OASIS3 tutorial

Toulouse, June 2010

The “tutorial” toy coupled model, in directory oasis3/examples/tutorial, should reproduce ping-pong exchanges between toyocn and toyatm with the OASIS3 coupler.
The sources model1.F90 and model2.F90 are examples of component codes before interfacing with the OASIS3 PSMILe. The idea of the tutorial is to complete these sources so that at each coupling exchange, “toyocn” (see model1.F90) sends the field “FSENDOCN” to “toyatm” (see model2.F90), which receives it as “FRECVATM”, sends “FSENDATM” to “toyocn, which receives it as “FRECVOCN”; “toyocn” also outputs to a file the field “FOCNWRIT”, which is the same field than “FSENDOCN”. The time step of the two models is 3600 sec and the run is of 6 hours, with a coupling period of 2 hours. The “toyocn” runs on a logically-rectangular (182x149) grid and “toyatm” runs on a logically-rectangular (96x72) grid.

To run tutorial, one should:

1. Login with login and password provided and open a terminal.
2. To compile OASIS3 and its PSMILe library:
   - Go into directory oasis3/util/make_dir
   - Adapt the “make.inc” file which includes your platform header makefile (here “make.inc” includes “make.pgi_cerfacs”).
   - Type “make clean –f TopMakefileOasis3”
   - Type “make oasis3_psmile –f TopMakefileOasis3”
   - ➢ The executable “oasis3.MPI1.x” is available in directory $ARCHDIR/bin (see make.pgi_cerfacs)
   - ➢ The libraries that need to be linked to the models are available in directory $ARCHDIR/lib
3. Go into directory oasis3/examples/tutorial and interface the model1.F90 and model2.F90 with appropriate PSMILe call (see “TOCOMPLETE” in the sources). The solution is available in model1.F90_TP and model2.F90_TP but you should try by yourself first!
4. To compile the tutorial models:
   - Go into directory oasis3/examples/tutorial
   - Type “make clean ; make”
   - The executables “toyocn” and “toyatm” are available in the current directory
   - A local link is made to the executable “oasis3.MPI1.x” in directory $ARCHDIR/bin
5. To run the tutorial coupled model:
   - Type “./run_tutorial” to run the script run_tutorial located in the directory
   - ➢ The results of the tutorial coupled model are now in subdirectory $rundir
   - ➢ You can visually compare the field sent by toyocn (in FSENDOCN_out.2000-01-01T00:00:00.nc) using the ferret script script_ferret_FSENDOCN_apple.jnl to the field received by toyatm (in FRECVATM_out.2000-01-01T00:00:00.nc) using the ferret script script_ferret_FRECVATM_apple.jnl or you can compare the fields sent by toyatm (in FSENDATM_out.2000-01-01T00:00:00.nc) using script_ferret_FSENDATM_apple.jnl to the field received by toyocn (in FRECVOCN_out.2000-01-01T00:00:00.nc) using script_ferret_FRECVOCN_apple.jnl ; type “ferret” and then “go xxx.jnl” where xxx.jnl is the name of the ferret script you want to run. Note that to run another ferret script, you have to restart ferret.

In this configuration, toyocn, toyatm and OASIS3 run with one process each. This is indicated in the "namcouple" configuration file (see lines below $CHANNEL keyword) and in the launching script "run_tutorial" (see "nproc_exe1" and "nproc_exe2"), and there is no LAG.

Running the models in parallel with OASIS3 in monoprocessor mode

To run "toyocn" and "toyatm" in parallel, the number of processes has to be modified in the launching procedure.
OASIS3 supports different parallel decompositions for the models (see OASIS3 User Guide, section 4.3). The APPLE or the BOX partitioning can be chosen (see routine oasis3_decomp.F90).
To test the APPLE and BOX decomposition for respectively toyocn and toyatm, recompile the toysimple models with, in Makefile: "CPPKEYDECOMP_M1=DECOMP_APPLE" or "CPPKEYDECOMP_M2=DECOMP_BOX". In this case, the results in subdirectory /work have to be visualized with ferret scripts script_ferret_*_apple.jnl. Note that in this example, OASIS3 itself still runs on 1 process; to run OASIS3 in a pseudo-parallel mode, see next paragraph.

- Recompile the models with "make clean ; make"
- Specify for example "nproc_exe1=3", "nproc_exe2=3" in the script run_tutorial
- Launch "run_tutorial" which adapts the "namcouple" configuration file (see lines below $CHANNEL keyword) and launches the models on 3 processes each.

➢ Visually compare the results with the non-parallel case

Compiling and running tutorial with OASIS3 in IPSL parallel mode

If more than one OASIS3 process is used in a coupled model, one configuration file per OASIS3 process must be provided by the user and the files must be named namcouple_x where x is the number of the corresponding OASIS3 process; each OASIS3 executable will treat the coupling fields described in its configuration file namcouple_x, resulting in a pseudo-parallelisation of OASIS3 on a field-per-field basis. Note that in this case, OASIS3 must be compiled with the CPP key `use_oasis_para` and that this mode is available only with the MPI1 CLIM communication technique. To test this option with the tutorial coupled model:

- Go into directory oasis3/util/make_dir
- Modify your platform header makefile "make.pgi_cerfacs" to activate the CPP key `use_oasis_para`
- Recompile by typing "make realclean -f TopMakefileOasis3" and "make oasis3_psmile -f TopMakefileOasis3"
- Go into directory oasis3/examples/tutorial ; recompile the models with "make clean ; make"
- Put "run_oasis3_para=1" in the script run_tutorial
- Run "run_tutorial" which then starts toyocn, toyatm and OASIS3 on two processes. Two namcouple files, i.e. "namcouple_0" and "namcouple_1" are copied to the working directory and respectively used by each OASIS process.

➢ The results can be compared with results obtained above.