

HPC Cloud at SURFsara

— Offering cloud as a service



Markus van Dijk <markus.vandijk@surfsara.nl>
Ander Astudillo <ander.astudillo@surfsara.nl>





Science Park, Amsterdam

The SURF family

SURF

SURF SARA

SURF NET

SURF MARKET

NWO

Nederlandse Organisatie voor
Wetenschappelijk Onderzoek

netherlands
eScience center

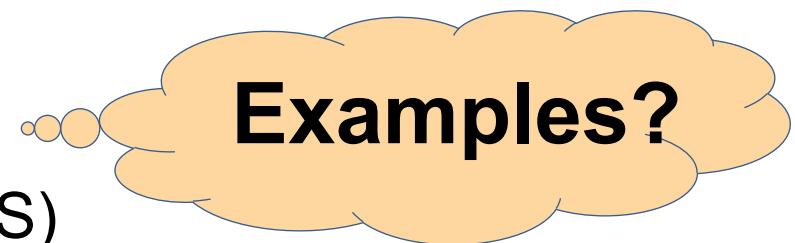
A definition: cloud computing

Essential characteristics:

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

Service models:

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)



Agenda

- 1.- SURFsara's HPC Cloud **service**
- 2.- **User** experience
- 3.- Demo
- 4.- SURFsara's HPC Cloud **implementation**



SURFsara's HPC Cloud service

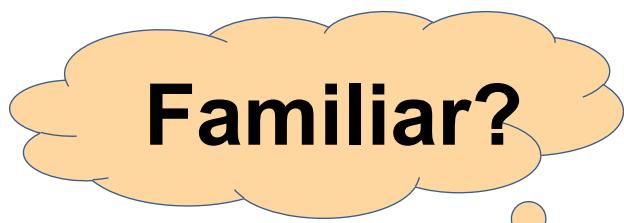


What do we (SURFsara) want to offer?

Services for **scientists** ...scientists \neq systems gurus

... complex users' problems

- **Data:** big, dirty, non-structured...
- **Computation:** complex (e.g.: modeling, simulation)
- Libraries nightmare
 - 3rd party, incompatibility, maintenance...



Familiar?

... test

... scratch

... trial and error

... share

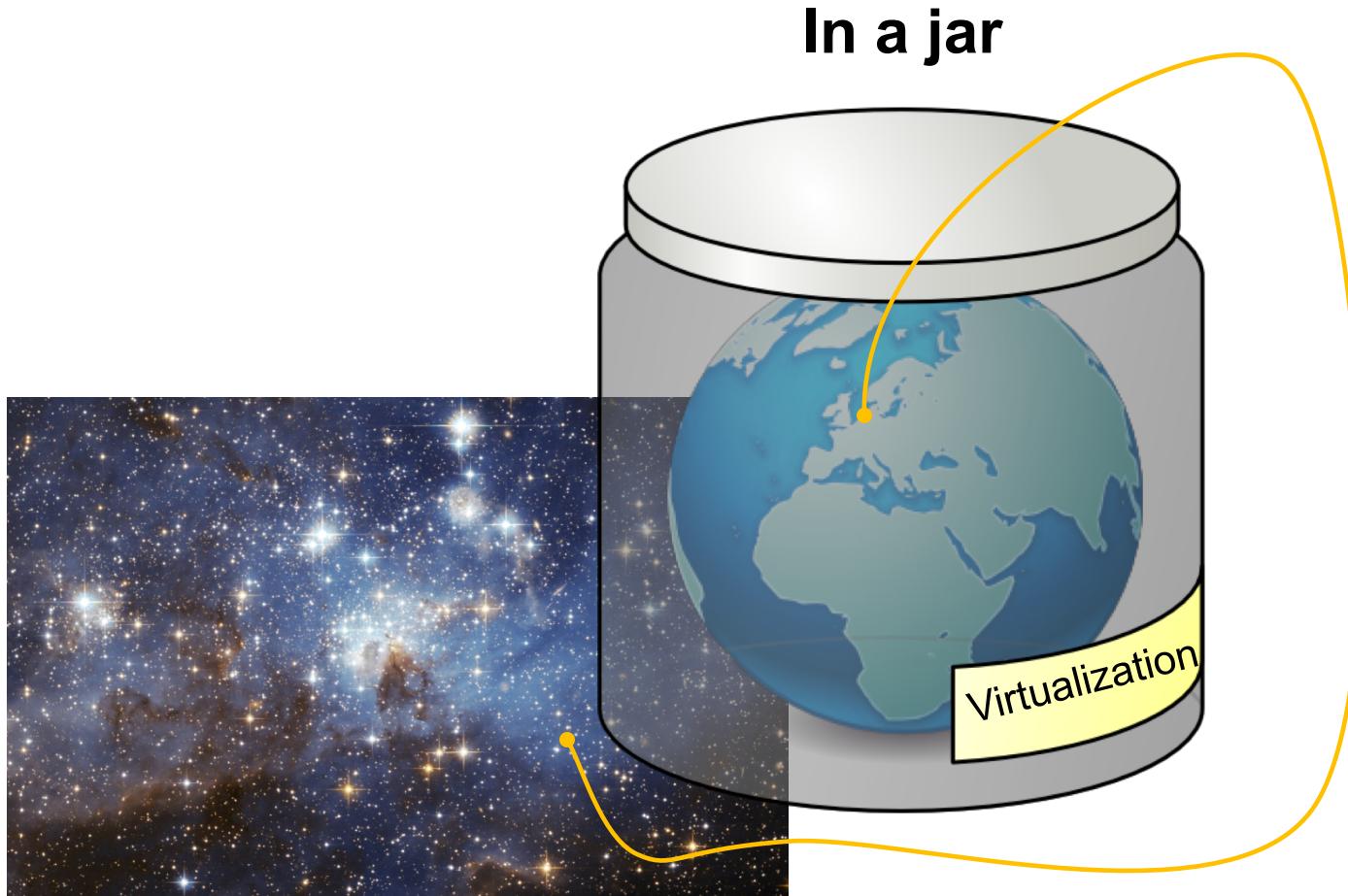
... show

... cooperate

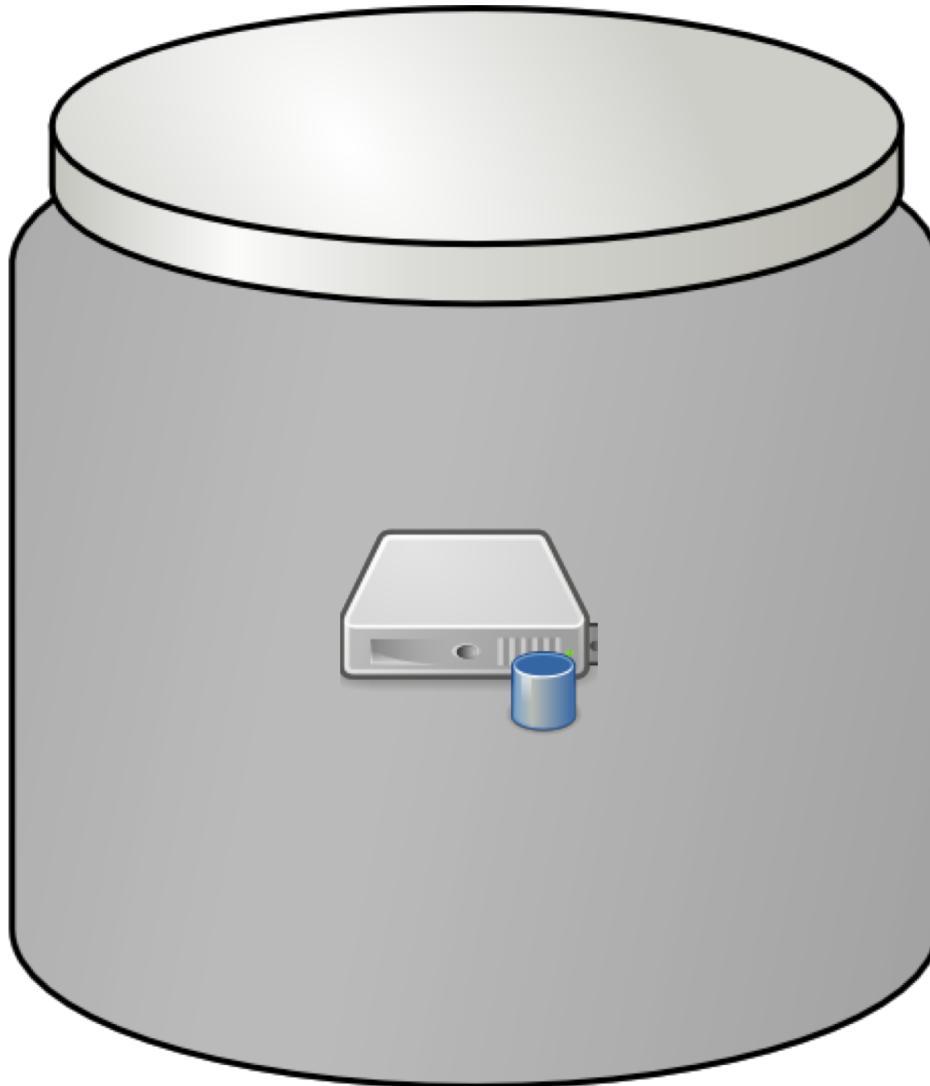
... flexibility

... privacy

What does our HPC Cloud offer?



What do you see, as a user?

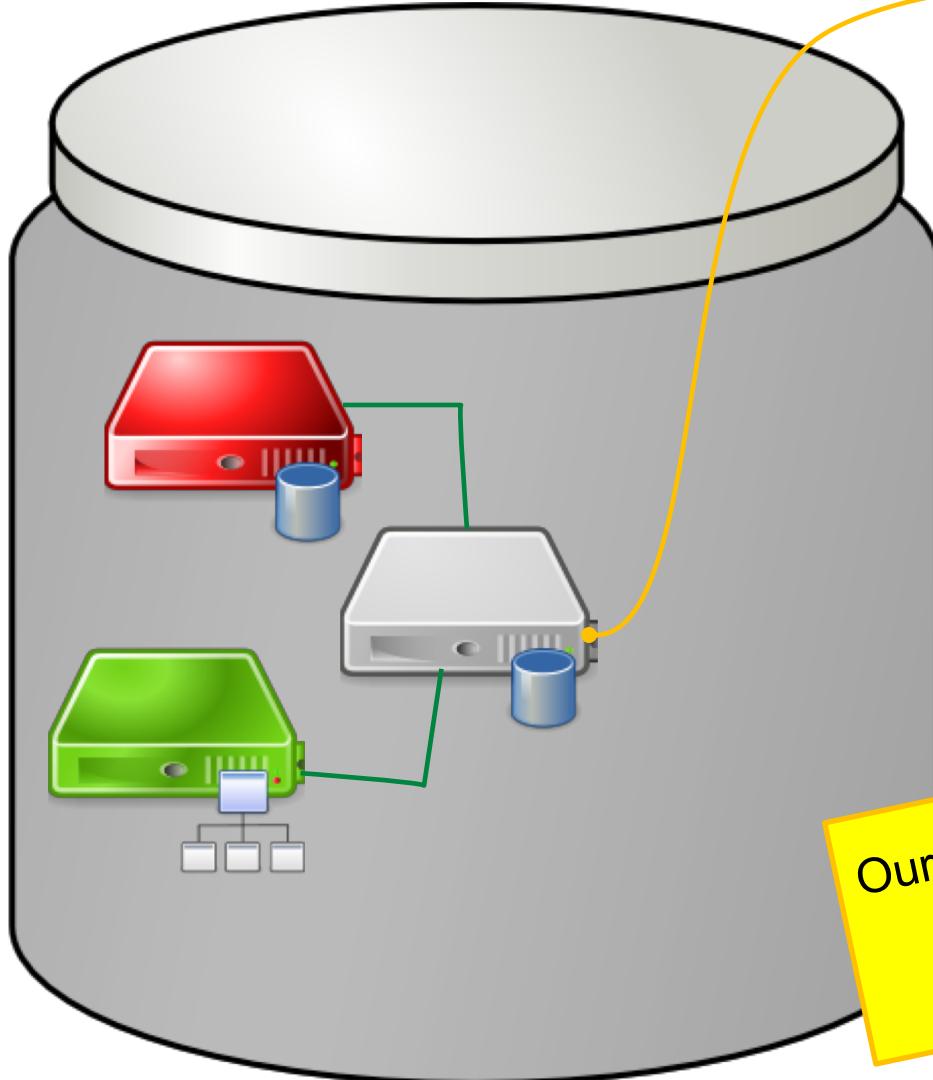


A place to build a running system

Build your own (virtual) machine:

- Hardware
 - CPU
 - Memory
 - Input/Output
 - Disk
 - Network interfaces
- Software
 - Operating System
 - Programs
 - Libraries

What do you see, as a user? (and II)



A place to build a bunch of systems

Build your own cluster:

- Private network
- Internet access



Our say:

IaaS

Powered by...
OpenNebula

User experience

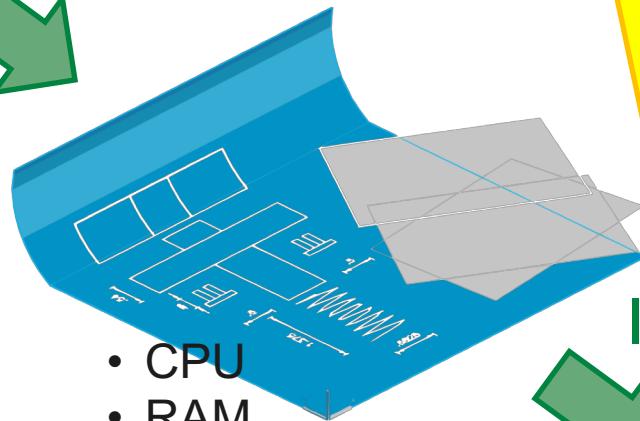


IaaS: Your place to run VMs



- Data store
- Persistence
- ...

Images

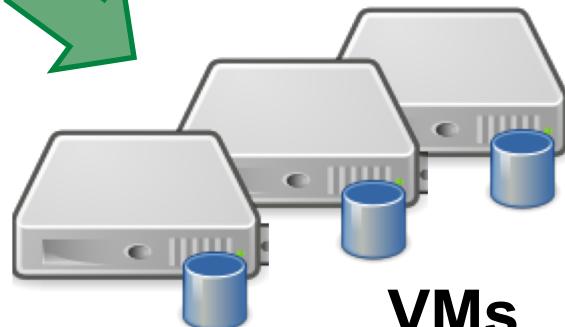


Template

- CPU
- RAM
- I/O
 - Disks
 - Network
- ...

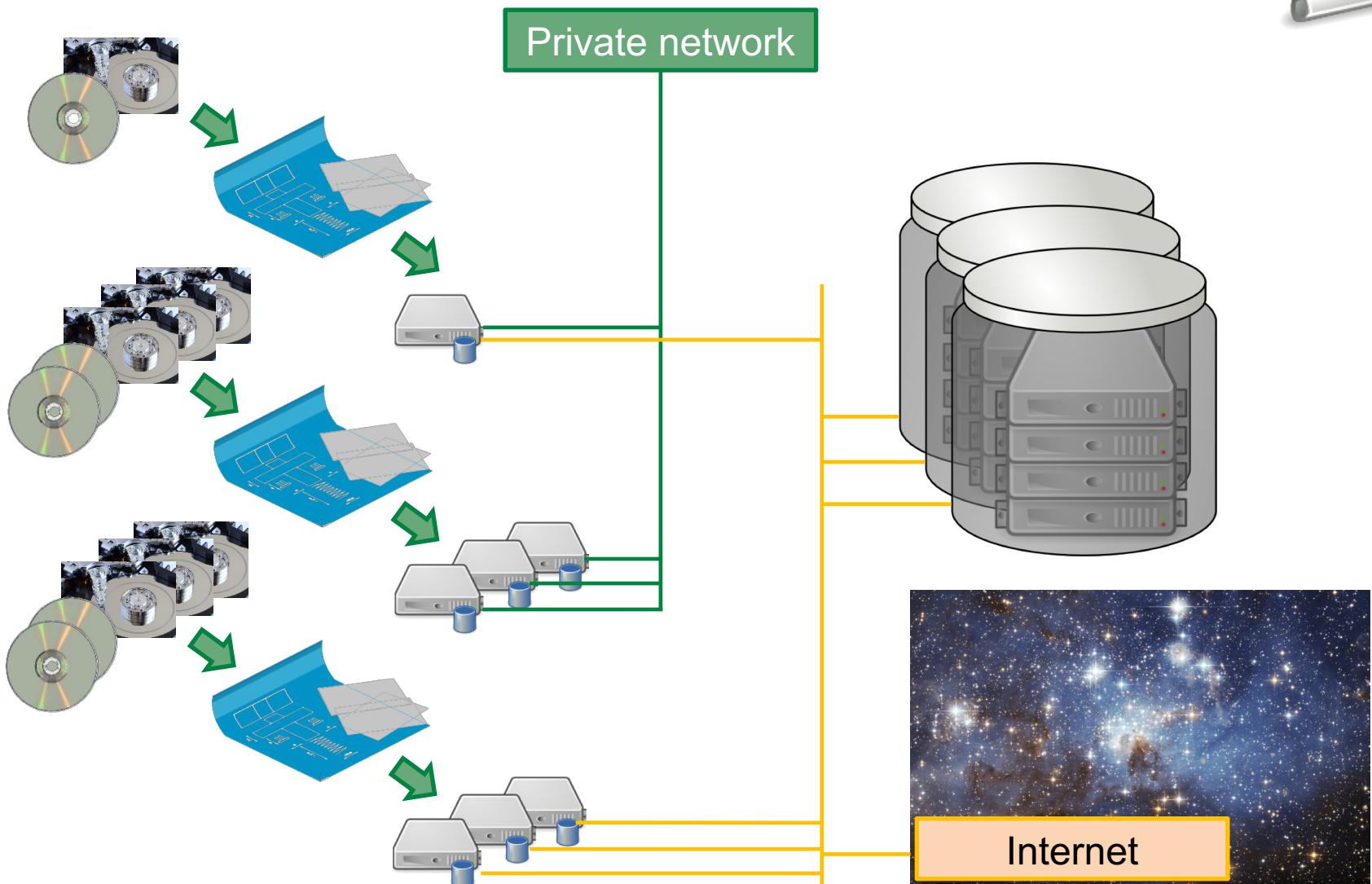


Instantiate



VMs

IaaS: your interconnected VMs





HPC

- Many nodes
 - Big nodes
- Fast interconnect
- Plenty of storage
 - Diverse storage
- Large memory

Cloud

- Multi-purpose **versatility**
- Shape **elasticity**
- **Self-service** on-demand

Service

- Project-based
 - Own quotas
 - Private network
 - Block storage
- Dynamic DNS
- Documentation
- Support

OpenNebula

- Web interface
- User groups
- Pre-built Apps
- Accounting



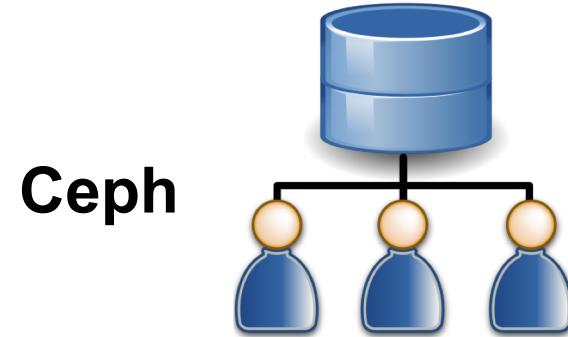
Per project



User accounts



CPU time



Ceph



Local SSD



Users like & leverage...

- Flexible software **mix**
- **Big VMs**
- **Elasticity**
- Provide their own service to **their own users**
- Software that requires **licenses**
- Set up, test and deploy **workflows**
- Deliver training; **courses**
- **Intensive** computing

...from diverse **fields**:

- Biology
- Genetics
- Informatics
- Chemistry
- Ecology
- Linguistics
- Robotics
- Business
- Social sciences
- Engineering
- Humanities
- Water management
- ...



Recently **added** and near **future** features:

Open**Nebula** • Latest release of OpenNebula



Ceph • Ceph storage; expansion

- Distributed object store and file system
- Cope with increasing load



• **GPU processing**

- Highly parallel structure
- Program specifically to use it

SURF

• **SURFconext; federated authentication**

Demo

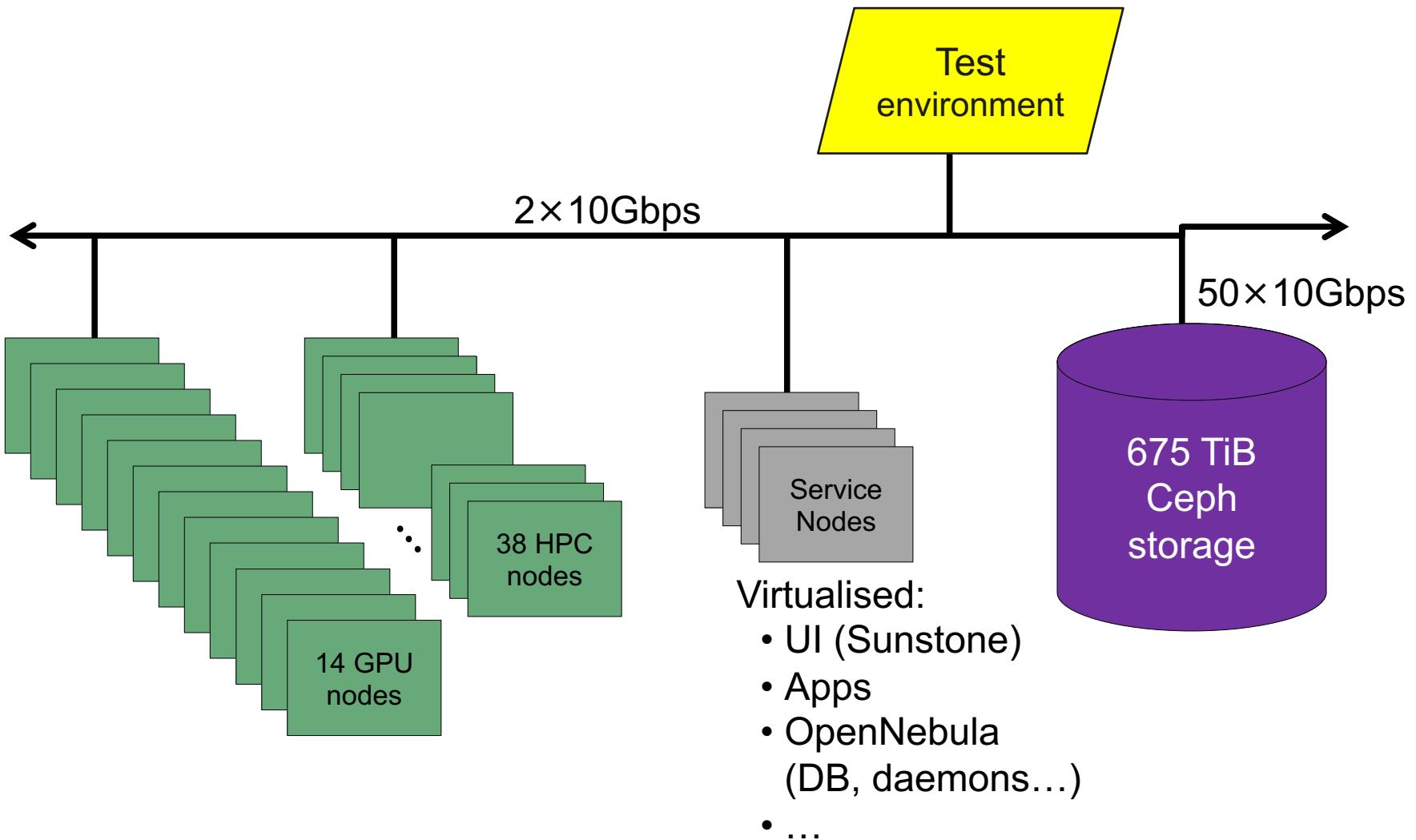
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SURFsara's HPC Cloud implementation



Network overview



Request: <https://e-infra.surfsara.nl>
UI: <https://ui.hpccloud.surfsara.nl>
Doc: <https://doc.hpccloud.surfsara.nl>

Credits

Images: Wikipedia, Science Park, RRZE icons,
NIST, nVidia, Ceph
Slides: SURFsara colleagues

Markus van Dijk
<markus.vandijk@surfsara.nl>
Ander Astudillo
<ander.astudillo@surfsara.nl>



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