

SURF Research Bootcamp

INTRODUCTION TO HPC CLOUD COMPUTING



Nuno Ferreira, Ander Astudillo / 2018.04.10

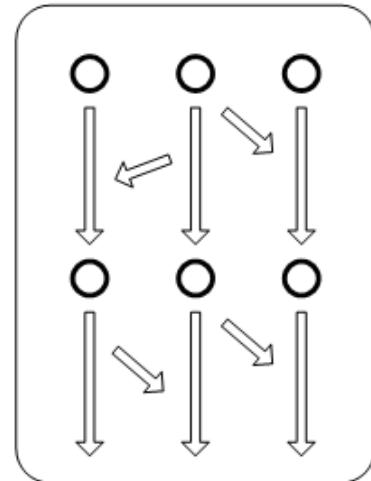


Agenda: Compute Track

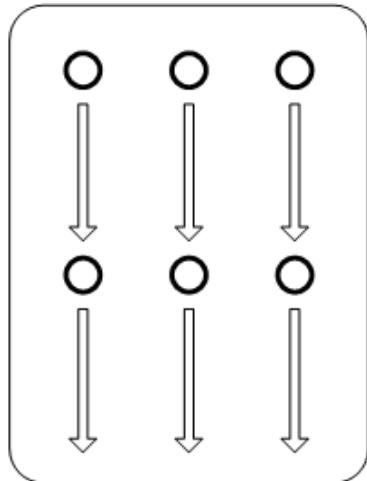
- 10:15 - 11:30 Introduction to UNIX
-
- 12:30 - 14:30 Introduction to Cluster Computing
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- 15:00 - 17:00 Introduction to HPC Cloud Computing
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- 15:00 Presentation: HPC Cloud Intro
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- 15:30 Hands-on
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-
- Access until the 17th April

Why different services?

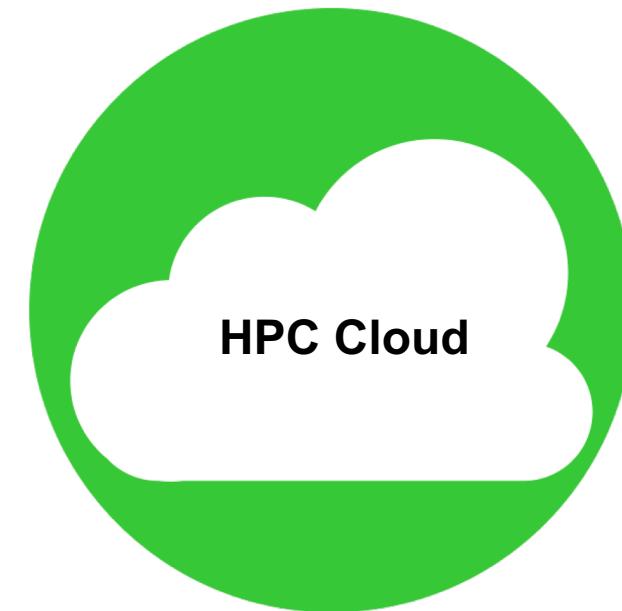
Supercomputer



Hadoop



Grid



What is Cloud Computing?

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

“Cloud computing is a model for enabling ubiquitous, convenient, **on-demand network access** to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be **rapidly provisioned and released** with minimal management effort or service provider interaction.”



Essential Characteristics

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

Service Models

- Software as a Service
- Platform as a Service
- Infrastructure as a Service



“Say Cloud one more time ...”



Pizza as a Service

You Manage

Vendor Manages

Traditional
On-Premise

Dining Table

Drinks

Electric / Gas

Oven

Fire

Pizza Dough

Tomato Sauce

Toppings

Cheese

Home Made

Infrastructure
as a Service

Dining Table

Drinks

Electric / Gas

Oven

Fire

Pizza Dough

Tomato Sauce

Toppings

Cheese

Take & Bake

Platform as a
Service

Dining Table

Drinks

Electric / Gas

Oven

Fire

Pizza Dough

Tomato Sauce

Toppings

Cheese

Pizza Delivery

Software as a
Service

Dining Table

Drinks

Electric / Gas

Oven

Fire

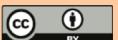
Pizza Dough

Tomato Sauce

Toppings

Cheese

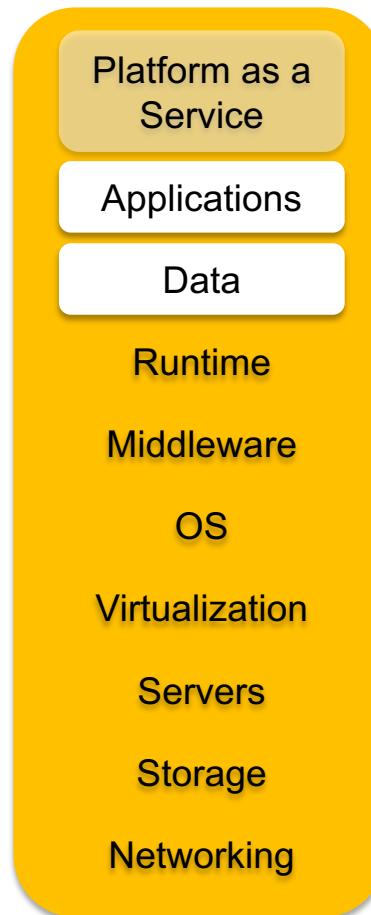
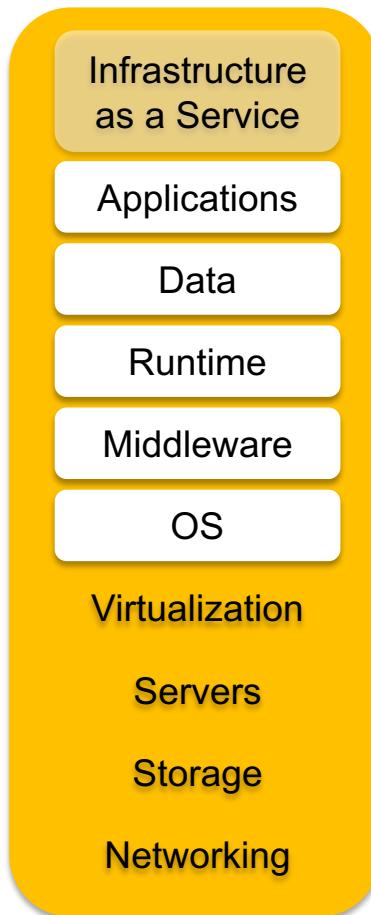
Restaurant



Cloud Service Models

You Manage

Vendor Manages

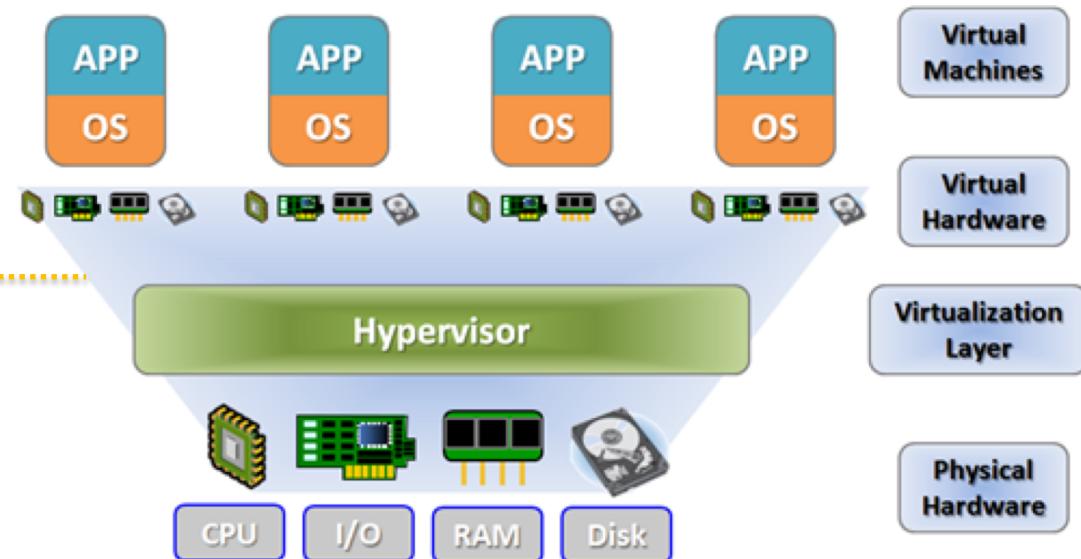


Infrastructure as a Service

You Manage

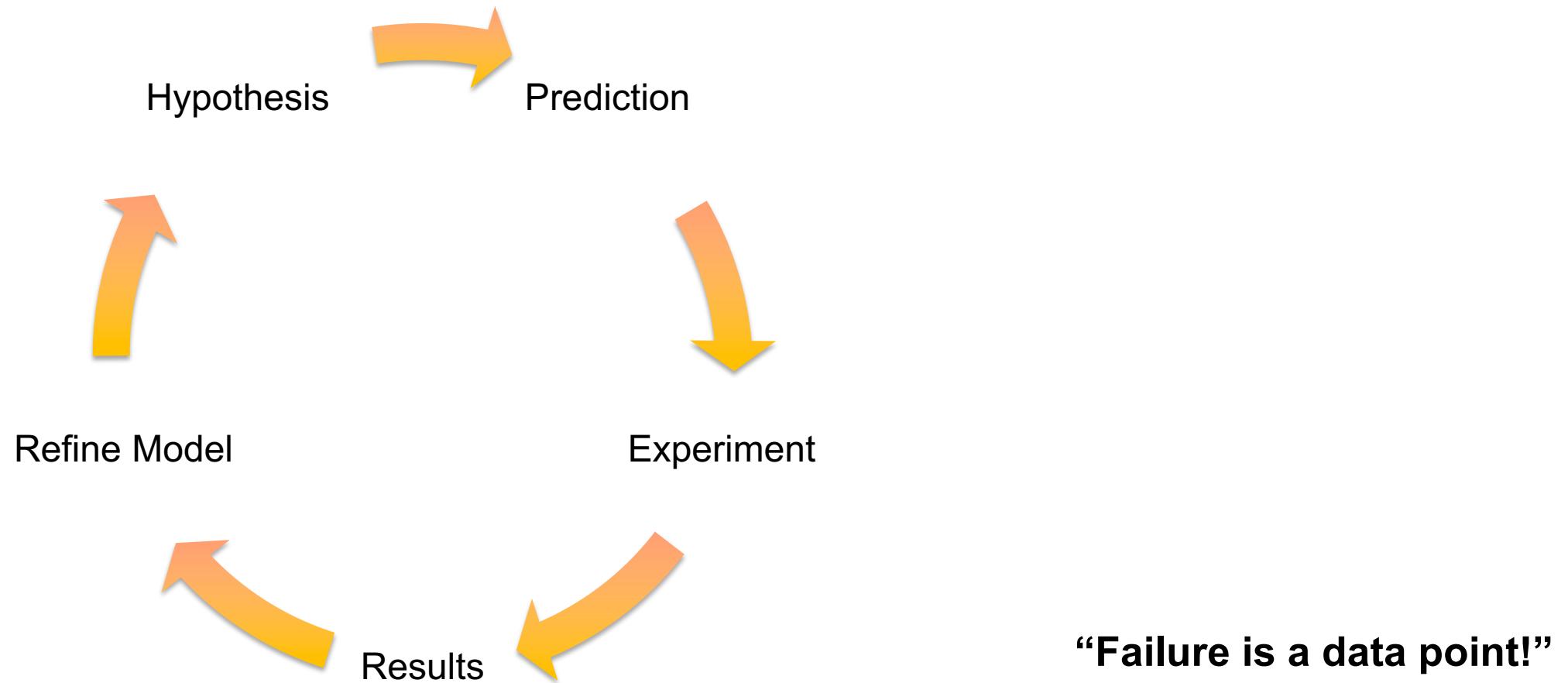


Vendor Manages



www.definethecloud.net

The Scientific Method



HPC Cloud 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!

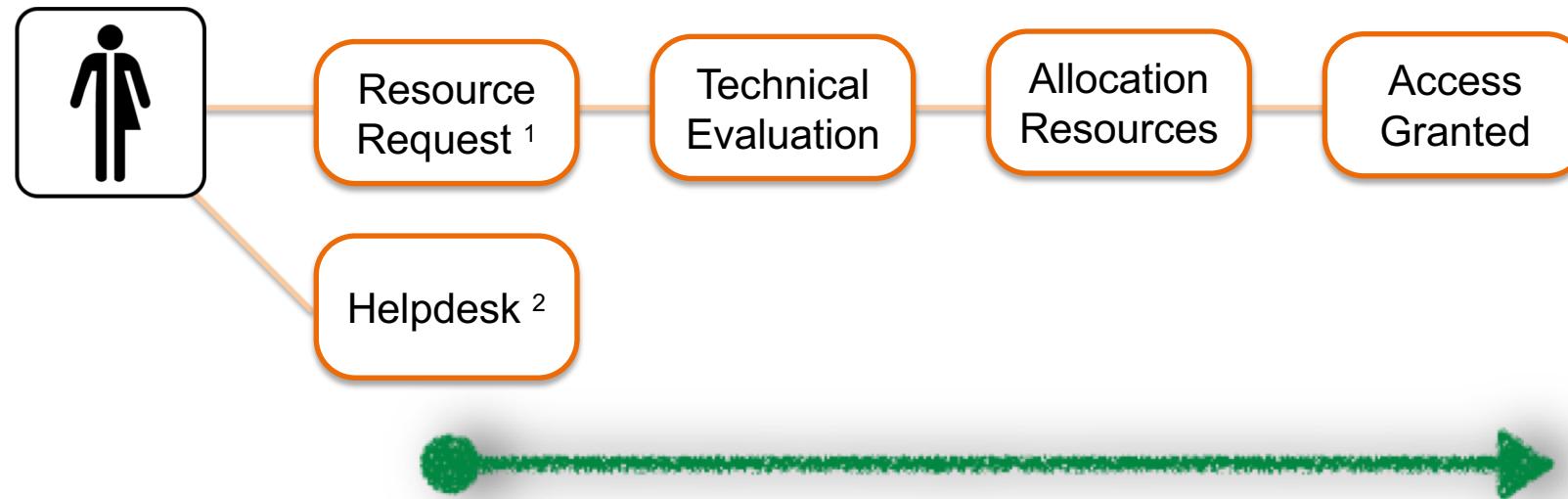


HPC Cloud Shortcomings

- 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?

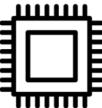
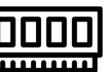
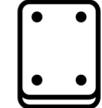


¹ [Resource Request form](#)

² helpdesk@surfsara.nl

HPC Cloud Resources

Compute Nodes

	#				
Intel(R) Xeon(R) CPU E5-2698 v3 @ 2.30GHz	21	64	256GB	3.2TB	
Intel(R) Xeon(R) CPU E5-2698 v4 @ 2.20GHz	10	80	512GB	3.5TB	
Intel(R) Xeon(R) Gold 6148 CPU @ 2.40GHz	7	80	576GB	3.0TB	
Intel(R) Xeon(R) CPU E5-2640 v3 @ 2.60GHz	11	32	256GB	800GB	4 (GRID K2)
Intel(R) Xeon(R) CPU E5-2609 v4 @ 1.70GHz	2	16	128GB	800GB	4 (Tesla P100)

Storage Nodes

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

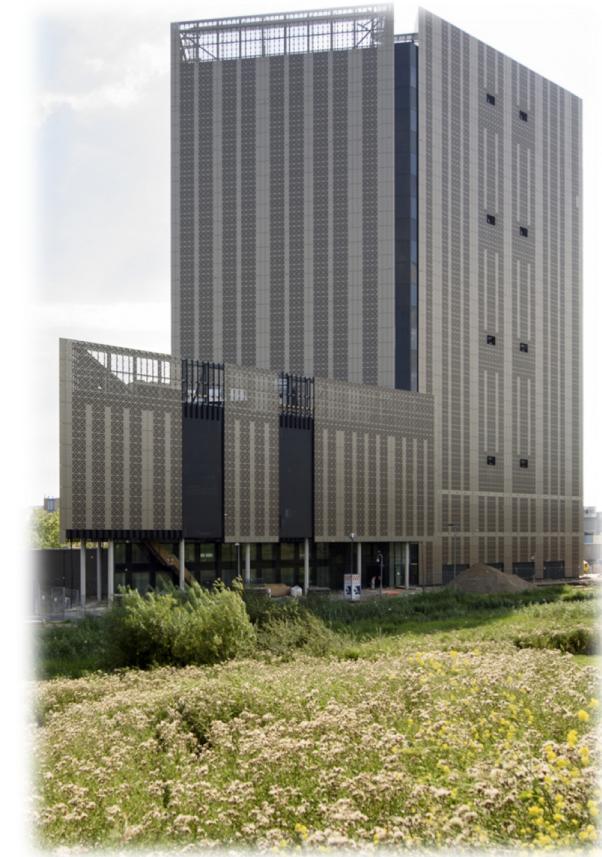
Network

- 10 Gbit

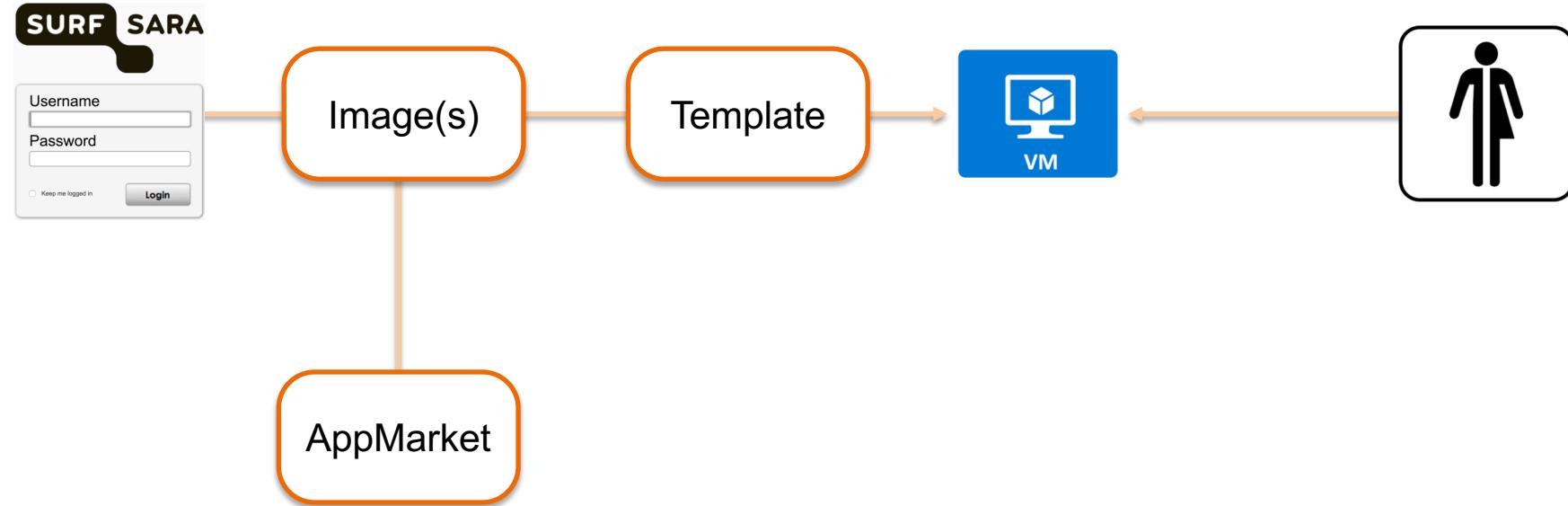
["GPU" icon](#) by Misha Petrishchev from [the Noun Project](#)

["SSD" icon](#) by mikicon from [the Noun Project](#)

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



Interacting with the HPC Cloud



demo

Hands-On

Access

HPC Cloud UI : <https://ui.hpccloud.surfsara.nl/>

Username : wolk-XYZ

Password : surf-XYZ

WWW : <https://doc.hpccloud.surfsara.nl/>

