ORCHIDEE Training course

Code management, installation, simulation, documentation

29-30 November 2018, IDRIS

Josefine Ghattas IPSL

SVN

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Versions and related configurations with ORCHIDEE

Lastest version of the trunk ORCHIDEE

Use with **configuration ORCHIDEE_trunk and LMDZOR_v6.2_work**
ORCHIDEE_trunk offline configuration contains the latest version of the trunk. For new developments this is often the version to use. Note: The trunk changes often : if you extract today and again next week there might be differences in the source code due to evolution of the trunk

Tag ORCHIDEE_2_0

Use with **configuration ORCHIDEE_2_0, LMDZOR_v6.1.5 (all LMDZOR_v6.1.x) and all IPSLCM6.1.x-LR**
Used for reference simulations for CMIP6.

Tag ORCHIDEE_2_1

Use with **configuration ORCHIDEE_2_1 or LMDZOR_v6.2_work**
Newest tag of ORCHIDEE, corresponds to the current version of the trunk. Close to ORCHIDEE_2_0 with some corrections and enhancements, includes possibility to be used with DYNAMICO.

Versions and related configurations with ORCHIDEE

Branches and other versions:
ORCHIDEE-MICT
ORCHIDEE-CN
ORCHIDEE-CN-CAN
…
Contact the developers of each branch to know about corresponding configurations.

Coding Guidelines

All new developements in the ORCHIDEE trunk must follow the Coding Guidelines.

See https://forge.ipsl.jussieu.fr/orchidee/wiki/Documentation

- **Comments in english**
- **Indentation**
- **Key words in capital letters**
- **Module and subroutine description part**
- **…**

Use module diffuco.f90 as example!

How to install using modipsl

See hands on exercises

- modipsl is a tool used to install and compile predefined configurations, for example ORCHIDEE offline or ORCHIDEE coupled to LMDZ

- modipsl contains scripts for extraction of predefined configurations, creation of makefiles, creation of job and some more. modipsl is also a empty file tree that will receive the models and tools.

- use **./model *config*** to download a specific configuration

```
> svn co http://forge.ipsl.jussieu.fr/igcmg/svn/modipsl/trunk modipsl
> cd modipsl/util
> ./model -h                  # list predefined configurations
> ./model config              # extract a predefined configuration
```

Install a branch or personal version

You can modify the version of the ORCHIDEE source before extraction of a configuration. In **modipsl/util/mod.def**, modify line:

#-C- ORCHIDEE_trunk trunk/ORCHIDEE HEAD 14 ORCHIDEE modeles

into

#-C- ORCHIDEE_trunk trunk/ORCHIDEE 2724 14 ORCHIDEE modeles

or

#-C- ORCHIDEE_trunk branches/xxx/yyy HEAD 14 ORCHIDEE modeles

For exemple:

#-C- ORCHIDEE_trunk branches/ORCHIDEE-MICT/ORCHIDEE HEAD 14 ORCHIDEE modeles

Different platforms

- Compiling options of ORCHIDEE is preconfigured at following platforms :

  obelix at LSCE
  irene at TGCC
  ada at IDRIS
  ciclad and climserv at IPSL (currently some problems, contct orchidee-help if you need ciclad/climserv)

- Compiling at other machines need more time for installing pre-request (compiler, netcdf,..)

TGCC and IDRIS

To work on the TGCC or IDRIS computing centres you need:

- **a login connected to an existing group/project**, discuss with your supervisor/colleagues

- **compute resources** in this group, yearly demand, discuss with your supervisor/colleagues

- **knowledge about the environment** at these centres : different machines, file systems, etc..

- **knowledge about how to calculate computing consumption**

Obelix/LSCE

ORCHIDEE offline and LMDZOR_v6 configurations can be used at obelix.

- Thee Job PBS directive for the core distribution needs to be changed if using more than 8 MPI with libIGCM. For example if using 32MPI, the headers will be

  #PBS -l nodes=1:ppn=32

  but needs to be changed to

  #PBS -l nodes=4:ppn=8

- Using libIGCM, archive is done on scratch filesystem : /home/scratch01/login/IGCM_OUT . Change this by adding ARCHIVE=/disk/where/you/have/space in config.card

- When running LMDZ at obelix:
  - change in run.def to: **use_filtre_fft=n**
  - Hybrid MPI-OpenMP mode has not been tested.

ciclad and climserv / IPSL

=> Contact orchidee-help if you want to run at ciclad/climserv

ORCHIDEE_trunk and LMDZOR_v6 can be used in standard configuration with modipsl and libIGCM on ciclad and climserv. See specific information here :
http://forge.ipsl.jussieu.fr/igcmg_doc/wiki/DocBenvDipslAciclad

- Sequentiel netcdf library is used as default. This is done using argument **--netcdf_lib netcdf4_seq** for the compilation of XIOS. Using sequentiel netcdf makes it impossible to use more than one server XIOS with one_file mode.

- Change PBS directive as for obelix, for 32 MPI set
  #PBS -l nodes=4:ppn=8

Steps to follow for installation at a new platform

1. Install modipsl and the configuration ORCHIDEE_trunk

- 2. Modify compile options in following files:
  - modipsl/util/**AA_make.gdef** (used for compilation of IOIPSL)
  - modipsl/modeles/**XIOS/arch/arch/arch-*yourtarget*.[fcm/path/env]**
  - modipsl/modeles/**ORCHIDEE/arch/arch-*yourtarget*.[fcm/path]**

Note: the variable FCM_ARCH in AA_make.gdef is the name of the arch files in ORCHIDEE/arch and XIOS/arch.

- 3. Recreate makefiles with target chosen above and compile as usual
  cd modipsl/util; ./ins_make -t yourtarget

=> Requirements are MPI and netCDF4 library.
Additional requirements: parallel library NetCDF4/HDF5

=> It is possible to compile and use without XIOS and without MPI.

Main makefile for ORCHIDEE offline

config/ORCHIDEE_OL/Makefile

```
### Main targets
#######################################################################################
# Default method : Compiling ORCHIDEE library and offline executables with XIOS
all : with_xios

# without_xios : Compiling ORCHIDEE and IOIPSL. Do not compile or link to XIOS.
without_xios : ioipsl driver verif

# with_xios : Compiling ORCHIDEE, XIOS and IOIPSL.
with_xios : xios ioipsl driver_xios verif


# clean : Remove everything created during compilation including the executables
clean :
        (cd ../../modeles/IOIPSL/src ; ${M_K} clean ; )
        (cd ../../modeles/ORCHIDEE ; ./makeorchidee_fcm -clean ; )
        (rm -rf ../../modeles/XIOS/bin/ ../../modeles/XIOS/inc ../../modeles/XIOS/obj ../../modeles/XIOS/lib ; )
        (rm -f ../../bin/orchidee_ol ; rm -f ../../bin/teststomate ; rm -f ../../bin/forcesoil ; rm -f ../../bin/xios_server.exe

### Internal targets
#######################################################################################
# xios : Only compiling XIOS (using fcm)
xios :
        (cd  ../../modeles/XIOS ; ./make_xios \
--prod --arch ${FCM_ARCH} --job 8 ; cp bin/xios_server.exe ../../bin/. ; )

# ioipsl : Only compiling IOIPSL (standard Makefile)
ioipsl :
        (cd ../../modeles/IOIPSL/src ; $(M_K) ; )

# driver : Only compiling ORCHIDEE without linking to XIOS (with fcm method)
driver :
        (cd ../../modeles/ORCHIDEE ; ./makeorchidee_fcm        -j 8 -parallel mpi -prod -arch ${FCM_ARCH} -driver ; )

# driver_xios : Only compiling ORCHIDEE and linking to XIOS 1.0 (with fcm method)
#               Note: For linking with XIOS 2.0 change -xios into -xios2
driver_xios :
        (cd ../../modeles/ORCHIDEE ; ./makeorchidee_fcm -xios2 -j 8 -parallel mpi -prod -arch ${FCM_ARCH} -driver ; )


# verif : List contents in executable directory
verif: ../../bin
        ls -lrt ../../bin
```

Main makefile for ORCHIDEE offline

config/ORCHIDEE_OL/Makefile

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        (cd ../../modeles/ORCHIDEE ; ./makeorchidee_fcm -clean ; )
        (rm -rf ../../modeles/XIOS/bin/ ../../modeles/XIOS/inc ../../modeles/XIOS/obj ../../modeles/XIOS/lib ; )
        (rm -f ../../bin/orchidee_ol ; rm -f ../../bin/teststomate ; rm -f ../../bin/forcesoil ; rm -f ../../bin/xios_server.exe

### Internal targets
################################################################################################
# xios : Only compiling XIOS (using fcm)
xios :
        (cd  ../../modeles/XIOS ; ./make_xios \
--prod --arch ${FCM_ARCH} --job 8 ; cp bin/xios_server.exe ../../bin/. ; )

# ioipsl : Only compiling IOIPSL (standard Makefile)
ioipsl :
        (cd ../../modeles/IOIPSL/src ; $(M_K) ; )

# driver : Only compiling ORCHIDEE without linking to XIOS (with fcm method)
driver :
        (cd ../../modeles/ORCHIDEE ; ./makeorchidee_fcm        -j 8 -parallel mpi -prod -arch ${FCM_ARCH} -driver ; )

# driver_xi
```

./makeorchidee_fcm -xios2 -j 8 -parallel mpi -prod -arch ${FCM_ARCH} -driver

```
# verif : List contents in executable directory
verif: ../../bin
        ls -lrt ../../bin
```

-prod or

Compiling ORCHIDEE

- The main Makefile launch compilation of XIOS, IOIPSL and finally ORCHIDEE
- Inside the main Makefile, the script **makeorchidee_fcm is launched to compile ORCHIDEE**. This compile script is based on the tool FCM.
- Dependencies between modules are determined automatically. No modifications are needed if you add a module in one of the existing src_ directories.
- **Specific platform dependent compile options are set in modipsl/modeles/ORCHIDEE/arch/** directory. 2 files per platform: arch-ifort_LSCE.fcm and arch-ifort_LSC.path
- **Change -prod into -debug** to use debugging options

Offline experiences using libIGCM

OOL_SEC_STO*
Experiment set up with sechiba and stomate, land use change activated

OOL_SEC
Experiment set up with sechiba only, lai file read

SPINUP_ANLAYTIC_FG1
Experiment set up with sechiba, stomate and spinup_analytic activate. In this experiment, the forcing is set to loop over 10 years.

SPINUP and ENSEMBLE
More complexe experiences not taught here…

FORCESOIL and TESTSTOMATE
Obsolete experiments, replaced by spinup_analytic. To use these experiments you need first to produce specific forcing files.

Modify parameters with libIGCM

In PARAM/run.def some parameters are modified by orchidee_ol.driver, sechiba.driver and stomate.driver. These parameters are always marked equal AUTO or AUTOBLOCKER

AUTO : These parameters can be changed using options in *comp.card* or *config.card.* You can also change them directly in the run.def file, for this case the drivers will not change them again.

AUTOBLOCKER : The job will stop if you modify these parameters. They are set by the *comp.driver* mainly using the information from config.card.

For example, in PARAM/run.def:

STOMATE_RESTART_FILEIN = _AUTOBLOCKER_
XIOS_ORCHIDEE_OK = _AUTO_

=> You can add or modify parameters directly in PARAM/run.def

Configure input parameters

Input parameters are set in run.def text file.

The parameters are read from the ORCHIDEE using:

CALL getin_p(“varname”,var)

```
SUBROUTINE slowproc_xios_initialize

  CHARACTER(LEN=255) :: filename
  LOGICAL            :: lerr
  REAL(r_std)        :: slope_noreinf
  LOGICAL            :: get_slope
  INTEGER            :: l

  IF (printlev>=3) WRITE(numout,*) 'In slowproc_xios_initialize'
  !! 1. Prepare for reading of soils_param file
  ! Get the file name from run.def file and set file attributes accordingly

  filename = 'soils_param.nc'
  CALL getin_p('SOILCLASS_FILE',filename)
  .
  .
  .
```

Configure output files

If time, presentation about XIOS and how to configure output files...

Finding information
Email lists @listes.ipsl.fr

All ORCHIDEE user's are invited to subscribe to:

orchidee-dev	Discussion and information about ORCHIDEE
platform-users	Ask and answer questions about libIGCM Information about IPSL-cmc tools

2 email addresses for contact:

orchidee-help	For technical questions
orchidee-projet	To contact the ORCHIDEE project team

See how to subscribe :

http://forge.ipsl.jussieu.fr/orchidee/wiki/GroupActivities/Contact

Finding information
Wiki and web site

ORCHIDEE official web site (update once a year)

http://orchidee.ipsl.fr

ORCHIDEE wiki (update frequently)
On the wiki you find useful information about on-going developments and help to use the model. Lots of information is found in the HowTo section

http://forge.ipsl.jussieu.fr/orchidee/wiki

You need a **“login forge” to be write on the wiki**. This login is also needed to see the full content of the wiki and also to see the SVN repository on the web interface. Write to orchidee-help to get a login.

Finding information
“Developer's meeting”

All users and developers are welcome to ORCHIDEE developer's meetings organized about every 2 months. These meetings consist in a presentation of a specific topic followed by discussions and questions. Meeting place at Jussieu/Paris but often a videoconference is set up.

See reports and presentations here :

http://forge.ipsl.jussieu.fr/orchidee/wiki/GroupActivities/Meetings/Developer

Information about these meetings are done at orchidee-dev email list.