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.

How to access

Scientific users can login to the ACMAD HPC by means of IP 10.10.10.3, not yet registered in the ACMAD network.
Access is granted on SSH, so please contact your local system administrator in order to get an account created on the system.
Once logged in, users arrive on the login servers.

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)*

Brief description of infrastructure

The environment is composed by:
- 2 master/head node
- 2 login node
- 4 compute node each with 2xIntel Xeon Gold 6248 @2.5GH (20 core)
- 5 server node (lustre infrastructure: 2x mds server; 2x oss server; iml server)
- 4 storage nodes:
  - -me4012 with 9.5 TB, providing parallel file system
  - -me4024 with 4.8 TB, providing high performance parallel file system
  - -2x me4084 each with 255.2 TB, providing high performance parallel file system
- Infiniband 100Gbit network
- Ethernet switch 1/10 Gb network

Networks

The cluster network infrastructure is composed as described below:

- External network (192.168.0.0/16): where are connected two master nodes and two head nodes. This network is used to access the cluster.

- Internal network (10.10.0.0/16): where are connected the master nodes, the login nodes, the compute nodes and the server nodes. This network is used to deploy and manage the cluster.
- Out-of-band network (10.20.0.0/16): where are connected the bmc (idrac) of all the nodes. This network is used to control the bmc of the nodes. In this network are also connected the master and iml nodes for management and monitoring respectively.
- Infini band network (10.60.0.0/16): where are connected the master nodes, the login nodes, the compute nodes and the server nodes. This network is used to share the parallel file system to the compute nodes.

Storage

Storage is based on 4 storage nodes:
- One ME4012 with 9.5 TB
- One ME4024 with 4.8TB
- Two ME4084 with 255.2TB each

This space is redundant but not under backup, with raid 6 or 10 and will be used as space for users and software datas. The parallel filesystem used is lustre.

```
[root@master-01 ~]# ssh login-01
Last login: Tue Jun 15 16:20:02 2021 from master-02.cm.cluster
[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
```

Services

Scientific software