedicated CPUs
- GPUs

Compute

- Volume Storage
- Object Storage*

Storage

- 10 GbE or 40 GbE

Private VLAN

- With or Without * NAT

IPv4

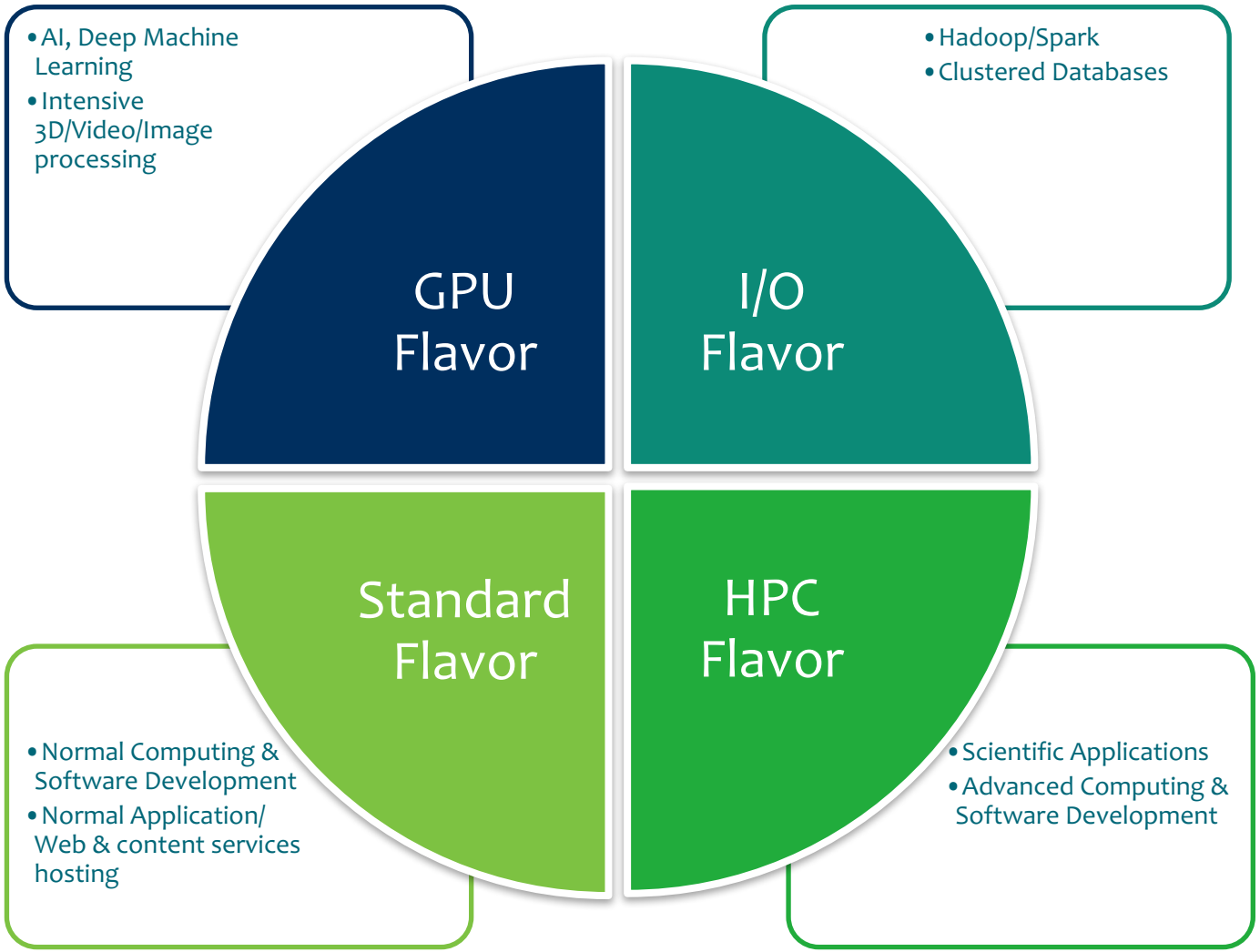
- With Latest Security patches

Images

- Full programmability of your resources

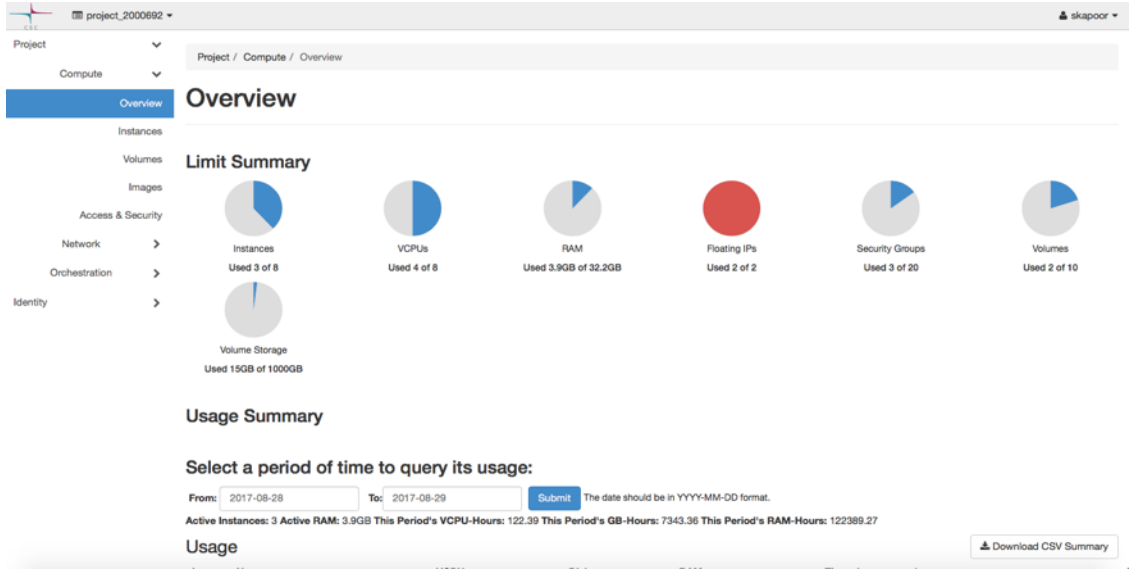
API

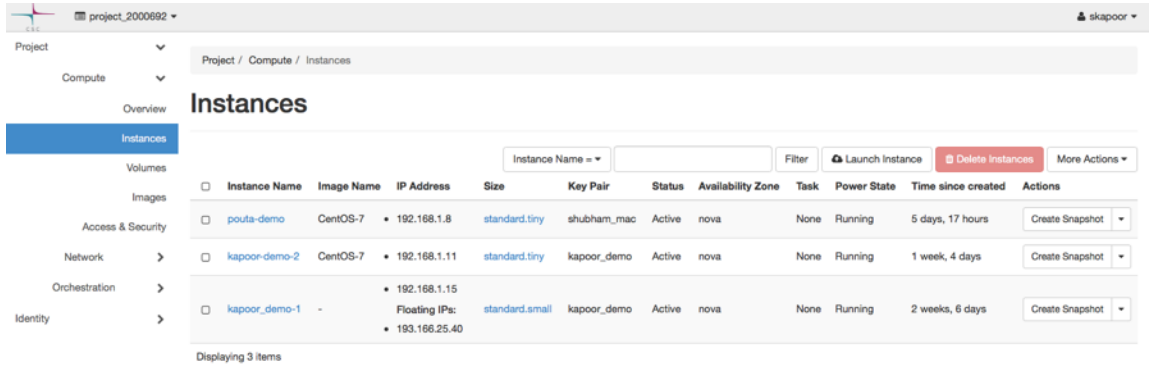
Pouta: Flavor Options

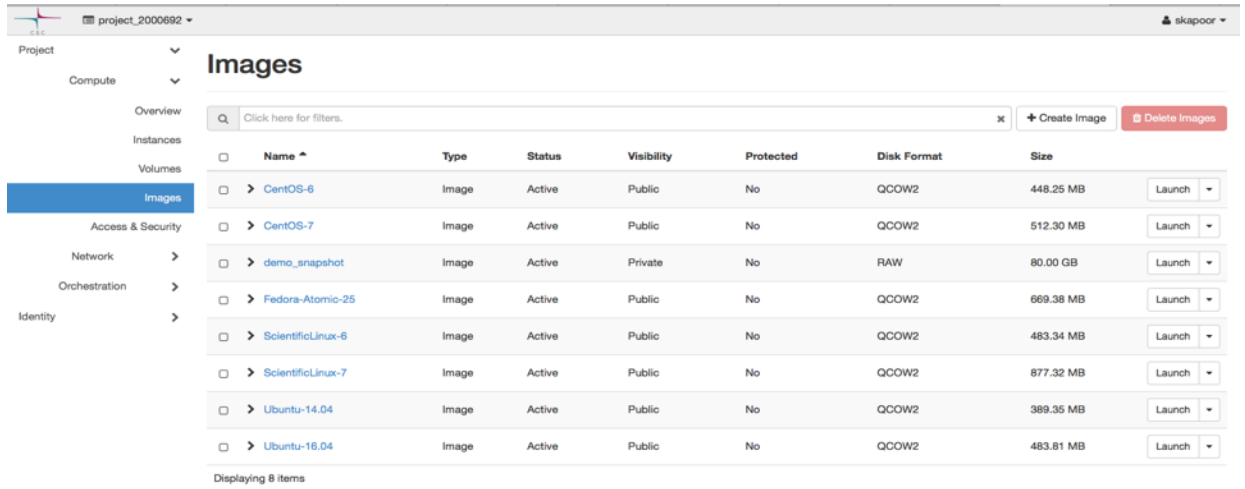


Diverse set of flavor options to support your computing needs

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
Overview
Instances
Volumes
Images
Access & Security
Network
Orchestration
Identity
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
Project
Compute
Overview
Instances
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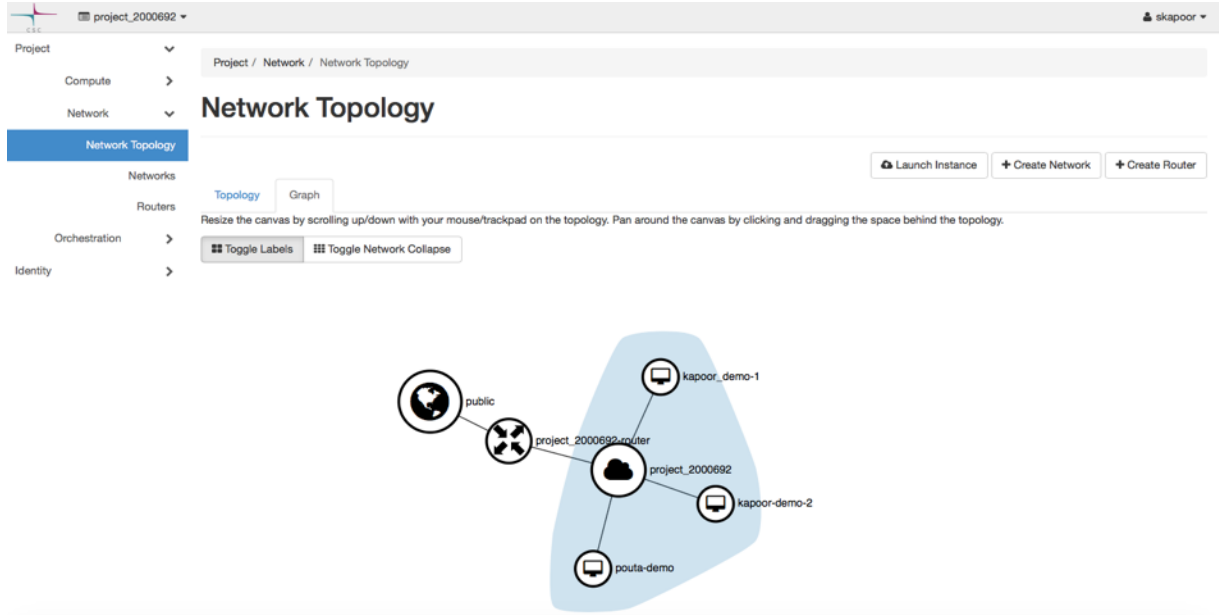
Access & Security
Network
Orchestration
Identity
Images
Click here for filters.
Create Image
Delete Images
Name
Type
Status
Visibility
Protected
Disk Format
Size
CentOS-6
Image
Active
Public
No
QCOW2
448.25 MB
Launch
CentOS-7
Image
Active
Public
No
QCOW2
512.30 MB
Launch
demo_snapshot
Image
Active
Private
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_2000692
skapoor
Project
Compute
Network
Network Topology
Networks
Routers
Orchestration
Identity
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
kapoor_demo-1
project_2000692
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 Usecases

- Scientific Modelling in the areas of natural sciences
- Advanced Computing and Software Development
- Big Data Analytics
- Digital Education
- Research Data Sharing & Archiving

ePouta

- OpenStack based cloud.

- Serving cloud computing needs of Finnish research institutes & universities which involves **Sensitive Data**.

- Complete Isolation of VMs from rest of the world and other ePouta customers.

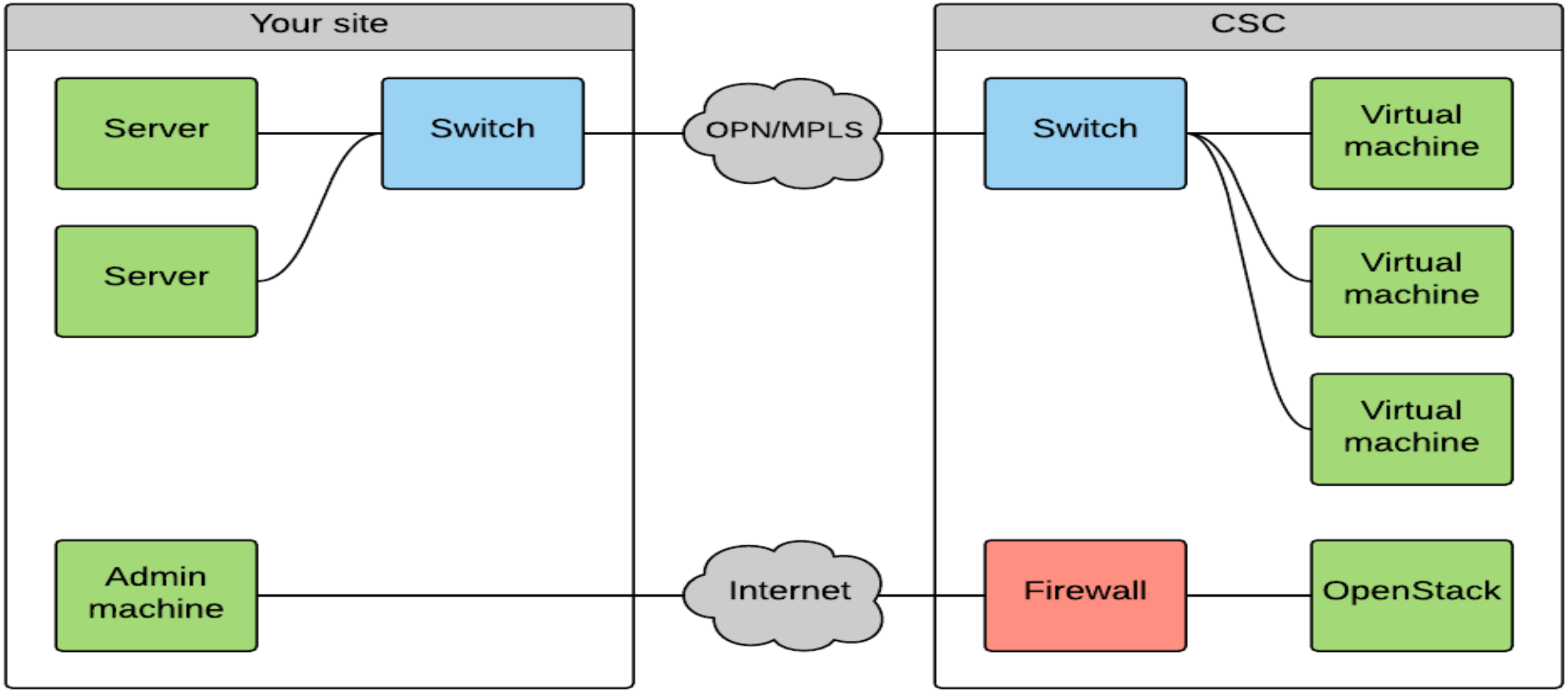
- VMs accessible only from customer network: Optical Private Network(OPN) or MPLS VPN connection between the end customer and ePouta VM instances.

- **VPC :** VMs executed in CSC's Datacenter, but logically part of Customer's own private network.

- Can support modern DevOps, Agile, CI/CD etc. environments.

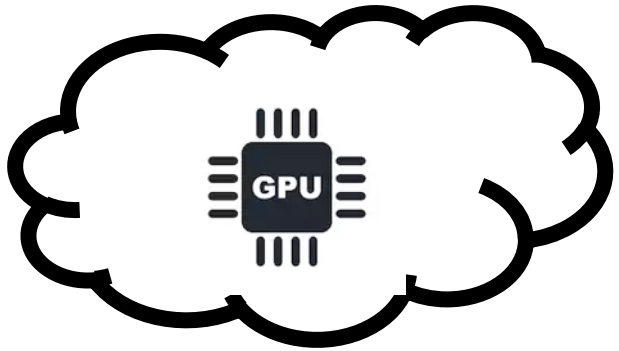
- Could be used for hosting:
  - Scientific applications dealing with sensitive data,
  - Sensitive Data Sharing, Archiving etc.

ePouta : Connection



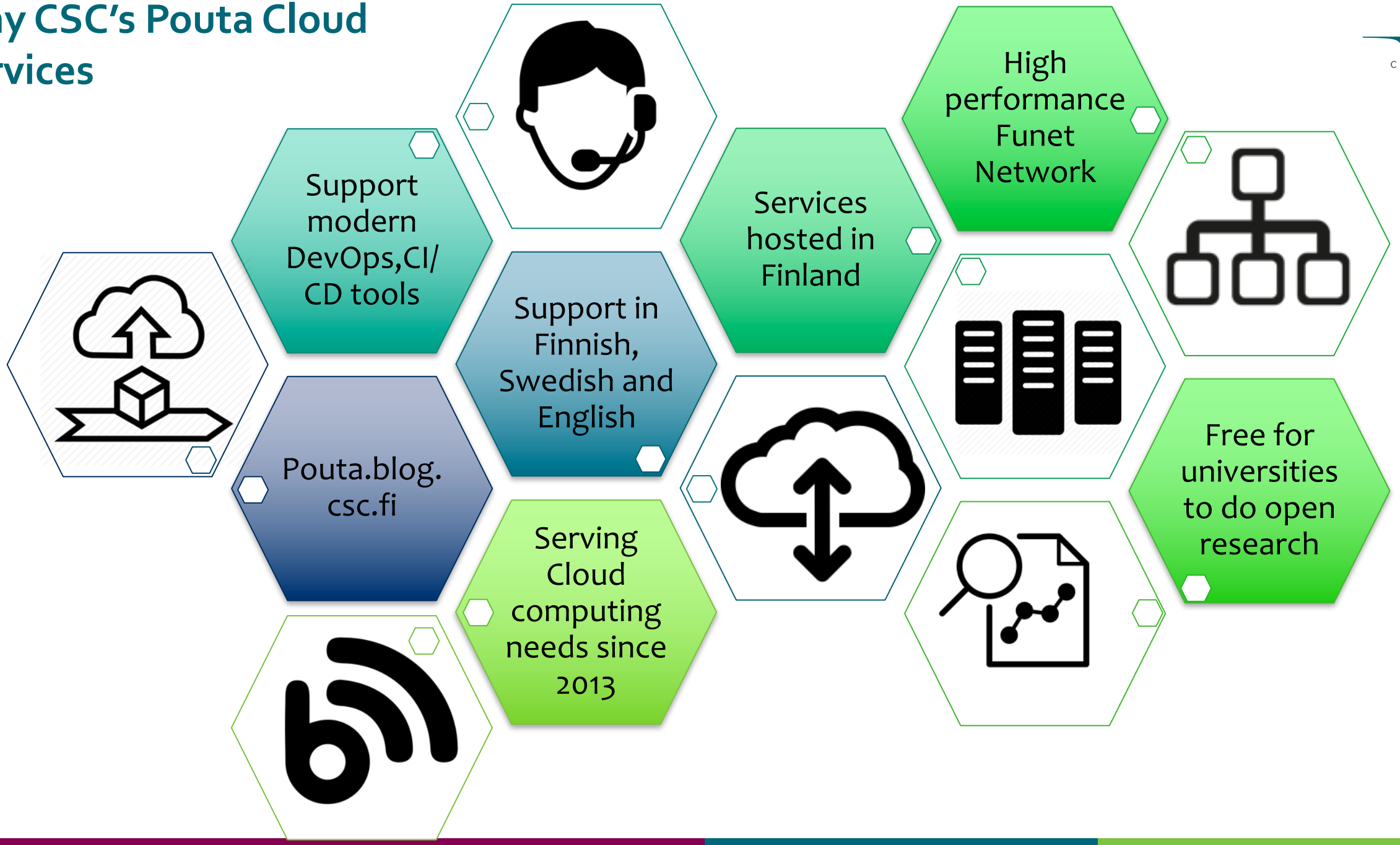
Typical VM connections between ePouta and customer's network. Such connections are normally coordinated between CSC's cloud team, Funet and customers IT department for initial setup.

GPU Flavors in Pouta



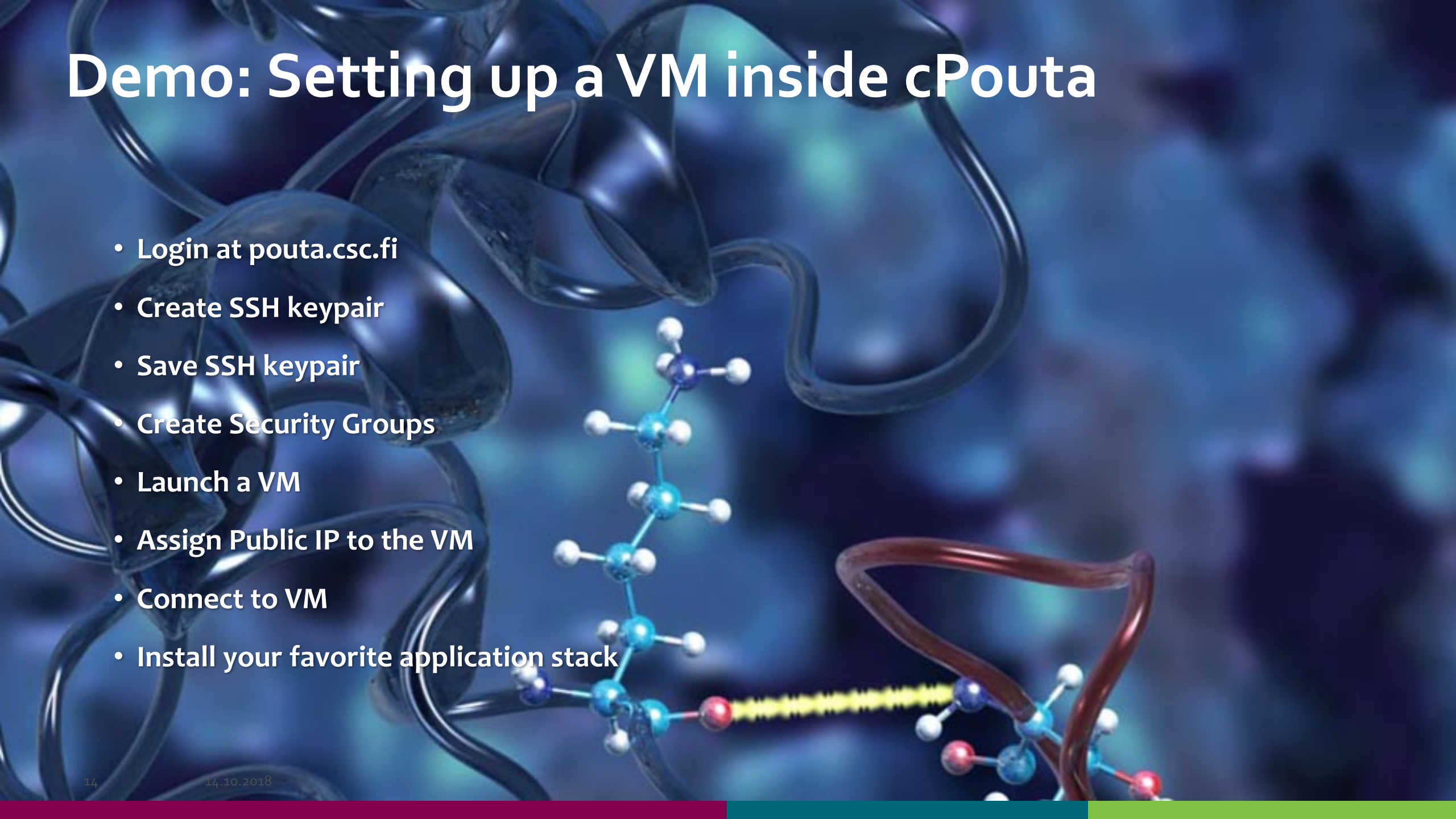
- GPU Flavors provide high performance computing leveraging GPGPUs.
- GPU 1.* family flavors in cPouta are powered by NVIDIA Tesla P100 GPGPUs
- GPU 2.* family flavors in ePouta are powered by NVIDIA Tesla V100 GPGPUs
- GPU flavors are backed by local SSDs (RAID-0) on the server.
  - Advisable to use persistent volumes for storing important data.
- You can use CSC's Code Optimization Service in case you are coding your own application.
  - https://research.csc.fi/optimization-service
- PCI passthrough is used to get GPGPUs in GPU flavor machines
- OS images pre installed with latest CUDA version are available.
  - You may also use your own OS images by installing required libraries yourself.
- GPGPUs are also available in the batch system on Taito: https://research.csc.fi/taito-gpu.

Why CSC's Pouta Cloud Services



Demo: Setting up a VM inside cPouta

- Login at pouta.csc.fi
- Create SSH keypair
- Save SSH keypair
- Create Security Groups
- Launch a VM
- Assign Public IP to the VM
- Connect to VM
- Install your favorite application stack



Thank You!

https://research.csc.fi

Shubham Kapoor

Cloud System Specialist

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