Connection with SSH: Windows session

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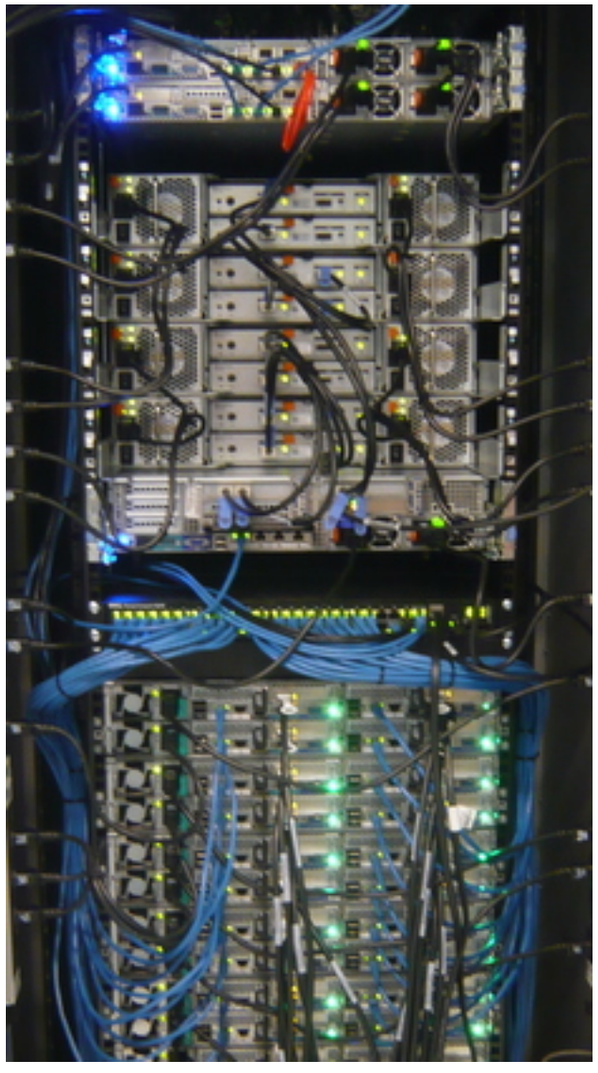
Plan of the talk

- Cluster presentation
  - ➡ how the cluster are organised
  - ➡ On which machine you can connect and from where
- SSH theory
  - ➡ What is a public/private key
- SSH exercise
  - ➡ How to get your keys
  - ➡ Use of MobaXterm
  - ➡ Frequent error
  - ➡ SSH agent
- Transfer file from/to cluster

Node in a cluster

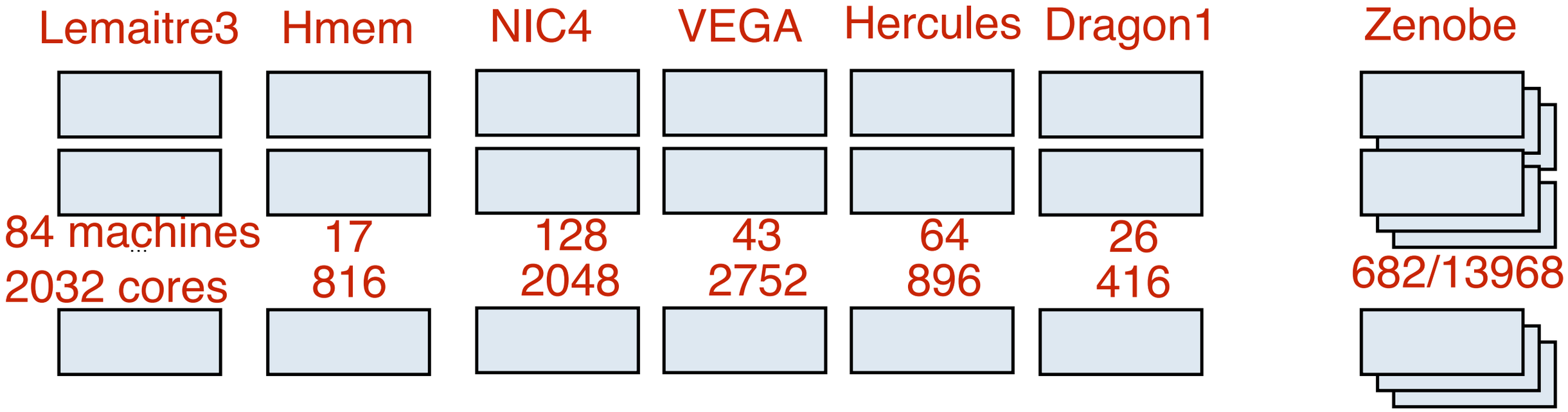
- A cluster is a set of machine

Lemaitre 3

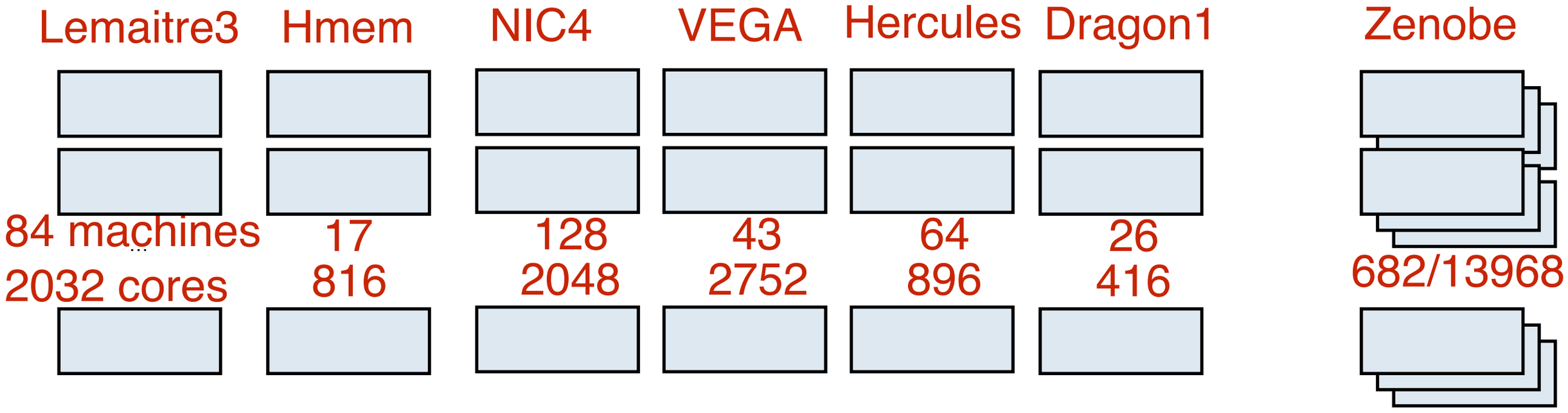


NIC4

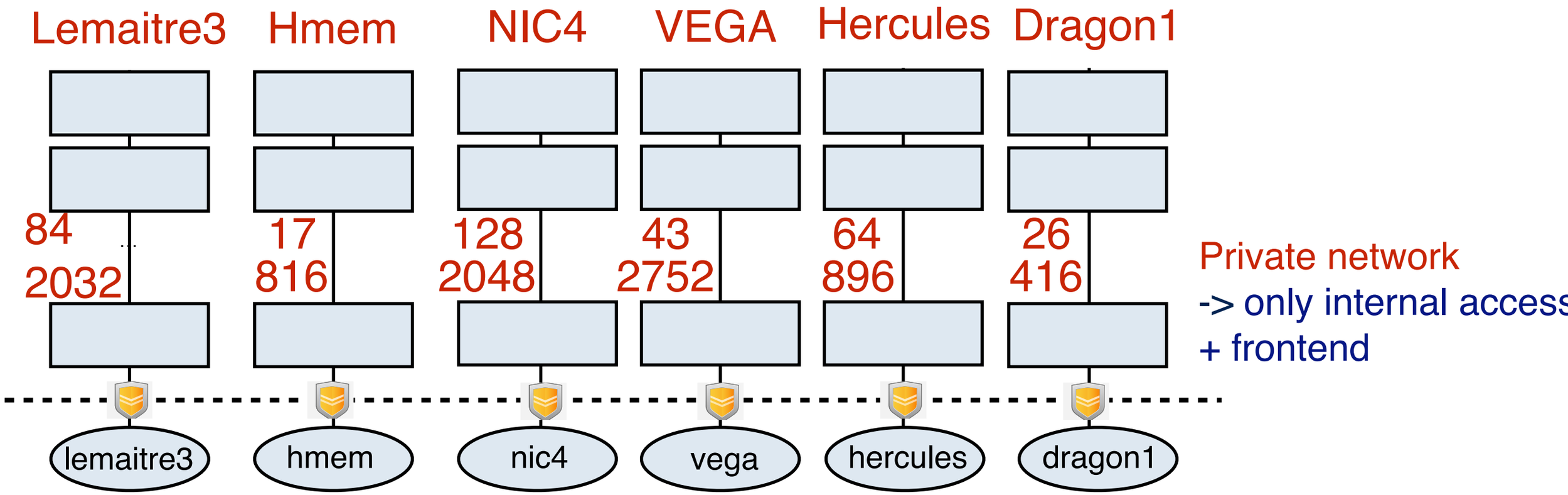
Zenobe



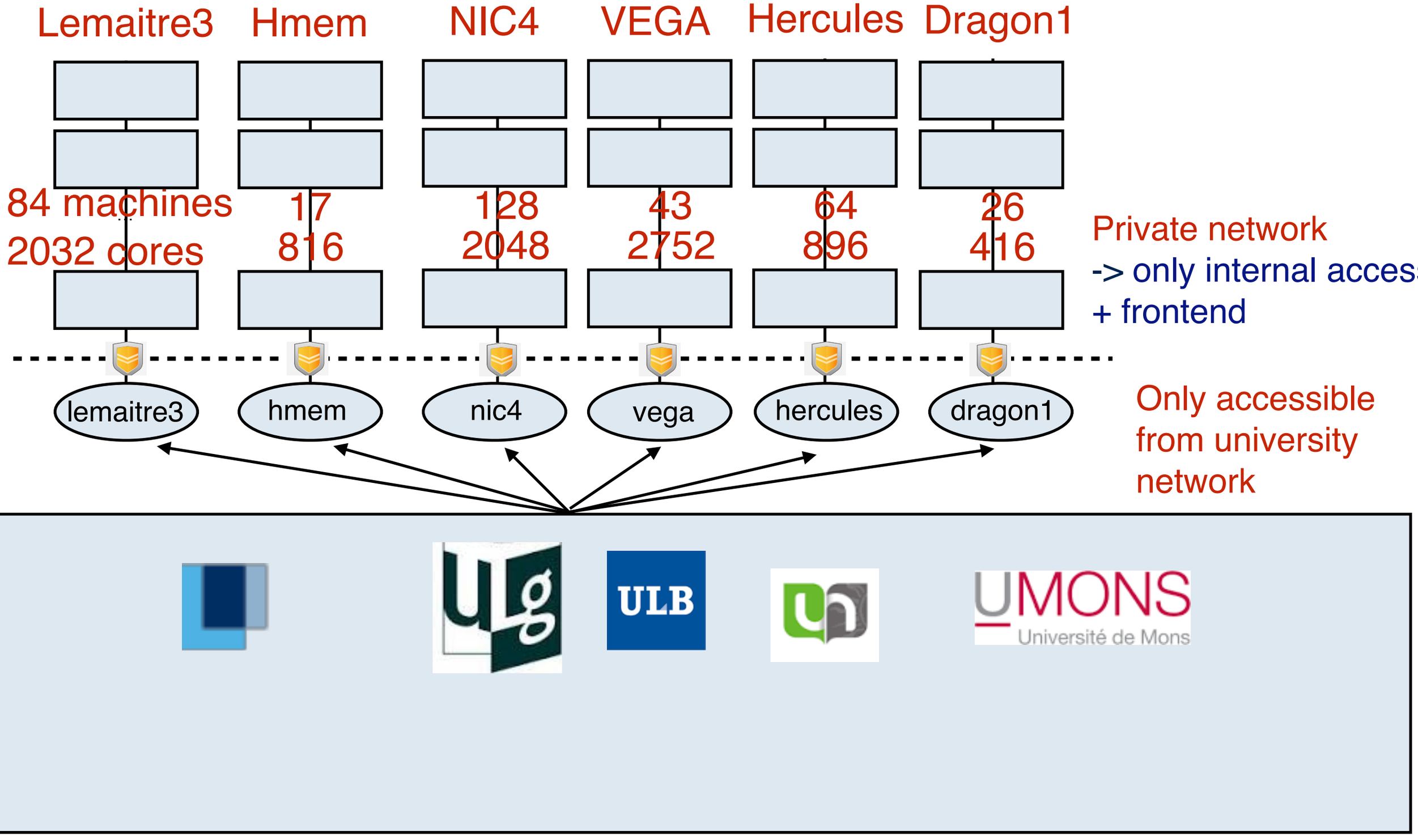
- Close to 9000 cores available trough your login
  - ➡ 14k more with zenobe (require approval but same login)
  - ➡ More available at European level (Prace program)
    - ✦ European competition to receive cpu time
- Not all machine are the same
  - ➡ Do not use hmem because of the tutorial

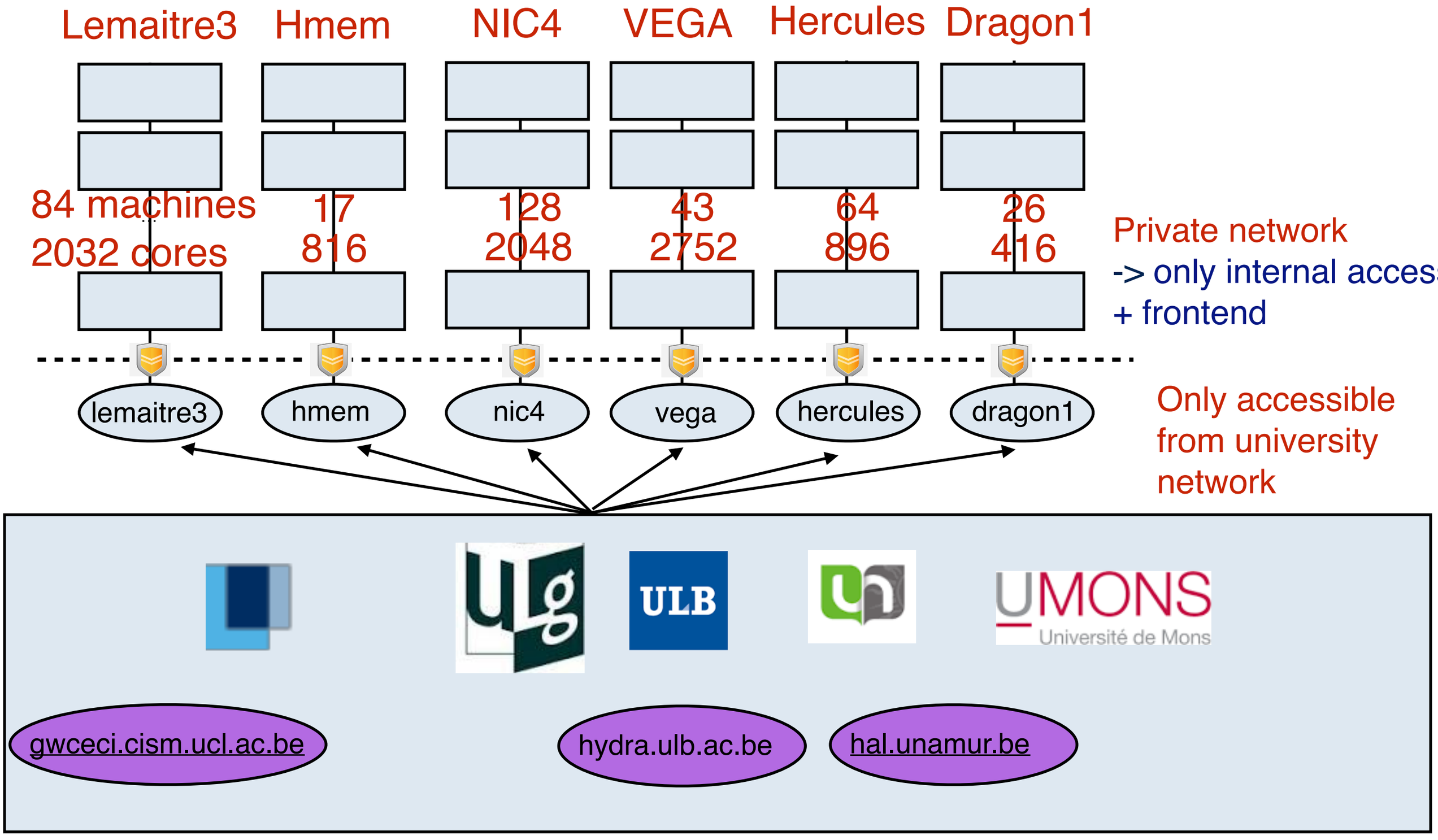


- You do not need/want to physically connect to all those machines to run script
  - ➡ Difficult to control fair share of the machines
  - ➡ Using a job scheduler -> SLURM
  - ➡ See slurm session for details on how to request machine for running a job



- To request machine, you connect to the FRONTEND
  - ➡ Only machine available that you can access directly
    - ✦ Only from the University network
  - ➡ No heavy jobs on that machine
    - ✦ You will impact everyone
    - ✦ rather use debug/fast partition


Lemaitre3
Hmem
NIC4
VEGA
Hercules
Dragon1
84 machines
2032 cores
17
816
128
2048
43
2752
64
896
26
416
Private network
-> only internal access
+ frontend
lemaitre3
hmem
nic4
vega
hercules
dragon1
Only accessible
from university
network
ULB
UMONS
Université de Mons



- From outside your university (home / abroad/ …)
  - ➡ Use a gateway or a VPN

How to connect

Office

- Connect to a frontend
- Submit jobs

Home

- Set up your university VPN
- Connect to a frontend
- Submit jobs

OR

- Connect to a gateway
- Connect to a frontend
- Submit jobs

SSH concept

Each user can enter the computer via a dedicated door protected via a key hole

Key hole = Public key

The user has the associate key

Physical key = Private key

To protect the key it is store in a safe with digicode

Digi-code = Pass-phrase

SSH concept

Key hole
=
Public key

Physical key
=
Private key

Digi-code
=
Passphrase

- When you create/renew your CECI account
  - ➡ We generate the public key (key hole)
    - ✦ Set it up on all cluster
  - ➡ We generate the private key (crypted by your passphrase)
  - ➡ Send it to YOU by email (we do not have any copy)

- Public key
  - ➡ Used to encrypt data
  - ➡ Use to verify digital signature
  - ➡ One copy is store on all CECI cluster

- Private key
  - ➡ Used to decrypt data
  - ➡ Create digital signature

steps of a ssh connection

1. Establishing communication and Negotiate algorithm of encryption
2. Host Identification
   - ➡ Host send his public key + message sign with Host private key

Example

```
$ ssh -i ~/.ssh/id_rsa.ceci jcabrera@hmem.cism.ucl.ac.be
The authenticity of host 'hmem.cism.ucl.ac.be (130.104.1.220)' can't be established.
RSA key fingerprint is 06:54:39:a0:5c:b5:56:b3:29:9e:96:67:a0:4a:c1:ff.
Are you sure you want to continue connecting (yes/no)?
```

FIRST TIME you connect to a frontend host from a client, you will be asked to accept the Public Key
Check the key fingerprint from CÉCI web site
http://www.ceci-hpc.be/clusters.html#hmem

steps of a ssh connection

1. Establishing communication and Negotiate algorithm of encryption
2. Host Identification
   - ➡ Host send his public key + message sign with Host private key
3. Generation of symmetric key based on a common integer
   - ➡ from now all data are crypted with that method
4. User identification
   - ➡ User send his username
   - ➡ User send his public key
   - ➡ User send a message signed with his private key

Enough of “theory”

Let’s get practical and connect to the machines !!

CÉCI Clusters News Training FAQ Documentation Support Contact Create/Manage Account

C.E.C.I

Consortium des Équipements de Calcul Intensif

6 clusters, 10k cores, 1 login, 1 home directory

CÉCI Login Management FAQ

I want to...

create an account

renew my account

join an existing project

create an account

You are about to request an account on the CÉCI clusters.

The first step is to enter your email address. You will recieve an email with a link to an online form which you will have to fill and submit.

Once your request has been approved, you will receive proper information on how to access the CÉCI clusters.

My email address:

@uclouvain.be

Send

Getting your private key (I)

- Users with email account access can ask for an account at: **https://login.ceci-hpc.be/init/**
  - ➡ Click 'Create Account'
  - ➡ Type in your email address
  - ➡ Click on the link sent to you by email.
  - ➡ Fill-in the form and hit the "Submit" button.
  - ➡ Wait ... (A sysadmin is reviewing your information). receive your private key by email.
    - ✦ Waiting too long tell us !
  - ➡ Store the id_rsa.ceci file in a safe location.

Getting your private key (I)

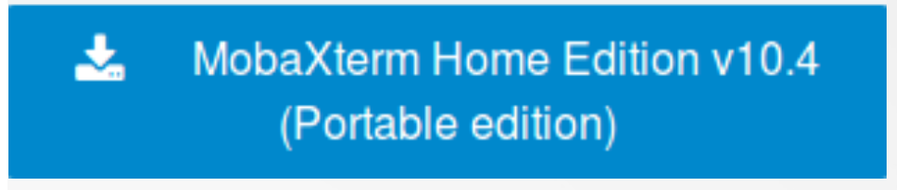
- Users without email account access, without CÉCI university email or who does not need a CÉCI account can use a key for one of the guest accounts.
- http://www.cism.ucl.ac.be/Services/Formations/pk/
- Save the private key in a file named id_rsa.ceci
  - ➡ Ask me for the passphrase

SSH tools for windows

- Putty
  - ➡ The most famous one
  - ➡ Only ssh agent
  - ➡ No file transfer, bad support of key
- MobaXterm
  - ➡ Very easy
  - ➡ Both connection and file transfer
  - ➡ The one that you will use here
- OpenSSH on Windows (latest windows 10)
  - ➡ Linux like experience
- Filezilla, winscp
  - ➡ File transfer ONLY

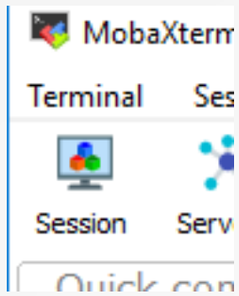
Install MobaXterm

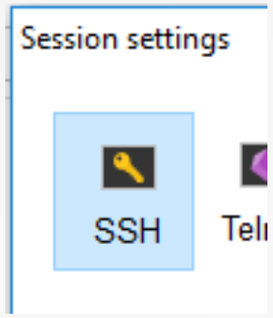
- search on your favorite web browser
- Download the free Portable edition
- Uncompress on folder ‘Documents\MobaXterm'
- Execute MobaXterm_Personal_X (where X is version number)
- If needed allow firewall acces for Private and Domain networks



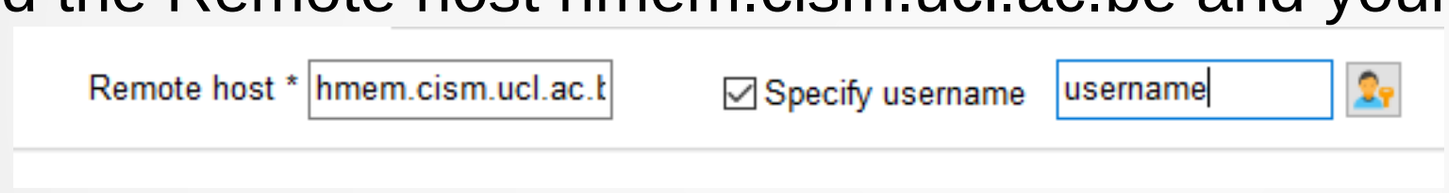
- MobaXterm is already installed on the Desktop of this room!

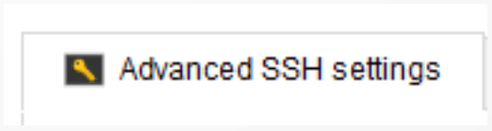
1) Save your id_rsa.ceci key file from your e-mail in a safe location

2) Click on Session 

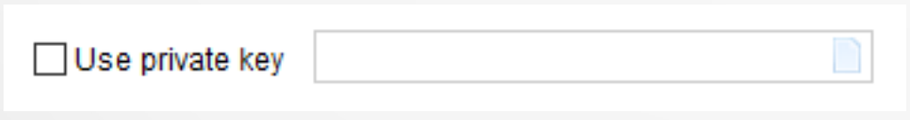
and SSH 

3) Add the Remote host hmem.cism.ucl.ac.be and your CÉCI user name



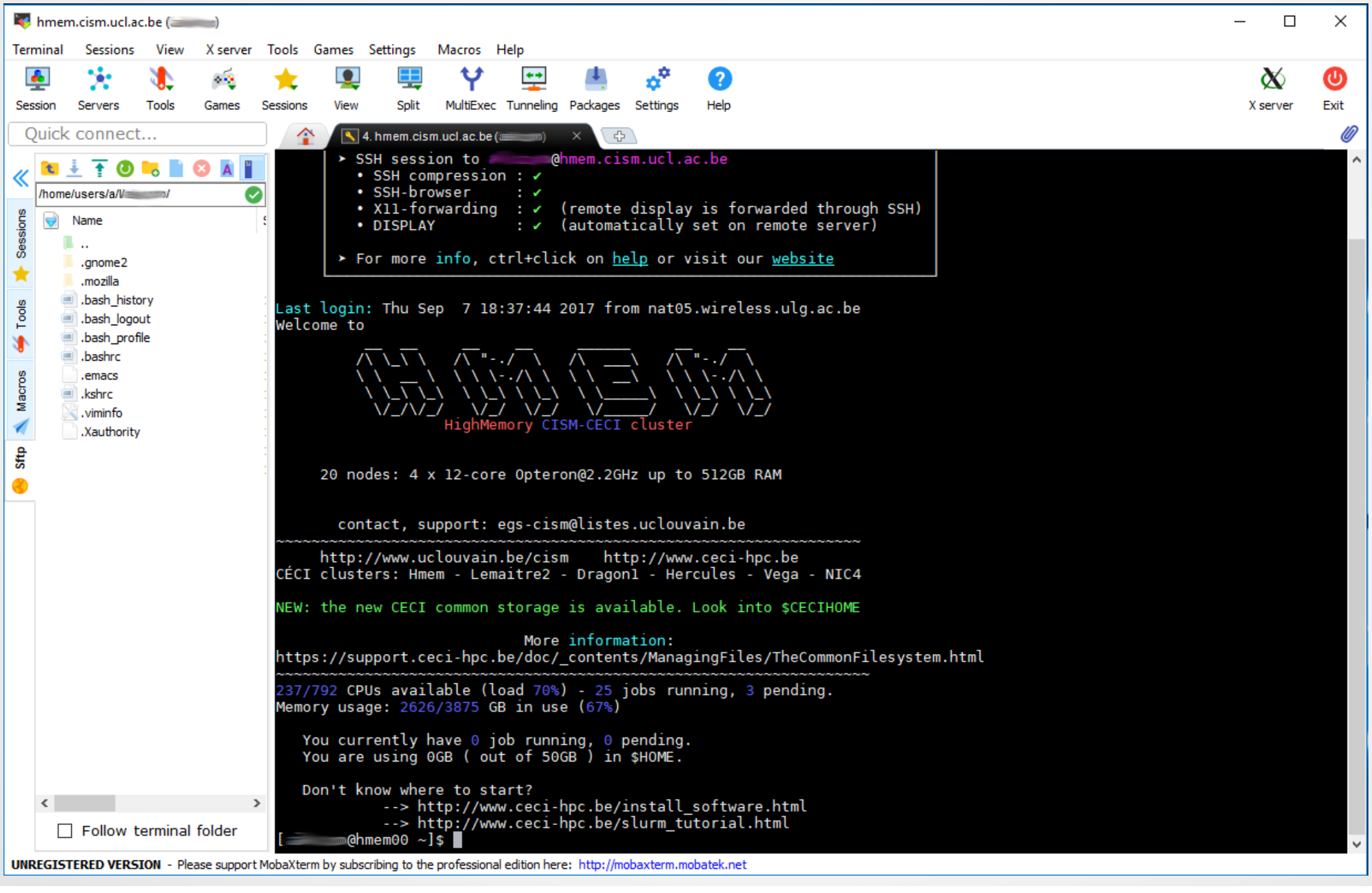
4) Select Advanced SSH Setting tab 

5) Select use private key and browse for your id_rsa.ceci file



6) click Ok button and enter your passphrase (characters are hidden)

You are now connected to hmem



Exercise

- On hmem run xeyes to check that you can forward graphics trough ssh
- Configure the other cluster that you need
  - ➡ lemaitre3
  - ➡ nic4
  - ➡ vega
  - ➡ dragon1
  - ➡ hercules

Frequent error

If, after running ssh, you are being asked for a password directly,

```
$ ssh hmem
dfr@hmem.cism.ucl.ac.be's password:
```

it means that your SSH client did not try to use the SSH key.

If, after running ssh, you are being asked for a passphrase, then a password,

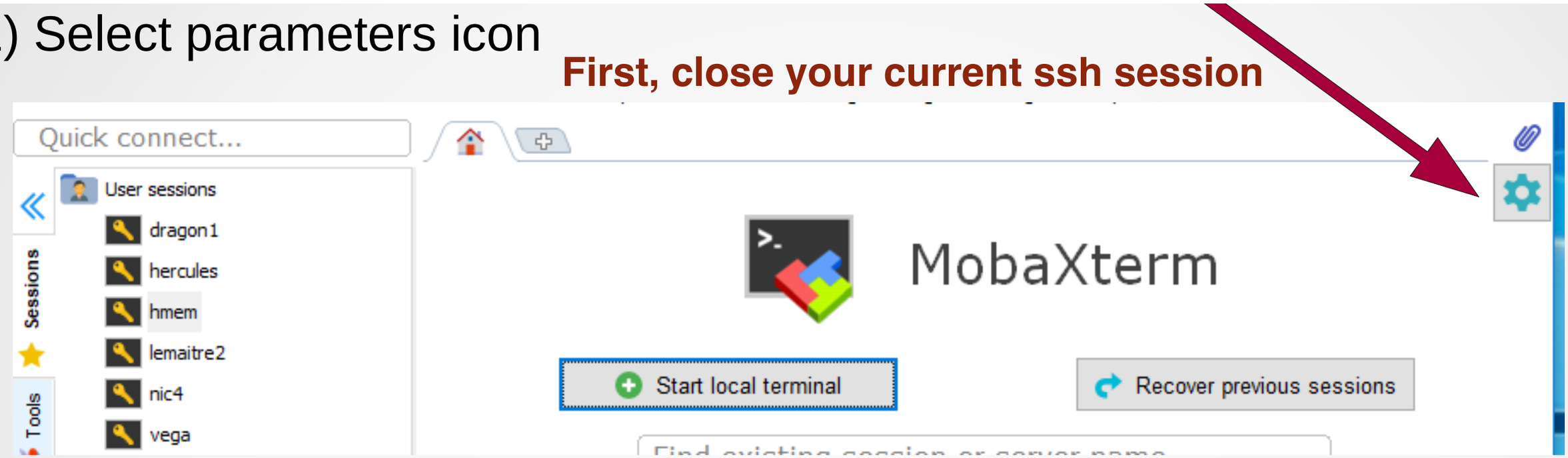
```
$ ssh hmem
Enter passphrase for key '/home/dfr/.ssh/id_rsa.ceci':
dfr@hmem.cism.ucl.ac.be's password:
```

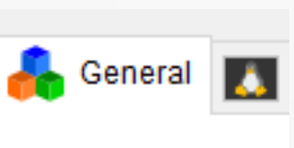
it often means that the user name you are using is not the correct one. It could also mean that you are trying to connect with the new private key while it has not been synchronized to the cluster yet (clusters are not synchronized simultaneously.)

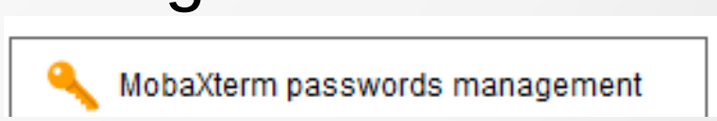
SSH AGENT

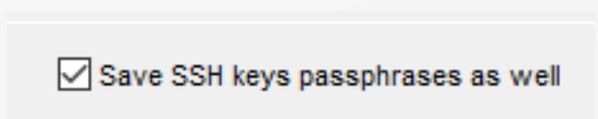
- Save your passphrase locally and let MobaXterm fill it for you!

1) Select parameters icon



2) Select on General tab  the password management

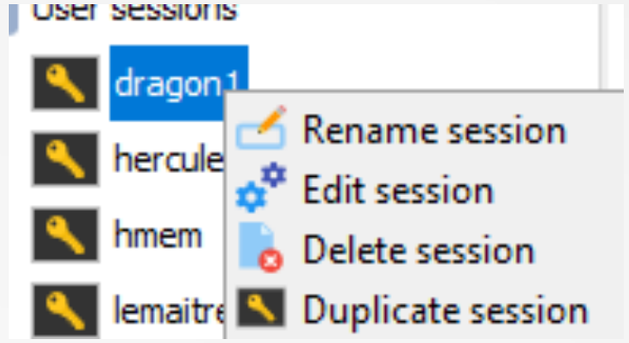


3) Check 'save ssh keys passphrases' 

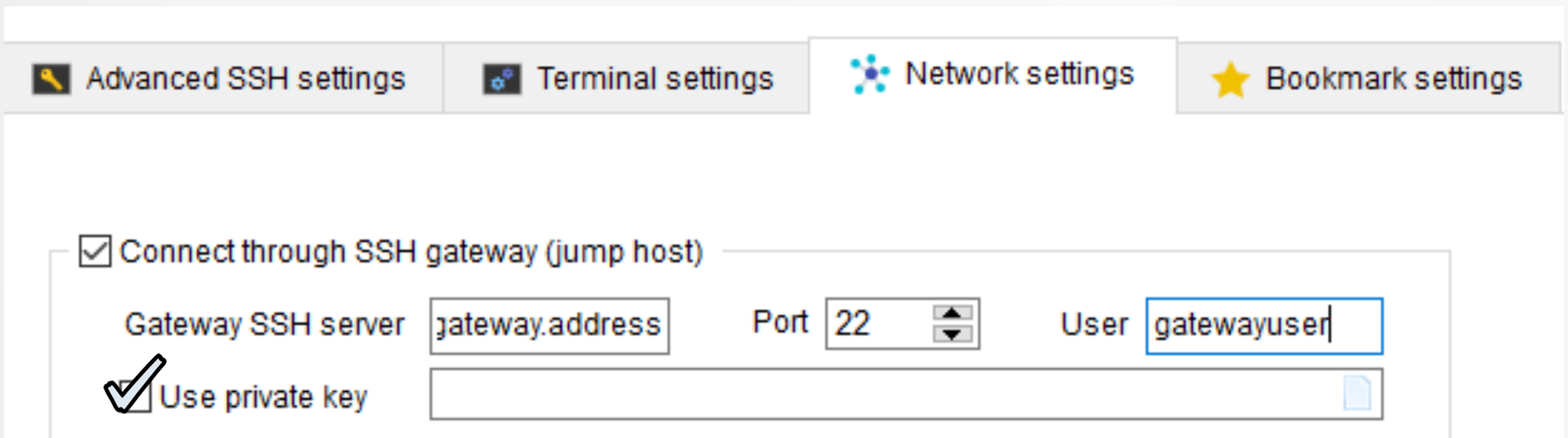
Connect from Outside UCL

- Need to go trough a gateway!

1) Right click on a session to duplicate and rename it.



2) Edit the new session, go to Select Network tab and add the gatewayadress and gatewayuser



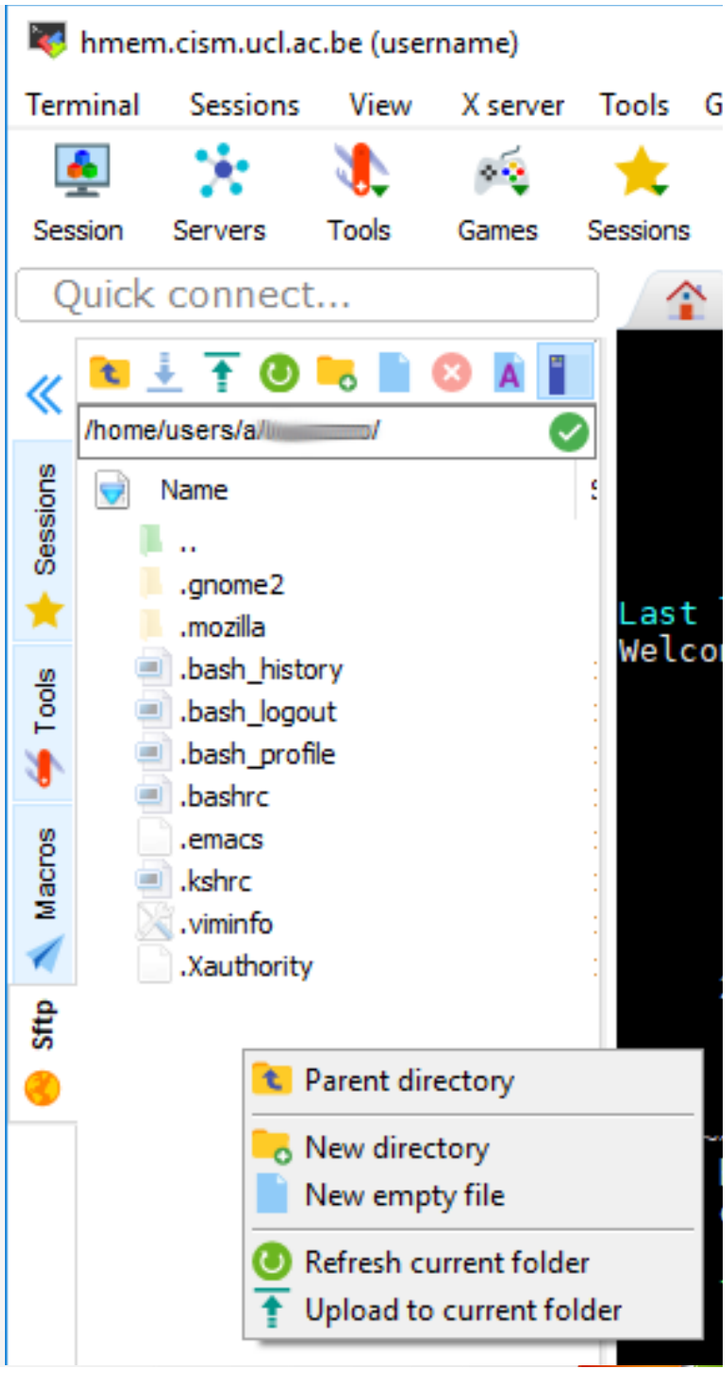
Indicate the path to your private key!

SCP/SFTP

1) Select Sftp tab on the left sidebar you get a file browser on the cluster you are connected to

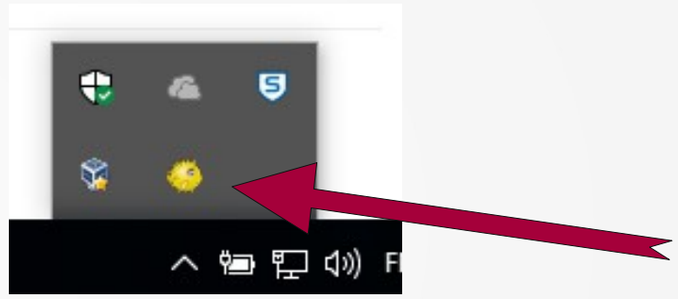
2) Drag and drop files from/to your computer to/from that panel and they will be copied to/from the cluster

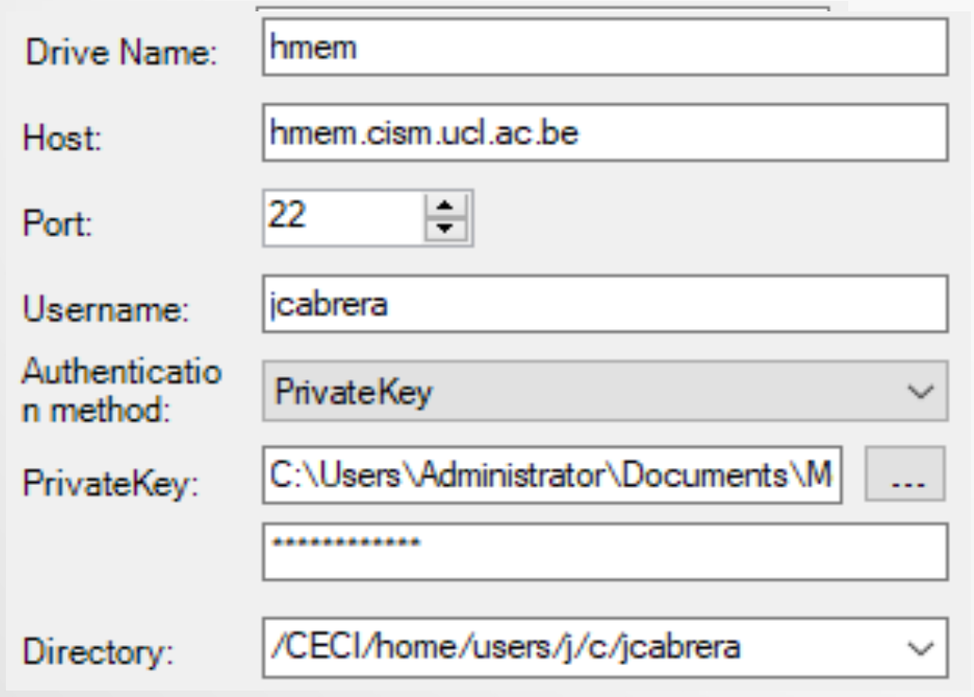
3) Right click on the panel and press the Refresh current folder button after you copied something or a new file or folder is created on the cluster



SSHFS

- Install equivalent fuse Libraries for windows (needs to be administrator)
  https://github.com/dokan-dev/dokany/releases/download/0.7.3-RC/DokanInstall_0.7.3-RC.exe
- Download win-sshfs
  https://github.com/Foreveryone-cz/win-sshfs/releases/download/1.5.12.8/Release1.5.12.8.zip
- Decompress in C:\Users\yourlogin\Programs\win-sshfs\
- Launch WinSshFS.exe and
  open the application with the task bar icon
- Configure the server





- Save profile and mount
  You will get new drives
  hmem has CECIHOME contents