ACMAD HPC

User manual

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Abstract

This document is a quick start guide to describe how to access and how to use the High Performance Computing facility installed at ACMAD in June 2021. A user perspective is used to present the main components of the infrastructure to the scientific users, and is then explained how to effectively use the computational and storage capabilities of the solution.

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How to access

Scientific users can login to the ACMAD HPC by means of **IP 192.168.0.85** from the internal network in ACMAD. Please note that apparently this IP is not yet registered in the ACMAD local DNS.
Access is granted on SSH, so please contact your local system administrator in order to get an account created on the system.

Test accounts have been created with username *test-01, test-02, test-03.* Please ask for the password, but we strongly recommend configuring SSH passwordless access with private/public key procedures (info at the end of this document).

From a Linux server, you can access with a command like the following:

ssh test-01@192.168.0.85

From a Windows server, you should configure Putty/MobaXterm accordingly.

Once logged in, users arrive on the active login server (two login servers are configured in high availability).

Brief description of infrastructure

The environment is composed by

- 2 master/head node
- 2 **login** node
- 4 **compute** node each with 2 x Intel Xeon Gold 6248 @2.5GH (20 core each)
- 5 server node (lustre infrastructure: 2x mds server; 2x oss server; iml server)
- 4 storage nodes providing data for users' home, scientific software, Lustre parallel filesystem
- Infiniband 100Gbit network
- Ethernet switch 1/10 Gb network

The scientific users are allowed to use the **login** nodes and the **computing** nodes.
The technical specs of the CPU of the computing nodes are available here:
https://ark.intel.com/content/www/us/en/ark/products/192446/intel-xeon-gold-6248-processor-27-5m-cache-2-50-ghz.html.

Networks for the scientific users

The networks at users' disposal are the following:

- External network (192.168.0.0/16), used by the users to connect to the login nodes.
- InfiniBand network (10.60.0.0/16), the low latency and high bandwidth network used to serve the Lustre parallel file system, and needed to allow the Message Passing Interface communications among the computing nodes.

Storage

```
[root@login-01 ~]# df -h
Filesystem                                Size  Used Avail Use% Mounted on
devtmpfs                                   47G     0   47G   0% /dev
none                                       47G     0   47G   0% /dev/shm
tmpfs                                      47G  147M   47G   1% /run
tmpfs                                      47G     0   47G   0% /sys/fs/cgroup
/dev/sda2                                  20G  4,3G   16G  22% /
/dev/sda1                                 100M     0  100M   0% /boot/efi
/dev/sda5                                 2,0G   33M  2,0G   2% /tmp
/dev/sda3                                 6,0G  294M  5,8G   5% /var
/dev/sda7                                 1,8T   33M  1,8T   1% /local
master:/home                              1,9T   33M  1,9T   1% /home
master:/cm/shared                         1,9T   31G  1,8T   2% /cm/shared
10.60.0.7@o2ib,10.60.0.8@o2ib:/lustre     462T  782G  438T   1% /lustre
tmpfs                                     9,3G     0  9,3G   0% /run/user/0
```

Once the users has been logged in, the space at their disposal on the login node and on the computing nodes is the following:

- home of the user in /home/[username]
- Lustre filesystem space in /lustre/[username]

Please note that there is no quota configured on the cluster, so the usage of the free space is under control of the fairness of the users.

Services

Scientific software

The scientific software is made available by means of environment modules (http://modules.sourceforge.net/)
To have a list of the installed software, please type *module avail.*
Different softwares are already available to the users. To load a software, type *module load [software name]*

Queue system

A queue system has been installed to allow the scientific users to use the computing nodes. The configured queue system is Slurm (https://slurm.schedmd.com/).

For a short introduction to Slurm please visit Chapter 4 and Chapter 5 of the Bright Computing User Manual: https://support.brightcomputing.com/manuals/9.1/user-manual.pdf.

Public/private keypairs

How to generate a public/private SSH key - Linux

In Linux or Mac Os, creating a public/private SSH key is easy.

1. Open a terminal. Type:

ssh-keygen -t rsa

2. In the next screen, you should see a prompt, asking you for the location to save the key. The default location is the .ssh folder in your Home directory. You can just press “Enter” to accept the default setting, or change it according to your environment.

3. Next, you will be prompted to enter a passphrase. This is NOT the passphrase to connect to your remote host. This is the passphrase to unlock the private key so that no one can access your remote server even if they got hold of your private key. The passphrase is optional. To leave it blank, just press “Enter”.

4. Your public and private SSH key should now be generated. Open the file manager and navigate to the .ssh directory. You should see two files: id_rsa and id_rsa.pub.

Send to system administrator the public key file: id_rsa.pub in this example.

How to generate a public/private SSH key - Windows

We recommend using Putty or similar clients to connect from Windows to Linux via SSH.

https://winscp.net/eng/docs/ui_puttygen

http://www.putty.org/

As an alternative, the Bitvise SSH client provides a complete environment to remotely interact with a Linux machine.

https://www.bitvise.com/ssh-client-download
https://www.bitvise.com/getting-started-public-key-bitvise

Once received confirmation of account's activation, try to connect to ***Acmad Cluster*** *via SSH (via Putty/MobaXterm/other SSH client when using Windows)*