



CÉCI/CISM HPC training sessions



Consortium des Equipements
de Calcul Intensif
en Fédération Wallonie-Bruxelles

<http://www.cec-hpc.be> &
<http://www.cism.ucl.ac.be> (mainly the FAQ)

log on lemaitre3:

```
[localuser@localmachine]$  
ssh -X -i ~/.ssh/id_rsa.cec  
ceciloginname@lemaitre3.cism.ucl.ac.be  
Enter passphrase for key 'id_rsa.cec':
```

Welcome toWelcome to

The logo for LEMAITRE3, where each letter is filled with a black and white circuit board pattern.

Massively parallel CISM-CECI cluster

80 nodes: 2 x 12-core Intel Skylake 5118@2.3GHz, 96GB RAM
1:3-blocking OmniPath Architecture network

contact, support: egs-cism@listes.uclouvain.be

~~~~~  
CÉCI clusters: Lemaitre3 - Dragon1 - Dragon2 - Hercules2 - NIC5

287/1960 CPUs available (load 85%) - 54 jobs running, 22 pending.

\* Job info for user bvr: 0 job running, 0 pending.

\* Diskquotas for user bvr

| Filesystem | used      | limit     | files | limit     |
|------------|-----------|-----------|-------|-----------|
| \$HOME     | 18.1G     | 100G      | 30.2K |           |
| /scratch   | 0.0 B     | unlimited | 0     | unlimited |
| \$CECIHOME | 156.7 MiB | 100.0 GiB | 664   | 100000    |
| \$CECITRSF | 0.0 B     | 1.0 TiB   | 1     | unlimited |

\* Account expiration: 2023-05-12

Don't know where to start?

--> [http://www.cec-hpc.be/install\\_software.html](http://www.cec-hpc.be/install_software.html)

--> [http://www.cec-hpc.be/slurm\\_tutorial.html](http://www.cec-hpc.be/slurm_tutorial.html)

```
[bvr@lm3-w001 ~]$ hostname
```

```
lm3-w001.cluster
```

```
[bvr@lm3-w001 ~]$
```

```
gedit ~/.ssh/config
```

```
Host lemaitre3
```

```
    HostName lemaitre3.cism.ucl.ac.be
```

```
    User bvr
```

```
    IdentityFile ~/.ssh/id_rsa.cec
```

```
ssh lemaitre3
```

(see <http://www.cec-hpc.be/linux.html> )

**start an ssh agent delivering your ceci public key:**

```
[localuser@localmachine ~]$ ssh-add ~/.ssh/id_rsa.cec
```

```
Enter passphrase for ~/.ssh/id_rsa.cec:
```

```
Identity added: ~/.ssh/id_rsa.cec
```

Now, as long as the ssh agent is running on your local machine, you don't need to type your passphrase in order to log into a ceci cluster frontend (or to start a single instruction, like « uptime ») :



```
rsync -av source destination
```

```
vim sftp://lemaitre3/.bachrc
```

```
cd  
mkdir lemaitre3home  
sshfs lemaitre3: lemaitre3home  
cd lemaitre3home  
ls  
df -h .  
cd  
fusermount -u ~/lemaitre3home
```

```
alias
```

```
env
```

```
PATH and MANPATH
```

```
exercice :
```

```
cp /tmp/flops.c ~
```

```
wget http://ftp.belnet.be/mirror/ftp.gnu.org/gnu/hello/hello-2.8.tar.gz
```

## Modules and Software on Lemaitre3 or on Hercules2, Dragon2, nic5...

Meta Modules : releases/2017b 2016a ... 2021b

Toolchains intel >< foss

Toolain Independent Software = TIS

module load/avail/list/purge/swap

module avail | av list available software  
(modules)

|                            |                                                 |
|----------------------------|-------------------------------------------------|
| module load   add [module] | set up the environment to use the software (ml) |
| module list                | list currently loaded software                  |
| module purge               | clears the environment                          |
| module spider              | list all possible modules                       |
| module show                | show the commands in the module file            |
| module help                | get help                                        |

module show GCC

module spider

user collection : module save | restore

### Easybuild

```
apt-get install Python-3.7 :-)  
yum install ...  
rpm -Ivh ...  
tar -xvf *.tgz; make; make install
```

<https://easybuild.readthedocs.io/en/latest/>

EasyBuild is a software build and installation framework that allows you to manage (scientific) software on High Performance Computing (HPC) systems in an efficient way.

Toolchains : one or more compilers + libraries (e.g. MPI, BLAS/LAPACK,...)  
foss, intel

```
eb -S WRF
```

(long!)

```
module load use.own
```

```
----- /home/ucl/pan/bvr/.local/easybuild/modules/all -----
```

## Software on multi-architecture cluster

example on Manneback

```
# sinfo
```

```
Partitions:
Def* (5days) keira (5days) cp3 (5days) cp3-gpu (5days) gpu (5days)
Nodes:
#Nodes Partition Features Cores/Slots Memory GPUs
16 cp3 CascadeLake,Xeon,4214 48 187G
1 cp3-gpu SandyBridge,Xeon,E5-2640 20 63G TeslaK80:2
15 cp3 IvyBridge,Xeon,E5-2695v2 48 126G
2 cp3 K10,Opteron,6134 16 31G
8 cp3 Rome,EPYC,7452 128 504G
19 cp3 SkyLake,Xeon,4116 48 187G
25 Def* Haswell,Xeon,E5-2630v3 16 63G
8 Def* IvyBridge,Xeon,E5-2650v2 16 63G
1 Def* Milan,EPYC,7452 128 504G
13 Def* SandyBridge,Xeon,E5-2650 16 63G
1 Def* SandyBridge,Xeon,E5-4620 32 126G
1 Def* SandyBridge,Xeon,E5-4640 32 252G
6 Def* SkyLake,Xeon,5118 24 94G
1 Def* Xeon,E5649 12 47G
2 Def* Xeon,E5649 24 47G
1 Def* Zen,EPYC,7551 128 504G
1 gpu CascadeLake,Xeon,5217,Tesla,TeslaV100 16 377G TeslaV100:2
1 gpu CascadeLake,Xeon,5217,Tesla,TeslaV100 32 377G TeslaV100:2
1 gpu CascadeLake,Xeon,6244,GeForce,GeForceRTX2080Ti 32 376G GeForceRTX2080Ti:6
1 gpu Milan,EPYC,7313,TeslaMIG,1g.10gb 64 252G 1g.10gb:14
1 gpu Milan,EPYC,7313,Tesla,TeslaA100 64 252G TeslaA100:2
1 gpu Milan,EPYC,7313,Tesla,TeslaA100_80 64 252G TeslaA100_80:2
2 gpu Rome,EPYC,7302,Tesla,TeslaA100 64 504G TeslaA100:2
1 gpu Rome,EPYC,7352,GeForce,GeForceRTX3090 96 504G GeForceRTX3090:4
2 keira Rome,EPYC,7742 256 252G
4 keira Rome,EPYC,7742 256 504G
Filesystems:
Filesystem quota
```

```
$CECIHOME      100.0GiB
$CECITRSF      1.0TiB
$HOME          50G
$GLOBALSCRATCH unlimited
```

```
[bvr@mbackm1 ~]$ ls /mb-stor/soft/localsoft/
```

```
build      RedHat-6_6-45-7_None RedHat-7_23-49-0_None RedHat-7_6-26-5_None RedHat-7_6-
62-4_None RedHat-7_6-85-7_None
cecisw     RedHat-7_16-9-1_None RedHat-7_25-1-1_None RedHat-7_6-44-2_Infiniband RedHat-7_6-
63-2_None tmpdir
licenses  RedHat-7_21-1-2_None RedHat-7_6-23-6_None RedHat-7_6-44-2_None RedHat-7_6-
79-1_None
noarch    RedHat-7_23-1-2_None RedHat-7_6-26-5_Infiniband RedHat-7_6-45-7_None RedHat-7_6-
85-4_None
```

```
on e.g. mb-zen001
```

```
module load OpenBLAS
```

```
[bvr@mb-zen001 ~]$ df -h /opt/sw/arch
```

```
Filesystem                               Size
Used Avail Use% Mounted on
mbackm:/mb-stor/soft/localsoft/RedHat-7_23-1-2_None 5.0T
2.4T 2.7T 47% /opt/sw/arch
```

### On Lemaitre3

```
[root@lm3-w001 ~]# sinfo
```

```
Partitions:
```

```
batch* (2days) debug (6hours)
```

```
Nodes:
```

| #Nodes | Partition | CPU                     | Cores/Slots | Memory | GPUs   |
|--------|-----------|-------------------------|-------------|--------|--------|
| 77     | batch*    | intel,skylake5000,5118  | 24          | 93G    | (null) |
| 4      | debug     | intel,haswell,e5-2690v4 | 28          | 63G    | (null) |

```
ls -l /opt/sw/arch/easybuild/2021b/software/OpenBLAS/0.3.18-GCC-11.2.0/lib
```

```
(and on a debug node lm3-w091)
```