



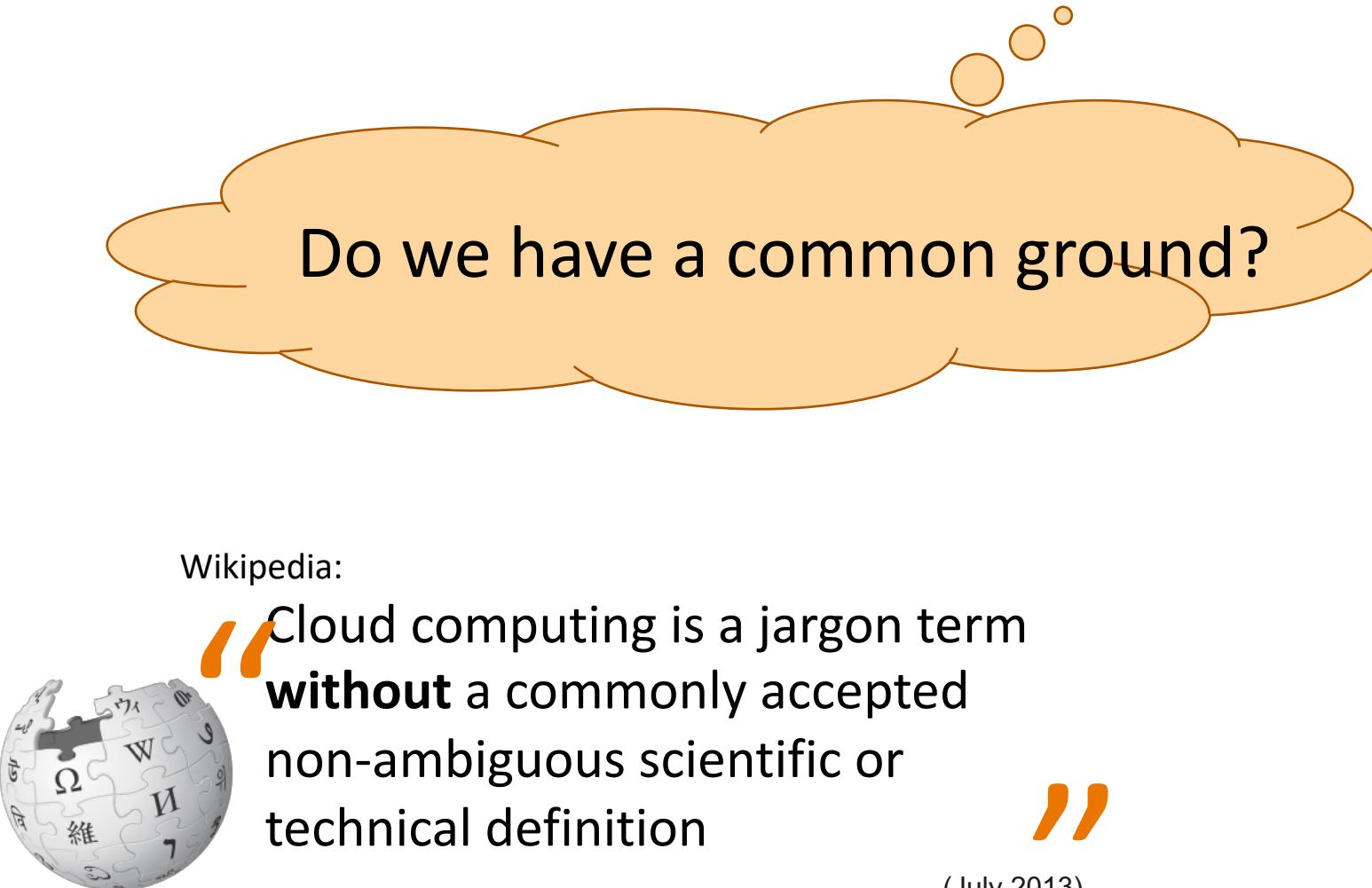
HPC Cloud at SURFsara

— Offering cloud computing as a service

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What is cloud computing?



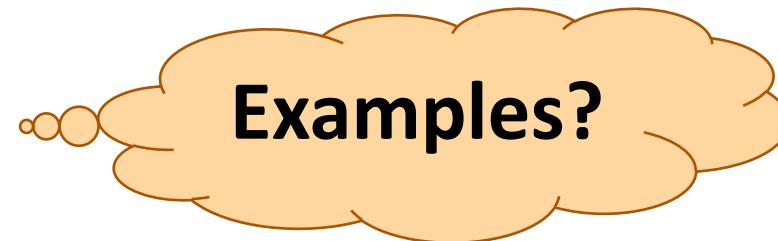
What is cloud computing?

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



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SURFsara's HPC Cloud service



What do we (SURFsara) want to offer?

Services for **scientists**
...scientists $\not\Rightarrow$ systems gurus

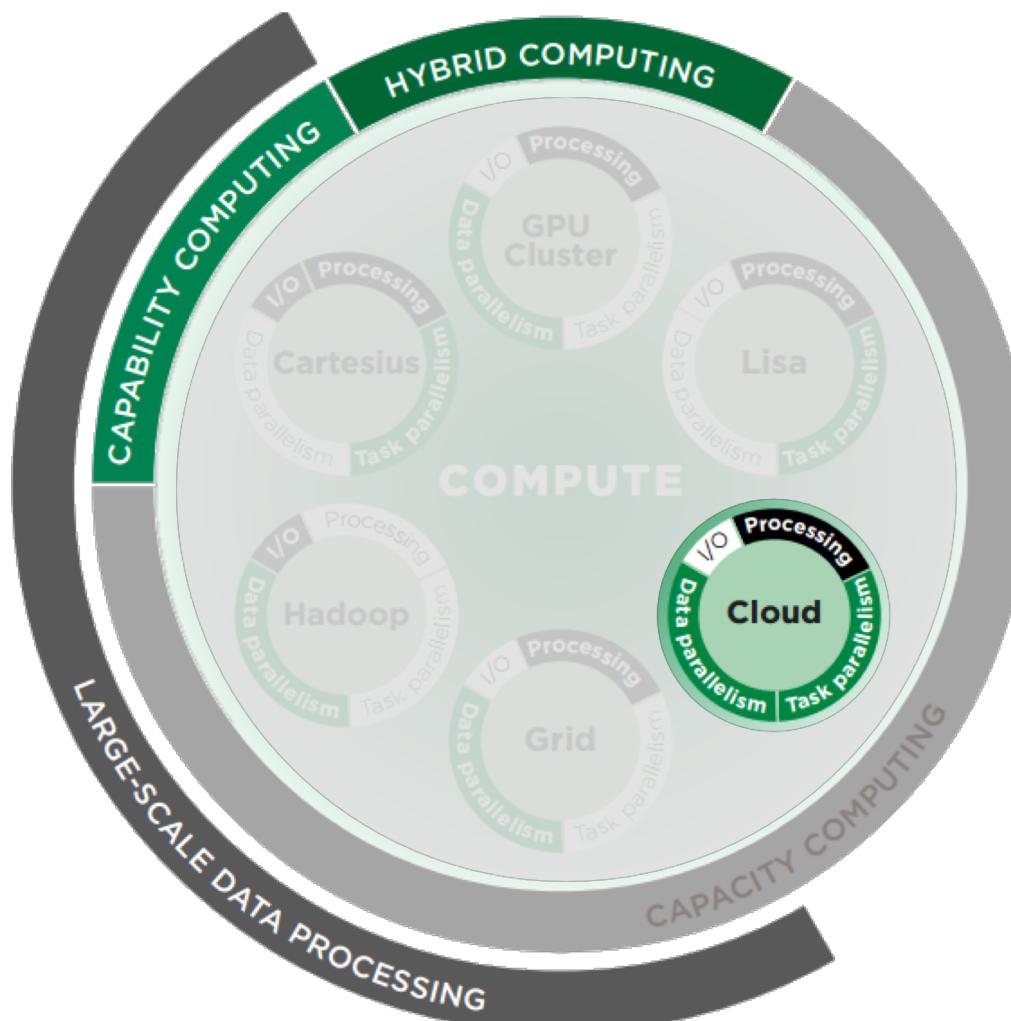
... complex users' problems

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



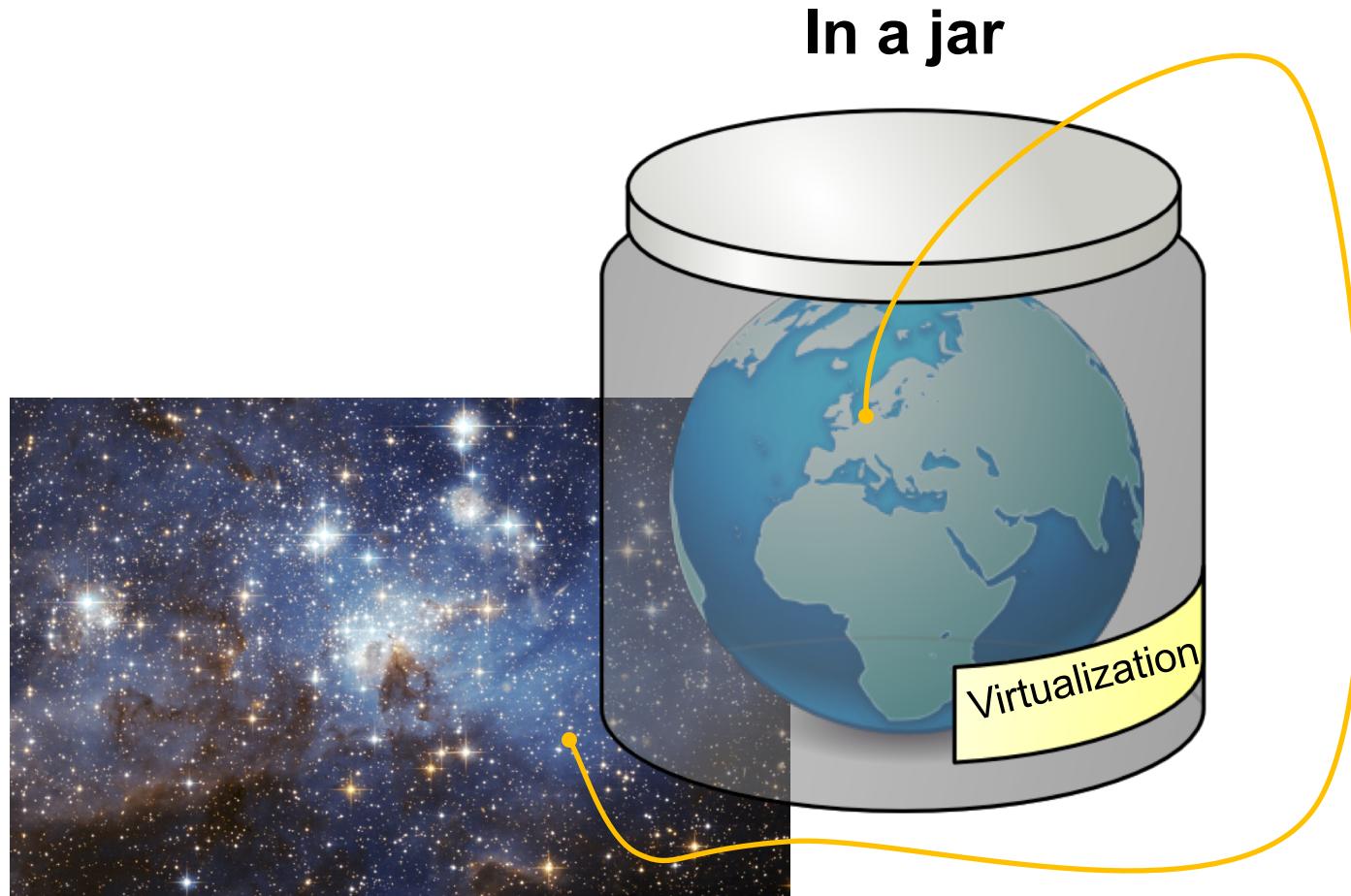
... trial and error ... share ... cooperate
... test ... scratch ... show
 ... flexibility ... privacy

Where does the HPC Cloud fit?



1.- Our service

What does our HPC Cloud offer?

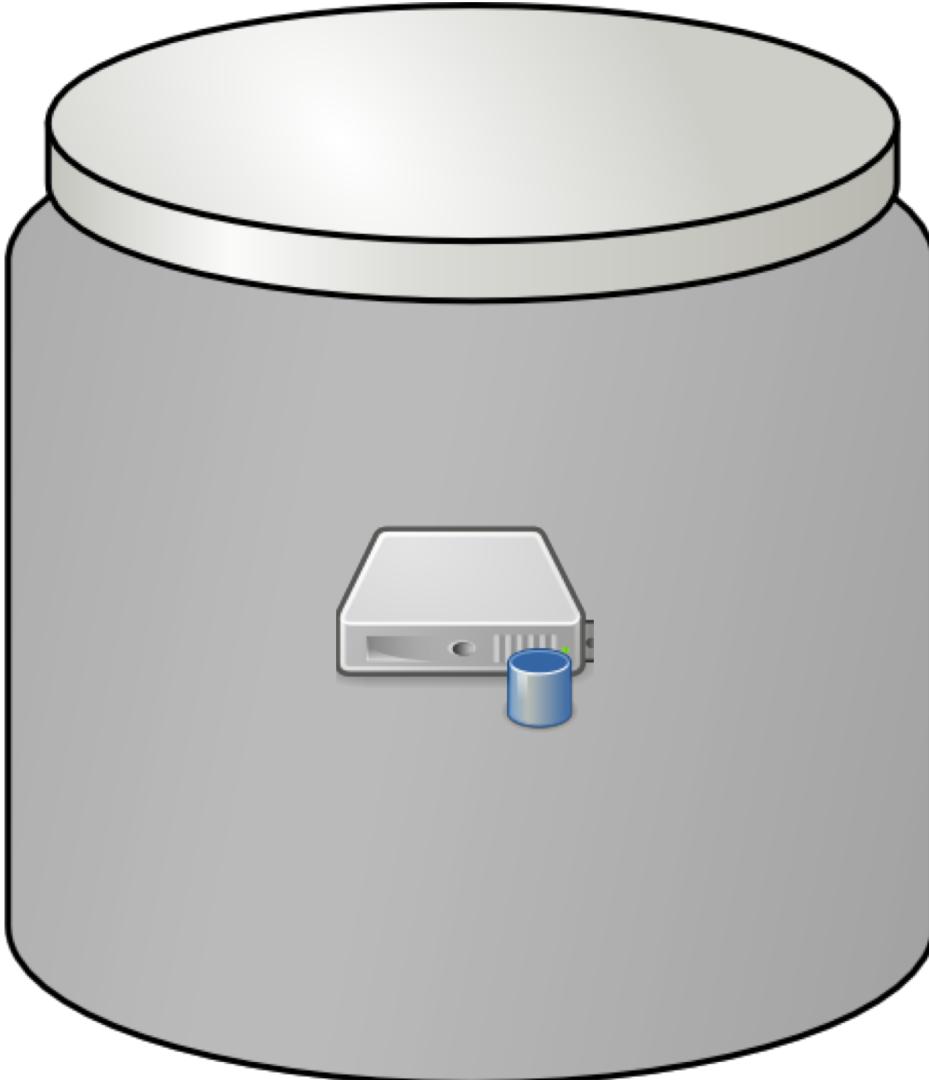


1.- Our service

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SURF

What do you see, as a user?

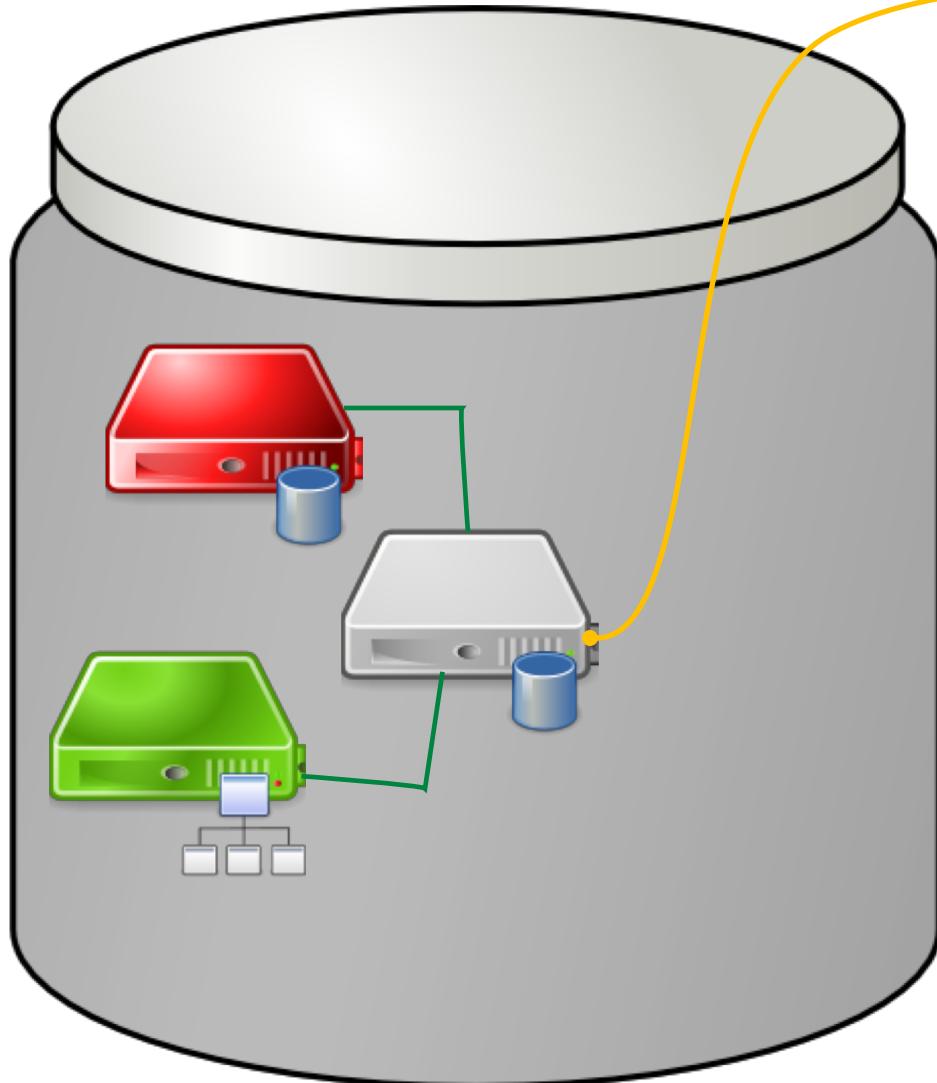


A place to build a running system

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? (II)



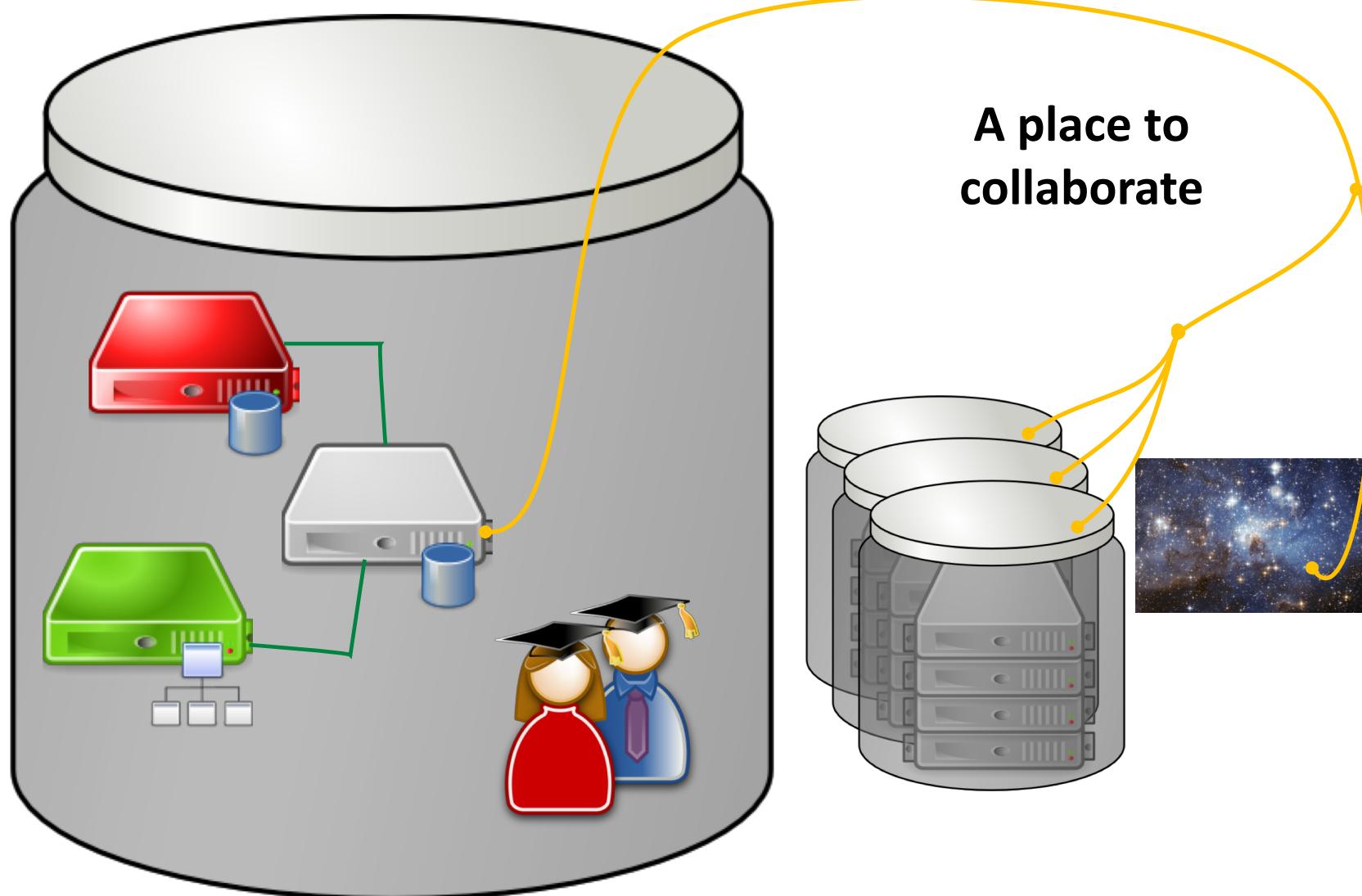
A place to build a
bunch of systems

Build your own cluster:

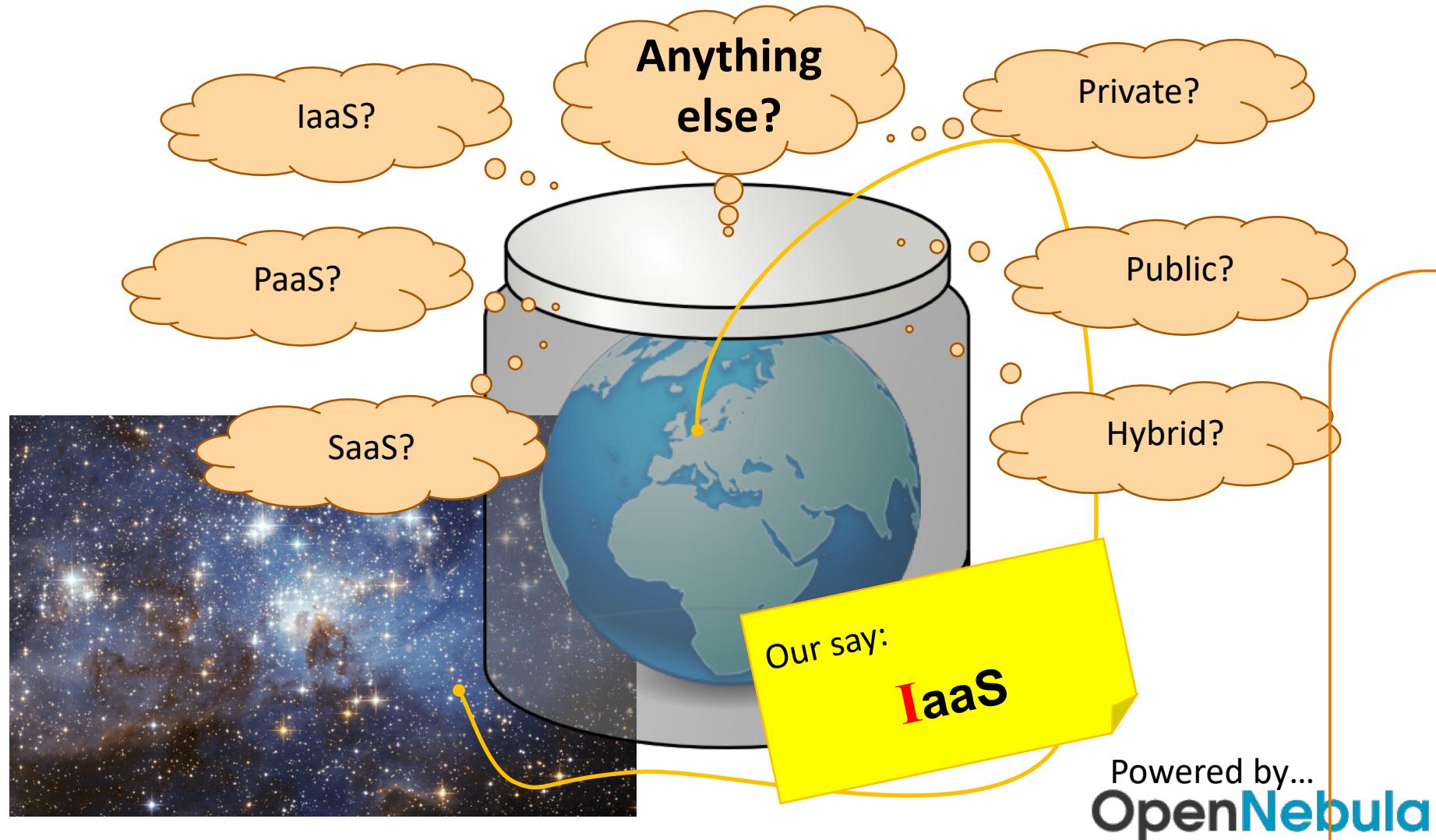
- Private network
- Internet access



What do you see, as a user? (III)



Thus...?

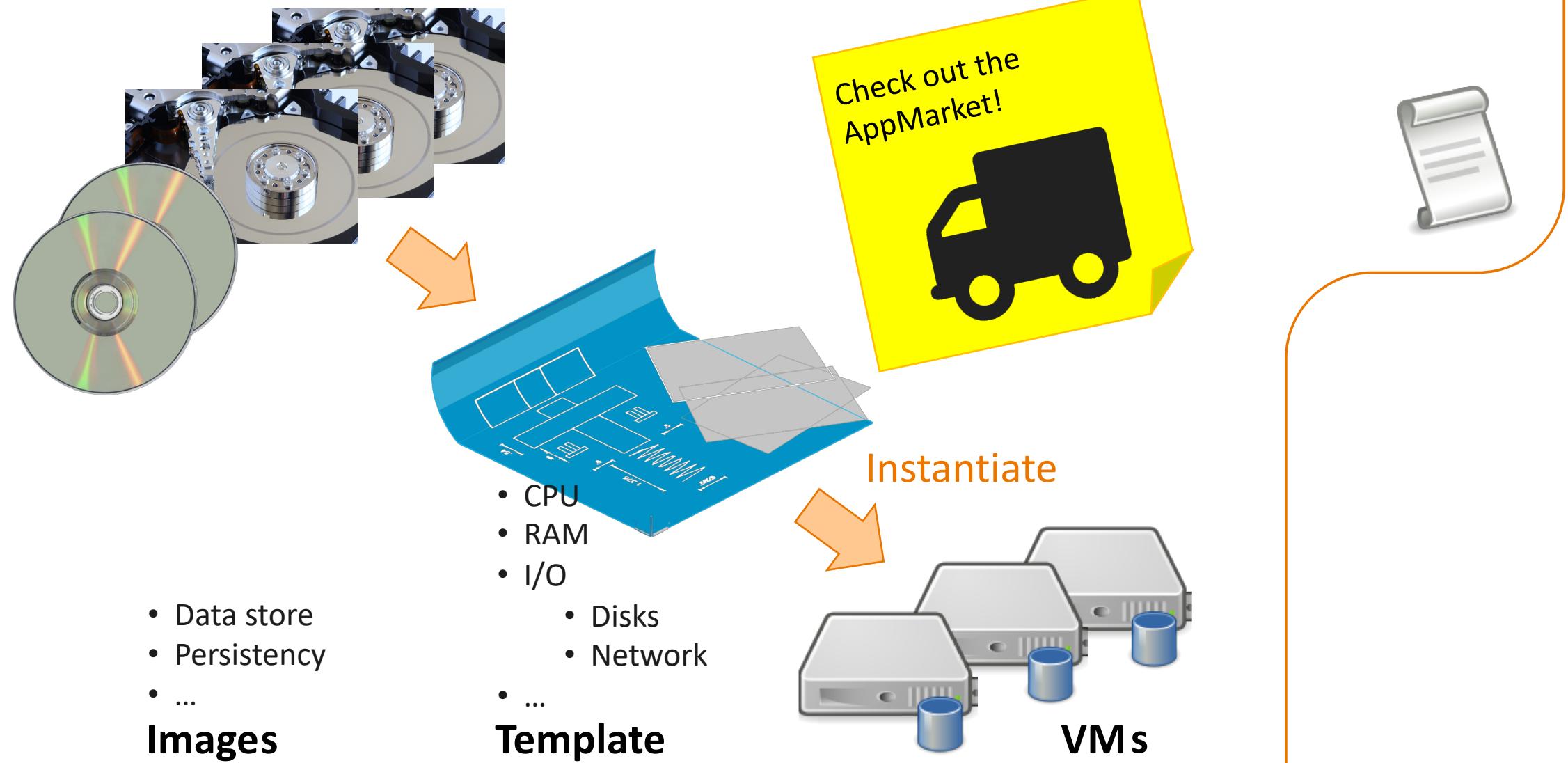


User experience

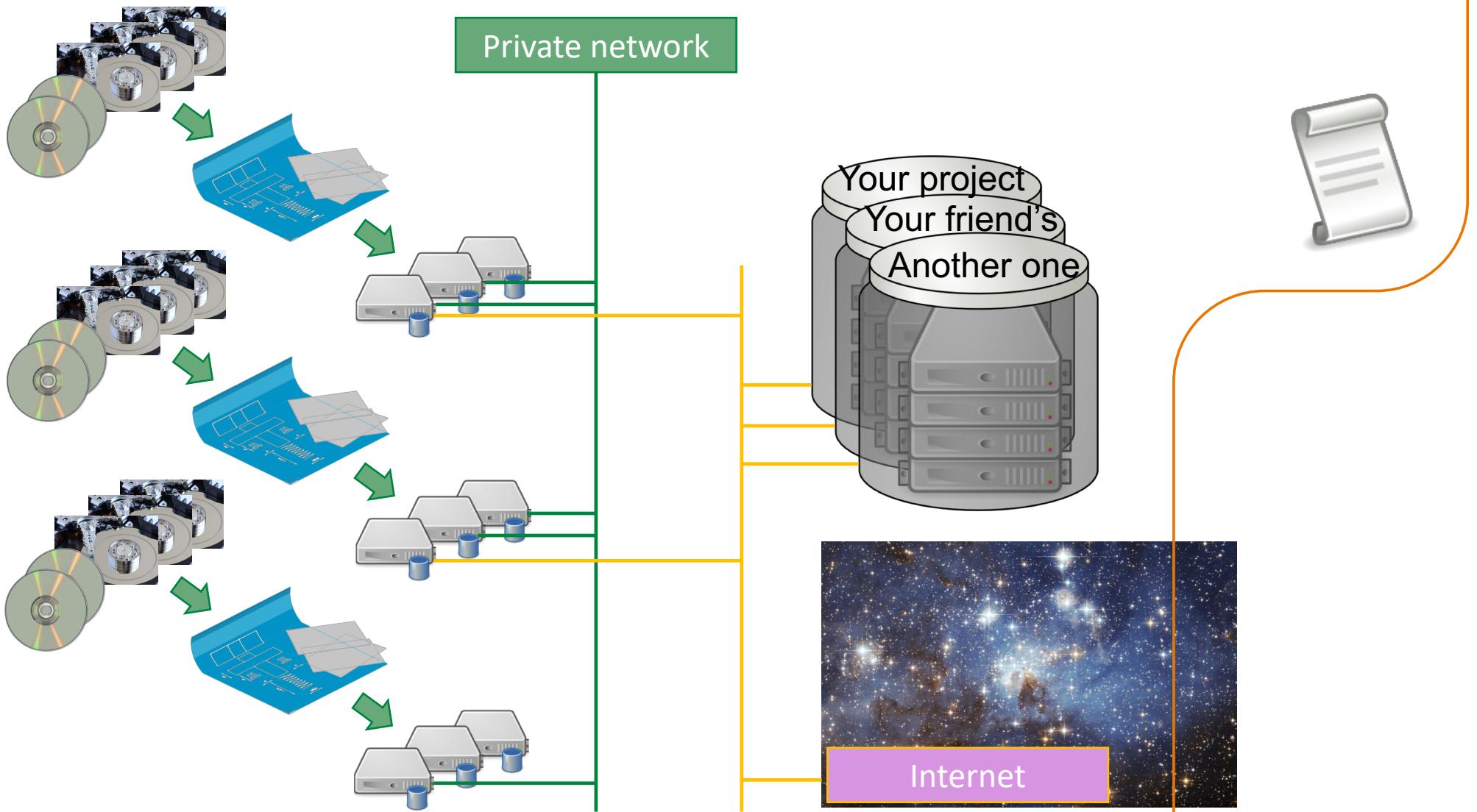
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IaaS: Your place to run VMs



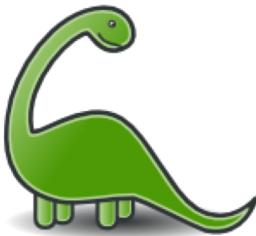
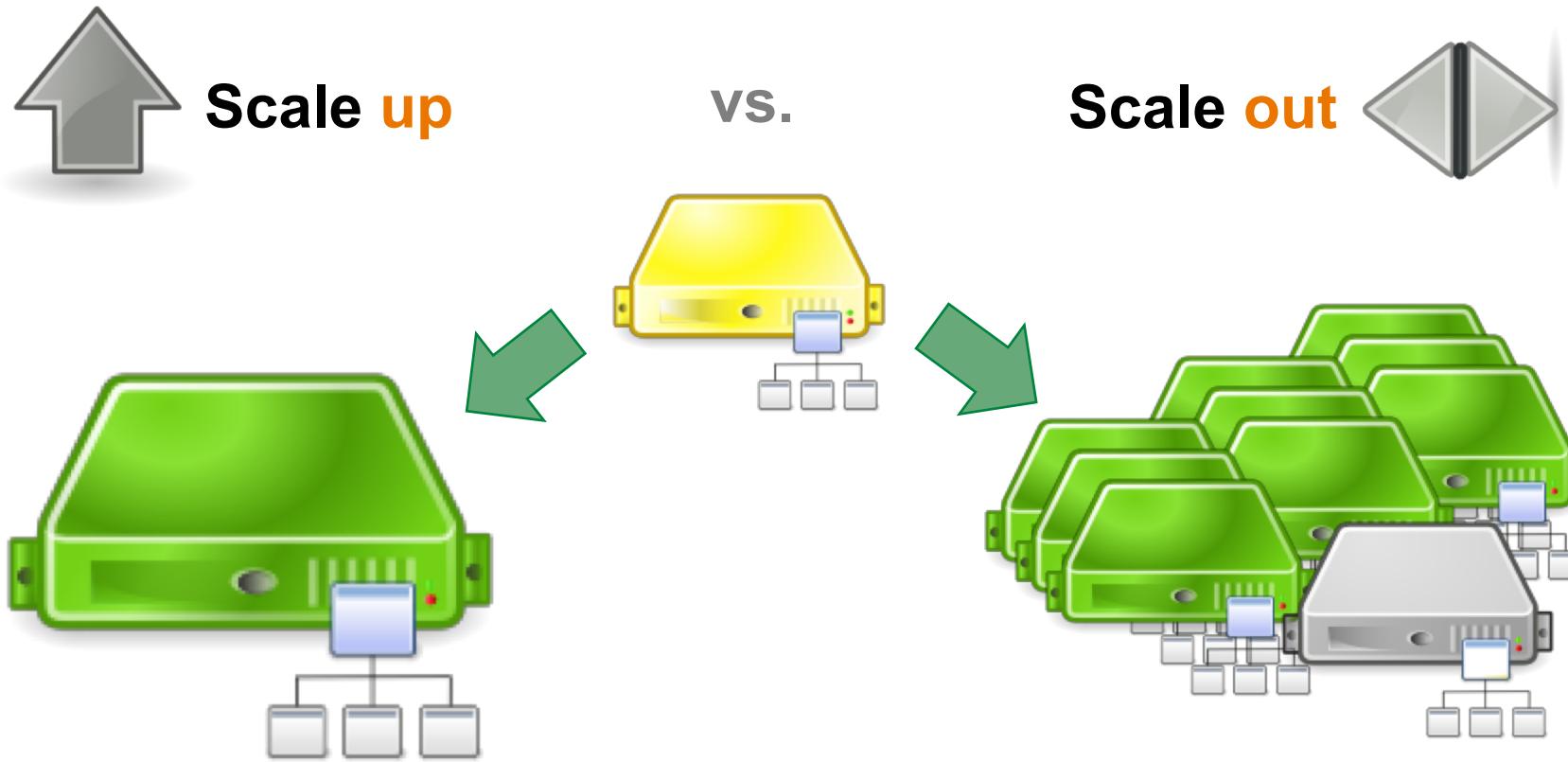
IaaS: your interconnected VMs



IaaS: Your craft

Your **application**

may need more...



You get

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

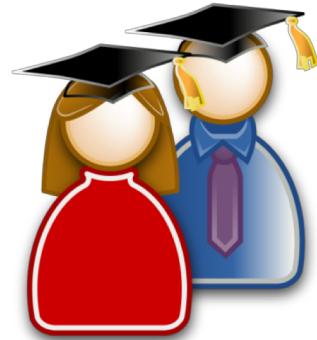
OpenNebula

- Web interface
- User groups
- (Custom) AppMarket
- Accounting



Accounting

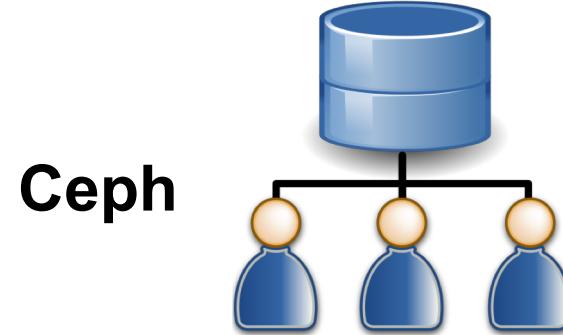
Per **project**



User accounts



CPU time



Local SSD



User applications

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

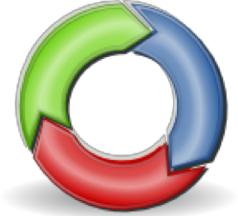
...from diverse **fields**:

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



Organic evolution

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



OpenNebula • 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



Demo



SURF

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



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