



High Performance  
Computing &  
Big Data Services



[hpc.uni.lu](http://hpc.uni.lu)



[hpc@uni.lu](mailto:hpc@uni.lu)



[@ULHPC](https://twitter.com/ULHPC)

# HPC School - Beginner

S1-1 - Connection to ULHPC - Mac and Linux



# Overview



The main steps are:

1. Install the necessary software to connect to the ULHPC
2. Create a pair of SSH keys to authenticate yourself on the ULHPC
3. Set your public key in our authentication system
4. Establish a first connection

# Step 1 - necessary software



- Mac and Linux users have a pre-installed terminal
- You can install any other terminal however it is out of the scope of this lecture

## Step 2 - Creation of the SSH key pair

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- Start a terminal and type the following command: `ssh-keygen -t ed25519 -a 100`
- A new key pair should be created in a hidden folder of your home folder `~/.ssh`
- `~` (tilde) represents your user home directory
- You can list the files of that folder to ensure the presence of both
  - `~/.ssh/id_ed25519` (private key)
  - `~/.ssh/id_ed25519.pub` (public key)
- List the files via the following command: `ls ~/.ssh/`

Reminder: only share the public key file (`~/.ssh/id_ed25519.pub`)

Note: if you already have a pair of key, feel free to use it. However if you want to generate a new pair of key, be careful and set another key name or you may override and lose your existing key.

You can do: `ssh-keygen -t ed25519 -a 100 -f newname`



## Step 3 - Give us your public key



IPA is the name of our authentication server: <https://hpc-ipa.uni.lu>

When your account has been created, you should have received an email with a link to IPA in order to set your account password.

Before being able to connect to the cluster, you need to add your public key to your account.

 Full documentation available here: <https://hpc-docs.uni.lu/connect/ipa/#upload-your-ssh-key-on-the-ulhpc-identity-management-portal>

## Step 3 - Give us your public key

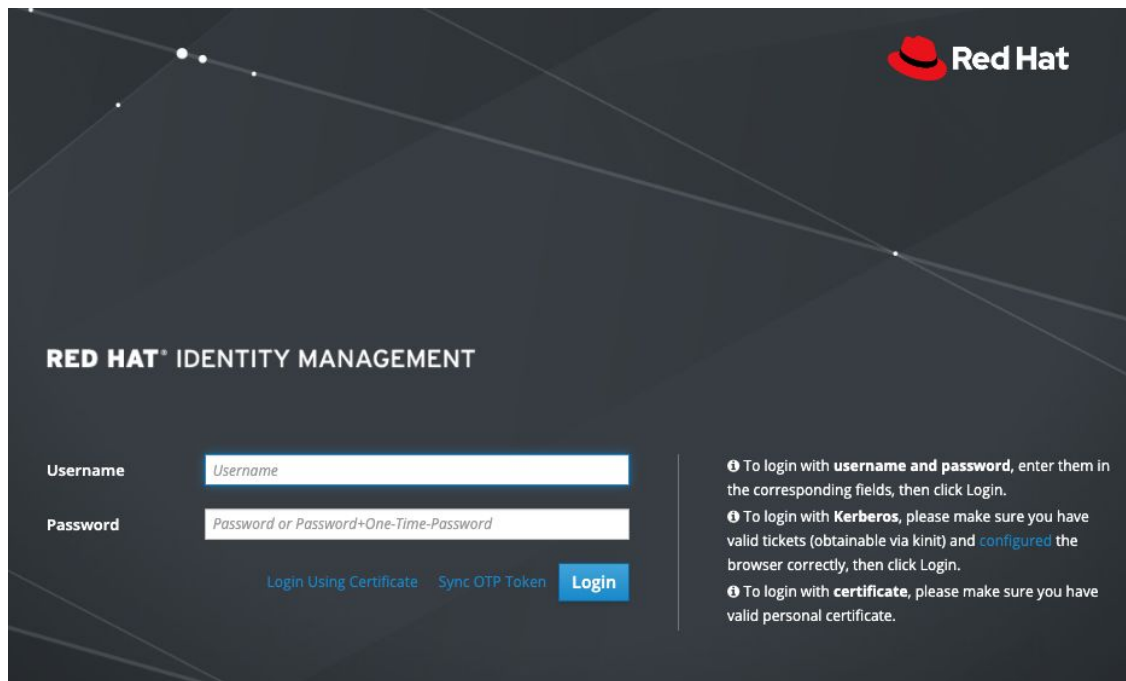
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- Log in on IPA with your password
- Select Identity / Users.
- Select your login (**this is not your UL account**, check your account creation email if you don't remember)
  - e.g., for me, it is `jschleich` and not `julien.schleich@uni.lu` or `julien.schleich`

 Full documentation available here: <https://hpc-docs.uni.lu/connect/ipa/#upload-your-ssh-key-on-the-ulhpc-identity-management-portal>

## Step 3 - Give us your public key

Go to the following URL: <https://hpc-ipa.uni.lu> and enters your ULHPC username and password




The image shows the Red Hat Identity Management login page. The page has a dark background with the Red Hat logo in the top right corner. The main heading is "RED HAT® IDENTITY MANAGEMENT". Below this, there are two input fields: "Username" and "Password". The "Username" field has a placeholder text "Username" and the "Password" field has a placeholder text "Password or Password+One-Time-Password". Below the password field, there are three links: "Login Using Certificate", "Sync OTP Token", and a blue "Login" button. To the right of the input fields, there are three instructions for login methods, each preceded by a red hat icon: "To login with **username and password**, enter them in the corresponding fields, then click Login.", "To login with **Kerberos**, please make sure you have valid tickets (obtainable via kinit) and **configured** the browser correctly, then click Login.", and "To login with **certificate**, please make sure you have valid personal certificate."


RED HAT® IDENTITY MANAGEMENT


Username


Password

[Login Using Certificate](#) [Sync OTP Token](#) [Login](#)

 **Red Hat**

 To login with **username and password**, enter them in the corresponding fields, then click Login.

 To login with **Kerberos**, please make sure you have valid tickets (obtainable via kinit) and **configured** the browser correctly, then click Login.

 To login with **certificate**, please make sure you have valid personal certificate.

# Step 3 - Give us your public key

Click on your username and a similar page should open:

Identity	Policy	Authentication	Network Services	IPA Server
<a href="#">Users</a>	Hosts	Services	Groups	ID Views
Automember ▾				

Active users » jschleich

✓ User: jschleich

jschleich is a member of:

Settings	User Groups	Netgroups	Roles	HBAC Rules	Sudo Rules
<a href="#">Refresh</a>	<a href="#">Revert</a>	<a href="#">Save</a>	<a href="#">Actions ▾</a>		

## Identity Settings

Job Title	<input type="text" value="Research scientist"/>
First name *	<input type="text" value="Julien"/>
Last name *	<input type="text" value="Schleich"/>
Full name *	<input type="text" value="Julien Schleich"/>
Display name	<input type="text"/>
Initials	<input type="text"/>
GECOS	<input type="text" value="Julien Schleich &lt;Julien.Schleich@uni.lu&gt;, Belval - MNO/E02/0225100, +352 46 66 44 5337"/>

## Account Settings

User login	<input type="text" value="jschleich"/>
Password	<input type="password" value="*****"/>
Password expiration	<input type="text" value="2024-02-21 07:57:44Z"/>
UID	<input type="text" value="5026"/>
GID	<input type="text" value="666"/>
Principal alias	<input type="text" value="jschleich@HPC.UNI.LUX"/> <a href="#">Delete</a>
	<a href="#">Add</a>



## Step 3 - Give us your public key

On the right side, find SSH public keys and click on the Add button



The screenshot shows a configuration interface with the following elements:

- Login shell:** A text input field containing `/bin/sh`.
- Home directory:** A text input field containing `/home/user`, followed by an **Undo** button.
- SSH public keys:** A section containing an **Add** button, which is highlighted by a red rectangular box.
- Certificate:** A section displaying a warning icon and the text **No Valid Certificate**.

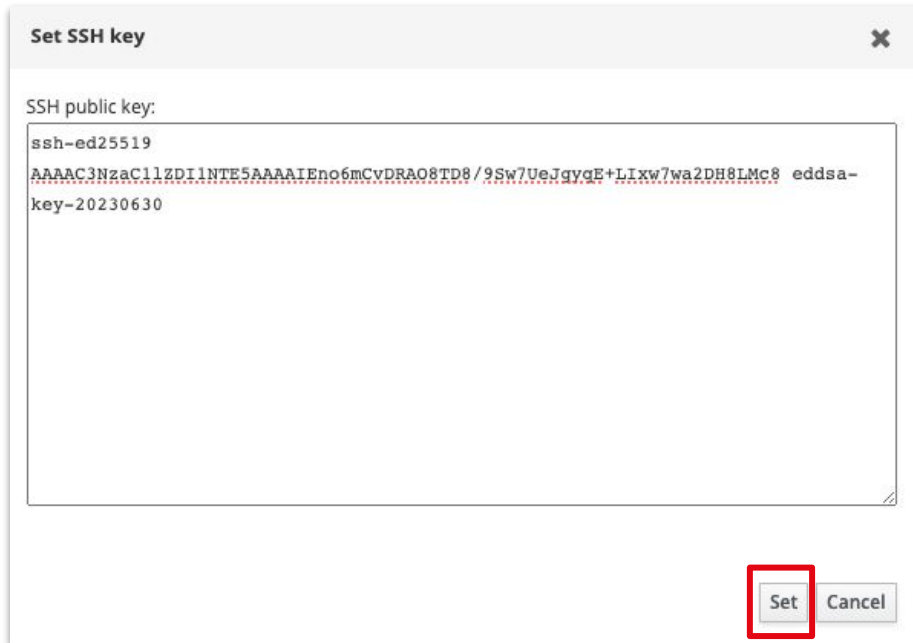


Full documentation available here:

<https://hpc-docs.uni.lu/connect/ipa/#upload-your-ssh-key-on-the-ulhpc-identity-management-portal>

## Step 3 - Give us your public key

Paste the content of your public key  
and click on Set



Set SSH key

SSH public key:

```
ssh-ed25519  
AAAAC3NzaC1lZDI1NTE5AAAAIEno6mCvDRAO8TD8/9Sw7UeJqygE+Lixw7wa2DH8LMc8 eddsa-  
key-20230630
```

Set Cancel



Full documentation available here:

<https://hpc-docs.uni.lu/connect/ipa/#upload-your-ssh-key-on-the-ulhpc-identity-management-portal>

## Step 3 - Give us your public key

Ensure that you clicked on **Save** before leaving IPA otherwise your key will not be taken into account.

✓ User: jschleich

jschleich is a member of:

Settings	User Groups	Netgroups	Roles	HBAC Rules
----------	-------------	-----------	-------	------------

Refresh Revert **Save** Actions ▾

Identity Settings

Job Title



Full documentation available here:

<https://hpc-docs.uni.lu/connect/ipa/#upload-your-ssh-key-on-the-ulhpc-identity-management-portal>

## Step 4 - First connection



To connect to the ULHPC via the ssh command, you can type:

- `ssh yourlogin@access-aion.uni.lu -p 8022` for AION
- `ssh yourlogin@access-iris.uni.lu -p 8022` for IRIS

In order to simplify the commands to this:

- `ssh aion-cluster`
- `ssh iris-cluster`

you can create a SSH configuration file which will contain the different, non-changing parameters.



Full documentation available here: <https://hpc-docs.uni.lu/connect/ssh/#ssh-configuration>

## Step 4 - First connection

The configuration file will look like this:

```
# ~/.ssh/config -- SSH Configuration
# Common options
Host *
    Compression yes
    ConnectTimeout 15

# ULHPC Clusters
Host iris-cluster
    Hostname access-iris.uni.lu

Host aion-cluster
    Hostname access-aion.uni.lu

# /\ ADAPT 'yourlogin' accordingly
Host *-cluster
    User yourlogin
    Port 8022
    ForwardAgent no
```

Do not type it, next slide contain a link to that configuration file

## Step 4 - First connection

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- You should create the following file: `~/ .ssh/config`
- This can be done in your terminal, e.g., using `nano ~/ .ssh/config` or any other text editor
- You can copy paste the configuration from this [documentation link](#).
- **Do not forget** to change your `login` with your ULHPC username

Note for MacOS users: `~/ .ssh` is a hidden folder as all folders starting with a dot ". To display all hidden folder, your can press `Command + Shift + .`



Full documentation available here: <https://hpc-docs.uni.lu/connect/ssh/#ssh-configuration>

## Step 4 - First connection



Upon your first connection, you will be prompted with the following message. Type yes to accept.

```
The authenticity of host '[access-aion.uni.lu]:8022 ([172.20.3.16]:8022)' can't be established.  
ED25519 key fingerprint is SHA256:jwbW8pkfCzXrh1Xhf9n0UI+7hd/YGi4Fly0E92yxxe0.  
This key is not known by any other names  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
```

# Step 4 - First connection

Success!

```
ssh aion-cluster

Welcome to access1.aion-cluster.uni.lu

=====
Aion Cluster
=====

Atos BullSequana XH2000 Direct Liquid Cooling (DLC) supercomputer
https://hpc-docs.uni.lu/systems/aion/
=== Computing Nodes === #RAM/n === #Cores ==
aion-[0001-0354] 354 Atos X2410 AMD compute blade      256GB      40704
                  (2 AMD Epyc ROME 7H12 @ 2.6 GHz [64c/280W])

Fast interconnect using InfiniBand HDR 100 Gb/s technology
Shared Storage with iris (raw capacity): 2180 TB (GPFS)+1300 TB (Lustre) = 3480TB

Support (in this order!)                                Platform notifications
- *NEW* Technical Docs ... https://hpc-docs.uni.lu      - Twitter: @ULHPC
- FAQ ..... https://hpc-docs.uni.lu/support/
- User Mailing-list ..... hpc-users@uni.lu (moderated)
- Helpdesk/Bug reports ... https://hpc.uni.lu/support (Service Now)
- HPC Devops/Admins ..... hpc-team@uni.lu (OPEN TICKETS)
ULHPC user guide is available on https://hpc-docs.uni.lu

*NEW (Apr. 6, 2023)*: Since Slurm 22.05, srun no longer inherits
--cpus-per-task from salloc/sbatch.
You should add '-c'/'--cpus-per-task' to srun or set SRUN_CPUS_PER_TASK
environment variable. **Please update your workflow accordingly.**

=====
/!\ NEVER COMPILE OR RUN YOUR PROGRAMS FROM THIS FRONTEND !
First reserve your nodes (using srun/sbatch(1))
/!\ BEWARE OF OS and architecture differences between Iris and Aion
Identify the cluster used to compile your programs (Ex: <name>_<cluster>)
Last login: Thu Jun 29 09:51:31 2023 from 10.186.26.12
(base) 0 [jschleich@access1 ~]$
```



# Troubleshooting



## Connection timeout

You probably use an internet connection that filters out the 8022 port. Try to use Eduroam or ethernet.

## No route to host

Check that there is no typo in your configuration

## Permission denied

- 1.You may have forgot to copy your public key in IPA
- 2.Check if you copy pasted correctly your key in IPA
- 3.If you already had other SSH keys, ensure you use the correct key to connect

# Connection the cluster - Troubleshooting



A different situation? [Open a support ticket here](#)

Provide as many details as you can about the issue and what you tried to solve it.