E2SCMS. Students' guidelines II

Access to MareNostrum and EC-Earth compilation

Content:

1 Working in Mare Nostrum

It is strongly recommended to read the "*MareNostrum III User's Guide*" which is intended to provide the minimum amount of information needed by a new user of this system. The guide can be downloaded from: http://www.bsc.es/support/MareNostrum3-ug.pdf.

1.1 MareNostrum accounts

Accounts to login in Mare Nostrum are

Username: nct010[01-10]

Password: EaRtH.2014.[001-010]

where [01-10] will the a number assigned to each student for the whole Summer School.

First login has to be done through

```
ssh dl01.bsc.es
```

And change the password with

```
passwd
```

Then you can connect to Mare Nostrum through four login nodes:

```
ssh -X mn1.bsc.es
ssh -X mn2.bsc.es
ssh -X mn3.bsc.es
ssh -X mn4.bsc.es
```

1.2 How to submit a job

Job management is done by a set of commands:

```
bsub < my_job.sh : submits the job my_job.sh and returns a job_id.
bcancel job_id : cancels the job with the assigned job_id.
bjobs  : prints the jobs queue
bjobs -l job_id : prints information about the job with the assigned job_id.
```

1.3 How to get track of errors and/or simulation status

Every execution done through the queue system provides two information files: the standard output (*.out) and error (*.err) in the log folder.

2 Assignments with EC-Earth

We'll be working with EC-Earth version 2.4 including the atmospheric model, IFS, and the ocean model, NEMO, coupled through OASIS. Model resolution to be used is T159L62_ORCA1L42. Due to the high resolution used, one year of simulation will take approximately 2 hours of computational time with 128 processors and it will produce around 50 G of output volume.

2.1 EC-Earth installation

The model code and initial condition files are included in a compressed file, located at

```
/gpfs/projects/nct00/nct00002/EC-EARTH/src/install/
```

Please, create your working folder in the projects folder and uncompress there the model code:

```
mkdir -p /gpfs/projects/nct00/nct00XXX/EC-EARTH/
cd /gpfs/projects/nct00/nct00XXX/EC-EARTH/
bsub < /gpfs/projects/nct00/nct00002/EC-EARTH/src/untar_src.sh
# Wait the uncompress to finish (check with bjobs)
mv install/* .
rm -rf install
```

In order to work with EC-Earth we have to define different environment variables and paths in the *bashrc* file:

```
vi ~/.bashrc

export ECEARTH=/gpfs/projects/nct00/nct00XXX/EC-EARTH
export PATH=$PATH:/gpfs/apps/MN3/ECEARTH/SRC/v3-
r1012/sources/util/makedepf90/bin/:$PATH
export PATH=$PATH:/gpfs/apps/MN3/GRIB/1.12.0/bin/:$PATH
export LD_LIBRARY_PATH=/gpfs/apps/MN3/NETCDF/3.6.3/lib:$LD_LIBRARY_PATH
export LD_LIBRARY_PATH=/gpfs/apps/MN3/OPENMPI/1.5.4/lib:$LD_LIBRARY_PATH
```

At this point, your model is in your projects folder, ready to be built.

Logout. And reconnect to load new environment variables.

To check if everything is copied do

```
ls $ECEARTH
```

Should produce

```
[nct00002@login2 /gpfs/projects/nct00/nct00002/EC-EARTH]$ ls $ECEARTH
archive  build  doc  etools  ifs  lpjg  nemo  oasis3  testdata  testrun  v2.4
```

2.2 EC-Earth compilation

Due to the license and rights of the IFS code, you'll receive a precompiled source code. You will exclusively get access to the source files needed to perform the assignments. All the other

source files are precompiled and will not be distributed. To avoid breaking the model compilation, **don't execute ./cleanifs.sh !!!** This will cause all the precompiled sources to be erased and you won't be able to build the model.

To start the compilation, go to the building script's folder:

```
cd /gpfs/projects/nct00/nct00XXX/EC-EARTH/build
```

There, you will find the settings.MN3 file, which is used to define all necessary settings to build EC-Earth in MareNostrum3.

```
vi settings.MN3
```

EC-Earth compilation requires the different model components to be built in an specific order:

1st: OASIS Coupler

```
./makeoasis3.ksh
# To check if OASIS is correctly build, look for the file:
ls $ECEARTH/oasis3/prism_2-5/prism/Linux_MN3/lib/libpsmile.MPI1.a
```

2nd: NEMO Ocean Model

```
./makenemo.ksh
# To check if NEMO is correctly build, look for the file:
ls $ECEARTH/nemo/nemo_build/opa_exe.ORCA1_OASIS3.4.8
```

3rd: IFS Atmospheric Model

```
./makeifs.ksh
./linkifs.ksh
# Take your time, this compilation can take long
# To check if IFS is correctly build, look for the file:
ls $ECEARTH/ifs/bin/ifsMASTER
```

At this point, your EC-EARTH model is built.

2.3 EC-Earth initial condition files

All the initial condition files for the different model components are located in $ECEARTH/testdata/

2.4 Running your first simulation

To run EC-EARTH you need to execute a script with a configuration file. It will manage all the configuration files and namelists of all the components and submit the job to queues. It is advisable to configure it to simulate a year per job. However, the scripts are set to run multiyear simulations without submitting manually the jobs. Therefore, when the simulation for one year finishes successfully, the next year is automatically submitted.

The main script to configure the simulation is *$ECEARTH/v2.4/ecearth_1850_nolpj.rc*

The initial and final time required for the simulation can be set at:

```
! --------------------------------------------------------------------
! run settings
! --------------------------------------------------------------------
! Init/Final time in YYYY-MM-DD HH :
run.initime      :  1850-01-01 00
run.finaltime    :  1855-01-01 00
```

The folder where the outputs and log files will be stored is set at:

```
! submit directory; log and output files are written here:
submit.dir          :${ECEARTH}/testrun/1850010100_oasis3_ifs_nemo_nolpjg
```

There is no need to change any other setting.

To submit the simulation run the following command:

```
./ecearth-run_1850_noLAI ecearth_1850_nolpj.rc
```

If everything goes fine, output and log files should be created in the submit directory previously defined.

```
cd ${ECEARTH}/testrun/1850010100_oasis3_ifs_nemo_nolpjg
ls *+*
```

Each model component creates an independent log file, please, check:.

>   *NODE.001_01* for IFS
>   *ocean.output* for NEMO
>   *cplout* for OASIS

When the each year run is completed, a folder *Output_${year}${month}${day}00* is created. All model outputs will be moved to this folder and files to restart the following year will be created.