

# SURF Research Bootcamp

COMPUTE TRACK - HPC CLOUD



Nuno Ferreira, 2017.06.15



Technische Universiteit  
Eindhoven  
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# Compute Track Agenda

10:15 - 11:30 Introduction to UNIX

**12:30 - 14:30 HPC Cloud** (Ander Astudillo, Maithili Kalamkar, Nuno Ferreira)

12:30 Presentation: Introduction to the HPC Cloud

12:55 Demo: Web User Interface

13:00 Hands-on

15:00 - 17:00 Introduction to cluster computing

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Access up to 18th June guaranteed

# SURFsara services

**Expertise** | Consultancy | Training | Visualisation | Optimisation



## High Performance Computing

- Supercomputing
- Cluster computing
- HPC Cloud



## Data processing

- Data analytics
- HPC Cloud
- Grid services
- Visualisation



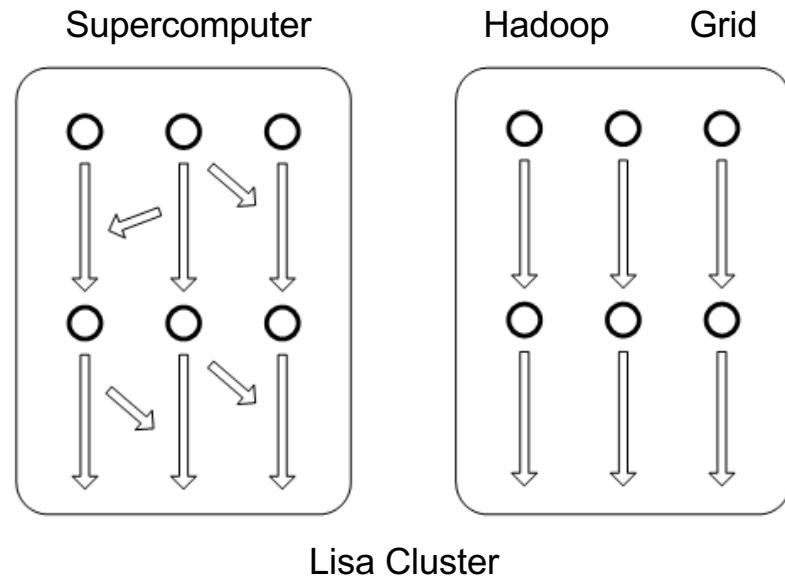
## Data services

- Mass Online Storage
- PID service
- Data management
- Preservation



Innovation & Collaboration

# Why different services?



# What is Cloud Computing?

**“Ask 10 people what the cloud is, get 11 answers.” [?]**

## **Essential Characteristics** <sup>[1]</sup>

On-demand self-service, Network access, Resource pooling, Elasticity, Measured service

## **Service Models** <sup>[1]</sup>

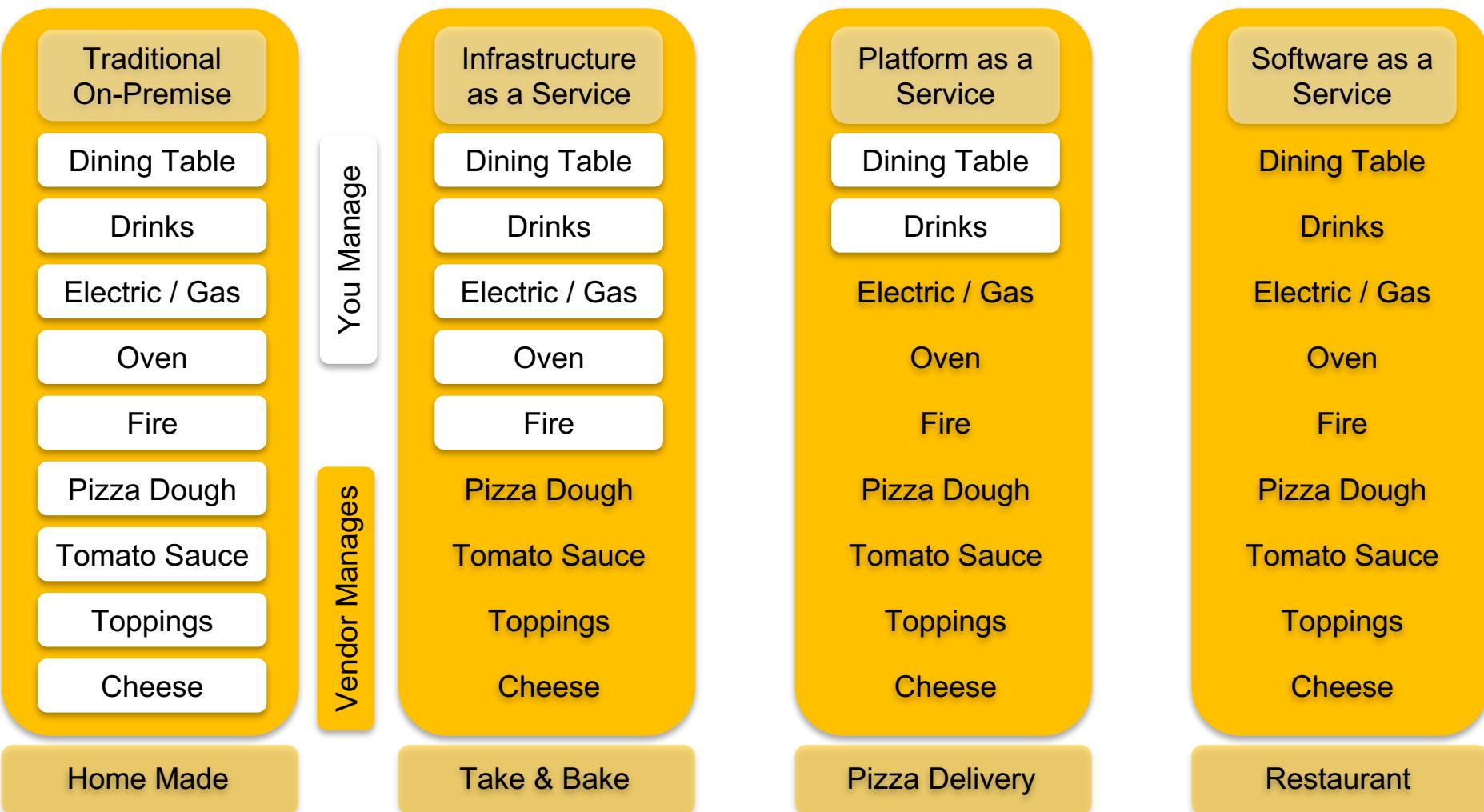
SaaS, PaaS, IaaS

[1]. [The NIST Definition of Cloud Computing](#)

# “Say Cloud one more time ...”



# Pizza as a Service



# Service Models: XaaS , X = [I,P,S, ...]

Traditional  
On-Premise

Applications

Data

Runtime

Middleware

OS

Virtualization

Servers

Storage

Networking

Infrastructure  
as a Service

Applications

Data

Runtime

Middleware

OS

Virtualization

Servers

Storage

Networking

Platform as a  
Service

Applications

Data

Runtime

Middleware

OS

Virtualization

Servers

Storage

Networking

Software as a  
Service

Applications

Data

Runtime

Middleware

OS

Virtualization

Servers

Storage

Networking

You Manage

Vendor Manages

# Infrastructure as a Service

Infrastructure  
as a Service

Applications

Data

Runtime

Middleware

OS

Virtualization

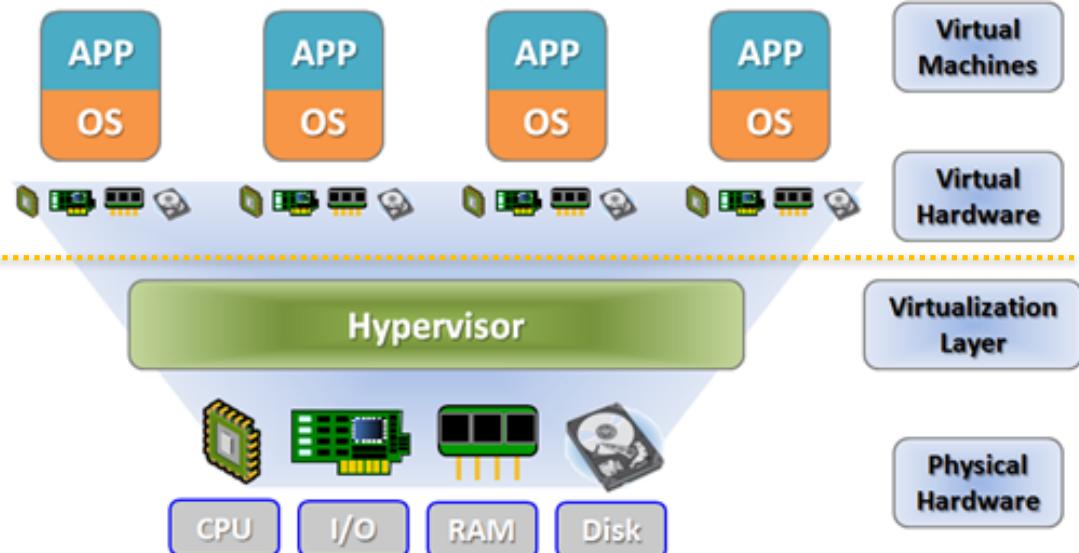
Servers

Storage

Networking

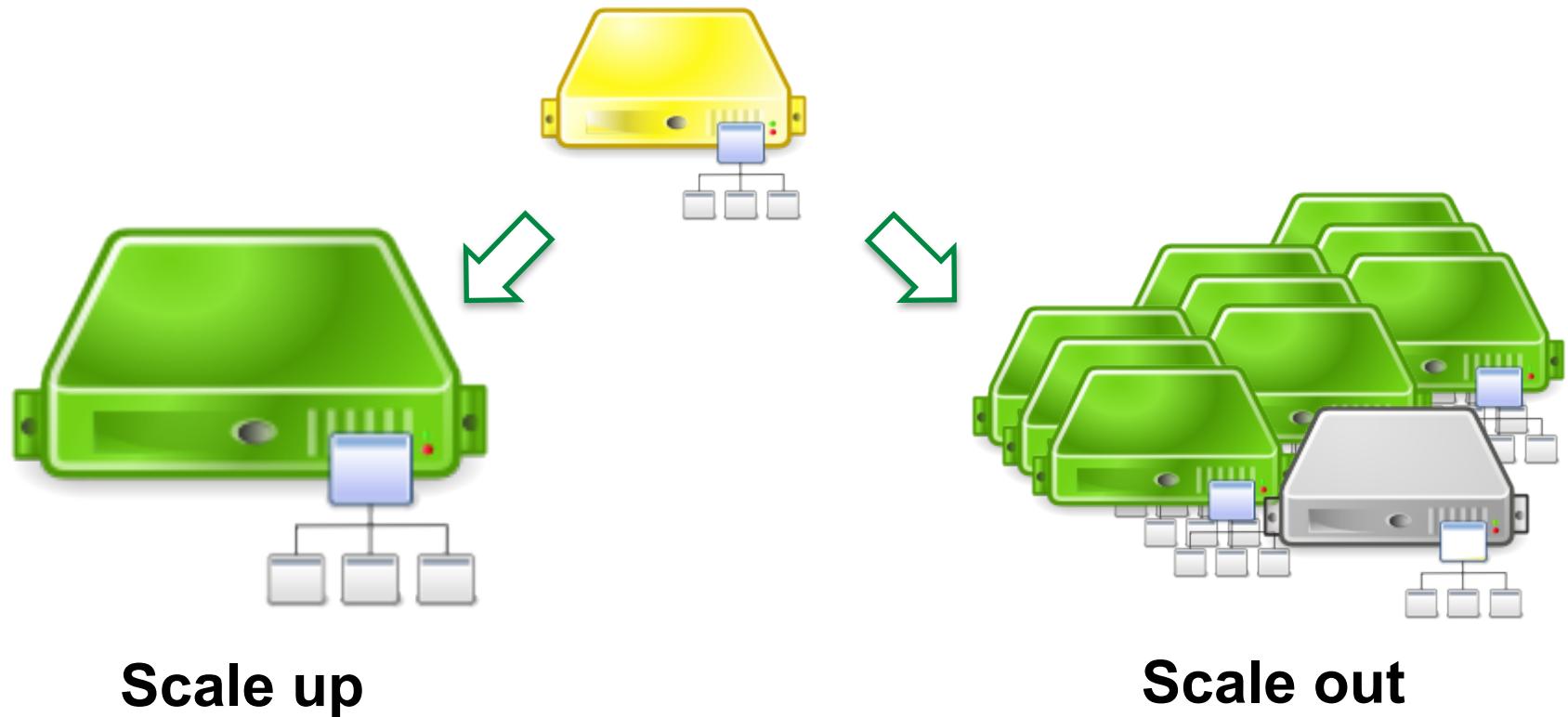
You Manage

Vendor Manages



[www.definethecloud.net](http://www.definethecloud.net)

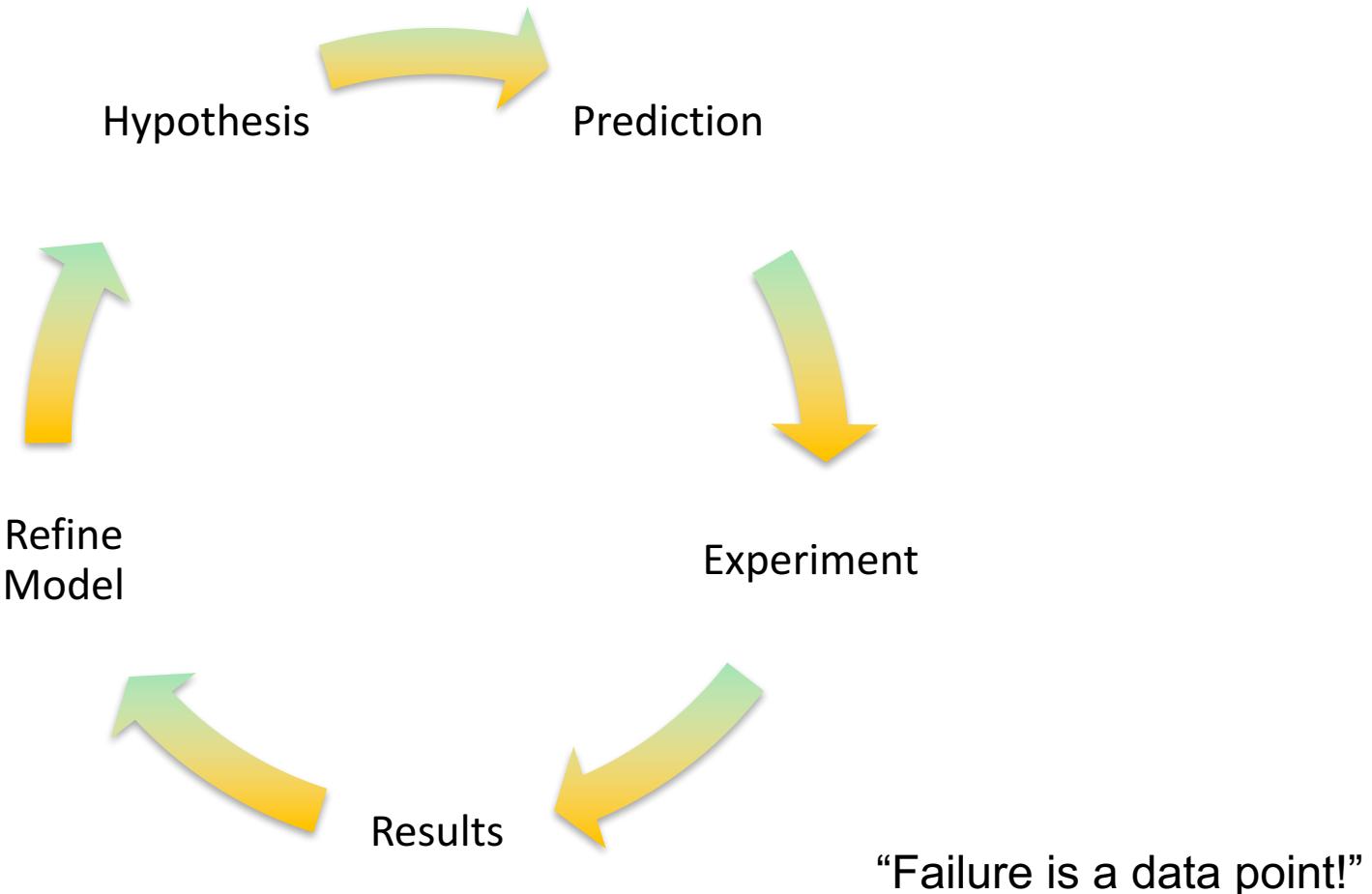
# Flexibility



**Scale up**

**Scale out**

# The Scientific Method



# HPC Cloud Running Projects

## Research fields:

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

## Use cases:

- Flexible software mix
- Big VMs
- Elasticity
- Provide a service to peers
- Software requiring licenses
- Set up, test and deploy workflows
- Training courses
- Intensive computing

# HPC Cloud Benefits

## General benefits

- Data & Computing in Dutch soil
- Data privacy inside your VM
- Unrestricted Internet access
- Collaborative work

## Technical benefits

- No overcommitting
- Tailor made your VM to your needs (flexibility)
- Root access!
- Controlled environment : choose your OS & packages
- Fast private network between VM's
- No maximum wall time!

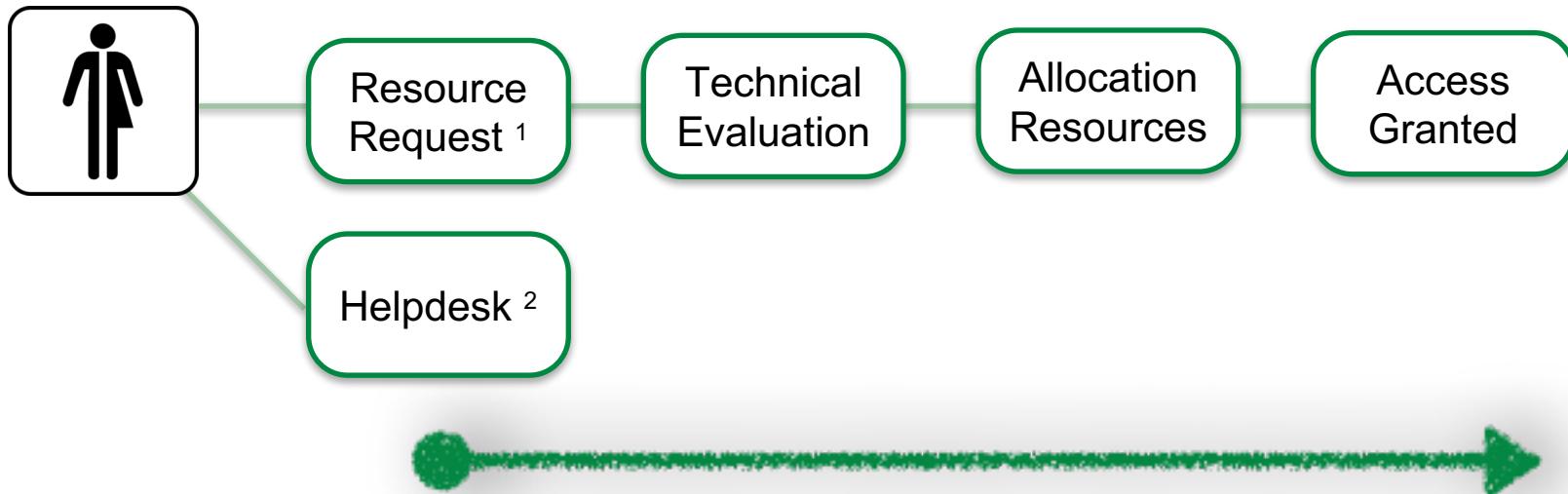


# HPC Cloud Shortcomings

- No Service Level Agreement
- No 24/7 Helpdesk service support
- You maintain everything in your VM
- You are responsible for all of your VM's behavior
- You must protect yourself against threats from the Internet
- Accounting on VM uptime, not just compute time (like gas, light)
- No automatic backups
- Your laptop is faster than a 1 core VM



# How to obtain an HPC Cloud account?



Time : hours to a few days

<sup>1</sup> [Resource Request form](#)

<sup>2</sup> [helpdesk@surfsara.nl](mailto:helpdesk@surfsara.nl)

# HPC Cloud Resources

## Compute Nodes

- 32 compute nodes: 64 vCPU, 256 GB RAM, 3.2 TB SSD
- 12 GPU compute nodes: 32 vCPU, 256 GB RAM, 800 GB SSD
- 1 High Memory Node: 40 vCPU, 2 TB RAM, 3.2 TB SSD
- More being installed

## Storage Nodes

- 900 TB Ceph net \* 3 redundancy : 2.7 PB total

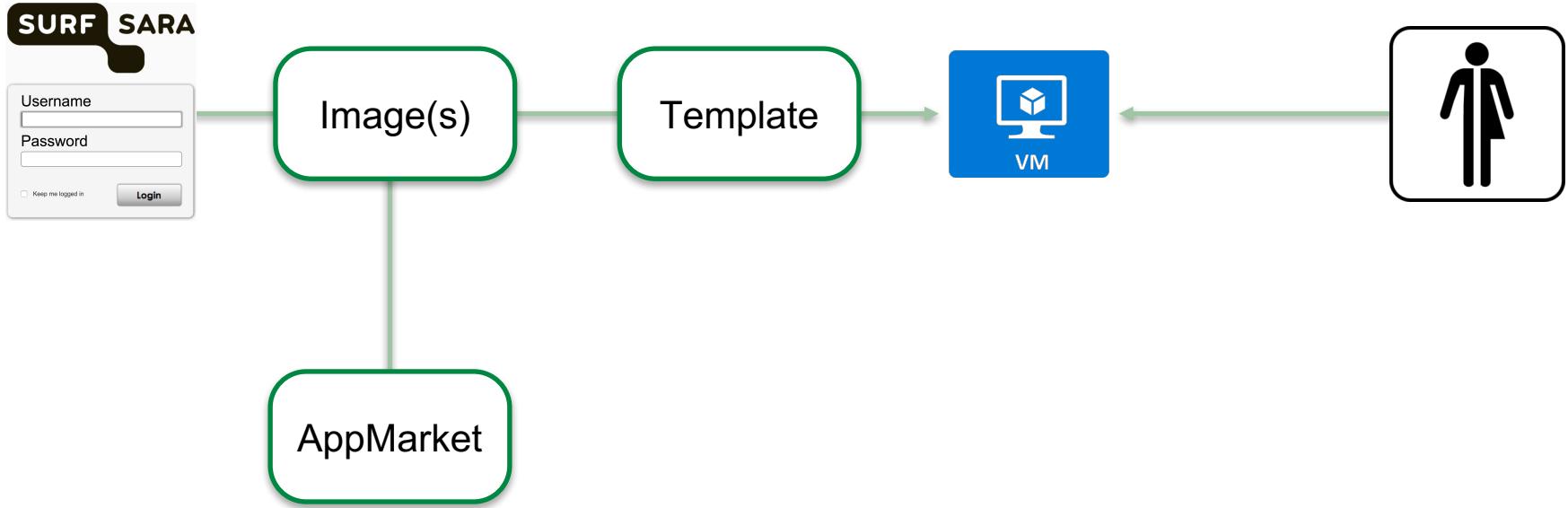
## Network

- 10 Gbit



[Top 10 beautiful data centers](#), Datacenter Dynamics, 2017.06.05

# Interacting with the HPC Cloud



# Demo



# Hands-On

**UI** : <https://ui.hpccloud.surfsara.nl/>

**Username:** s-campXY ; XY = [01, ...]

**Password:** ;-)

**WWW** : <https://doc.hpccloud.surfsara.nl/bootcamp-20170615>

**Tips** : At your own pace

Advice as a Service

