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Short guide to install a configuration on a local PC or other cluster

Compiling and running tools are set up by default for known IPSL computing centers. If you need to work on a local PC or another computing cluster, you need to adapt the compilation and running options.

1. Compiling

1.1. Test installation of XIOS

It is recommended to first make a test installation of [XIOS](#) following the guide here: <http://forge.ipsl.jussieu.fr/ioserver/wiki/documentation>. Then use the same libraries and compiler versions for all components as for [XIOS](#).

Note: the netcdf4 library can be parallel or sequential, depending on the version. If the sequential netcdf4 library is used, some functionalities in [XIOS](#) can not be used such as using several servers. To link [XIOS](#) to the sequential library, the argument `--netcdf_lib netcdf4_seq` must be set when compiling [XIOS](#). This is added in the main Makefile or the main script for compilation just after `./make_xios --netcdf_lib netcdf4_seq ...`

Only some configurations can be installed without [XIOS](#).

1.2. Compilation with script for configurations _v6.2 and newer

Compilation of each component included in the configuration must be adapted. Each component has a arch folder containing 2 files specific for each machine: arch-NEW_ARCH.fcm and arch-NEW_ARCH.path. These files must be added in each arch folder. Use one of the existing target machines as example. For example for LMDZOR_v6.2 configuration, following files must be added:

```
modipsl/modeles/IOIPSL/arch/arch-NEW_ARCH.fcm
modipsl/modeles/IOIPSL/arch/arch-NEW_ARCH.path
modipsl/modeles/XIOS/arch/arch-NEW_ARCH.fcm
modipsl/modeles/XIOS/arch/arch-NEW_ARCH.path
modipsl/modeles/ORCHIDEE/arch/arch-NEW_ARCH.fcm
modipsl/modeles/ORCHIDEE/arch/arch-NEW_ARCH.path
modipsl/modeles/LMDZ/arch/arch-NEW_ARCH.fcm
modipsl/modeles/LMDZ/arch/arch-NEW_ARCH.path
```

Add also the file arch-NEW_ARCH.env containing modules in the config/ARCH folder. For LMDZOR_v6.2, add following file:

```
modipsl/config/LMDZOR/ARCH/arch-NEW_ARCH.path
```

Launch the compilation by specifying **-arch NEW_ARCH** as argument to the compilation script. For LMDZOR_v6.2, launch as follow:

```
cd modipsl/config/LMDZOR
./compile_lmdzor.sh -arch NEW_ARCH
```

1.3. Compilation with main Makefile for configurations _v6 and _v6.1.*

1.3.1. Choose a target in AA_make.gdef

The `ins_make` script from modipsl will not recognize your local PC to create makefiles. You must specify an existing target or create a new target in the `util/AA_make.gdef` file. Adapt this target to your computing environment (compiler, options, path to netcdf, etc), and create a new makefile specifying this target:

```
./ins_make -t new_target
```

One of the important variables given is `FCM_ARCH`. Set for example `FCM_ARCH=NEW-ARCH`. `FCM_ARCH` gives the name of the arch files used for the different models, see next section.

1.3.2. Adapt compilation for each model

Please refer to the model managers of your model configuration to learn more about how to compile the IPSL models on a local PC and which compilers can be used with the specific models you need. See some information here below.

Most of the IPSL models uses compilation based on fcm ([for more informations on fcm](#)) and the compiling options are set in arch files. Depending on the version of the models and between the models the file `arch-target.path` might have different syntaxes. For each model, take as example one existing target machine and adapt for your PC. The files are stored in the folder `modipsl/modeles/MODEL/arch/arch-NEW_ARCH.fcm/.path/.env`. The name `NEW_ARCH` can be changed but must be the same for all modeles and set in `AA_make.gdef`.

1.4. Example for ORCHIDEE_2_2 offline version

Before installing [ORCHIDEE](#), make a test installation of [XIOS](#), see guide here: <http://forge.ipsl.jussieu.fr/ioserver/wiki/documentation>. If this fails, it is still possible to install [ORCHIDEE](#) without [XIOS](#), see notes below.

```
# 1. Install a new modipsl
svn co http://forge.ipsl.jussieu.fr/igcmg/svn/modipsl/trunk modipsl

# 2. Install the configuration ORCHIDEE_2_2
cd modipsl/util
./model ORCHIDEE_2_2

# 3. Adapt and add compile options to your machine

# 3a. Compile options for component IOIPSL:
# Add a section NEW_ARCH in modipsl/util/AA_make.gdef
# Do this by coping the section ifort_CICLAD for example and adapt all options according to your machine and your compiler
# Make sur to have the variable FCM_ARCH correct as follow:
#-Q- NEW_ARCH FCM_ARCH = NEW_ARCH

# 3b. Add compile options for component XIOS
# Add following files (by coping and adapting one of the existing targets closest to your machine)
modipsl/modeles/XIOS/arch/arch-NEW_ARCH.fcm
modipsl/modeles/XIOS/arch/arch-NEW_ARCH.path
modipsl/modeles/XIOS/arch/arch-NEW_ARCH.env

# Note: the netcdf4 library can be parallel or sequential, depending on the version. If the sequential netcdf4 library is
#       some functionalities in XIOS can not be used such us using several servers. To link XIOS to the sequantial library
#       argument --netcdf_lib netcdf4_seq when compiling XIOS. This should be added in modipsl/config/ORCHIDEE_OL/AA_make
#       after ./make_xios --netcdf_lib netcdf4_seq ...

# 3b. Add compile options for component ORCHIDEE
# Add following files (by coping and adapting one of the existing targets closest to your machine)
modipsl/modeles/ORCHIDEE/arch/arch-NEW_ARCH.fcm
modipsl/modeles/ORCHIDEE/arch/arch-NEW_ARCH.path
modipsl/modeles/ORCHIDEE/arch/arch-NEW_ARCH.env

# 4. Create makefiles with target NEW_ARCH
cd modipsl/util
./ins_make -t NEW_ARCH

# 5. Compile
cd modipsl/config/ORCHIDEE_OL
gmake
```

Notes:

- The name `NEW_ARCH` can be changed to another name but needs to be same everywhere
- All `arch_NEW_ARCH.*` files and `AA_make.gdef` must be coherent for the libraries and options choosen
- It is still possible to install without [XIOS](#). For that case, you do not need to do 3b above and the compilation is done using **gmake without_xios**

1.5. Example for LMDZOR_v5.2 sequential mode with gfortran

```
# 1. Install configuration LMDZOR_v5.2 in a new modipsl
svn co http://forge.ipsl.jussieu.fr/igcmg/svn/modipsl/trunk modipsl
cd modipsl/util; ./model LMDZOR_v5.2

# 2. Adapt the path to your netcdf which must also be compiled with gfortran, in 3 files:
modipsl/modeles/LMDZ/arch/arch-gfortran.path
modipsl/modeles/ORCHIDEE/arch/arch-gfortran.path
modipsl/util/AA_make.gdef (section gfortran)

# 3. Change default compiling to sequential run mode in main makefile.
In modipsl/config/LMDZOR_v5.2/AA_make
change "-parallel mpi" into "-parallel none" at 3 places.
The name of the executables changes also, therefore change "_phylmd_para_orch.e" into "_phylmd_seq_orch.e" at 2 places

# 4. Recreate makefiles with target gfortran
cd modipsl/util
./ins_make -t gfortran

# 5. Compile as usual
cd modipsl/config/LMDZOR_v5.2; gmake
```

Note 1: for installing in parallel mode with MPI, do as above but adapt the files `arch-gfortran.path`, `arch-gfortran.fcm` and `AA_make.gdef` with suitable compile options. You can use target `gfortran_CICLAD` in `AA_make.gdef` as example. Do not do point 3 above.

Note 2: for older version of [ORCHIDEE](#), such as in LMDZOR_v5, the files in `modeles/ORCHIDEE/arch` do not exist. Compile options in `AA_make.gdef` is used for [ORCHIDEE](#) in this case.

The v6 configurations cannot be compiled in sequential mode because [XIOS](#) do not compile or run without the MPI library.

2. Simulation with libIGCM

When using [libIGCM](#) on a local PC, the parameters of the default system described in the `libIGCM_sys/libIGCM_sys_default.ksh` file will be used. You may have to change this file to match your system.

A minimum subset of files located on the shared IGCM account must be downloaded and installed. This directory is called `R_IN` in `libIGCM_sys_default.ksh` and it has the default path `/home/${LOGIN}/IGCM`.

3. Installing rebuild

The output of old version of the models (ORCHIDEE, LMDZ, INCA, REPROBUS) must be recombined to the total horizontal domain when simulation is done in parallel mode.

The tool for this is called *rebuild*. The rebuild tool is called in the post-processing phase by [libIGCM](#). Rebuild is a Fortran code included in [IOIPSL](#). rebuild must be installed and compiled on the local machine. The rebuild can then be used interactively outside libIGCM or in the post-processing phase.

Installation

```
cd modipsl/util
./model IOIPSL_PLUS
# Modify AA_make.gdef for the compiling as above
./ins_make -t new_target
cd ../modeles/IOIPSL/tools
gmake
```

For use with [libIGCM](#), add the path to your rebuild in `libIGCM_sys/libIGCM_sys_default.ksh`.

Use in interactive mode

rebuild can also be used interactively. For example create the global file `sechiba_history.nc` as following :

```
./rebuild -h  
./rebuild -o sechiba_history.nc sechiba_history_00*
```