Run RAPID in Local Linux

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Goal

Run RAPID model in a local Linux-friendly computer.

Hardware Requirement

A Linux-friendly computer with gfortran compiler is required. In this case, Ubuntu 11.10 with GNU Fortran 95 (version: gfortran 4:4.6.1-2 ubuntu5) is used.

Other Requirements

MPI, PETSc scientific library, TAO optimization library and netCDF are required for RAPID. The corresponding versions and download links are below.

mpich2-1.0.8 (http://www.mcs.anl.gov/research/projects/mpich2/downloads/tarballs/)

PETSc 3.1-p6 (http://ftp.mcs.anl.gov/pub/petsc/release-snapshots/)

TAO 1.10.1-p3 (http://www.mcs.anl.gov/research/projects/tao/download/index.html)

netCDF 3.6.3 (http://www.unidata.ucar.edu/downloads/netcdf/netcdf-3_6_3/index.jsp)

All scientific libraries are compiled with the same complier - gfortran95 (version: gfortran 4:4.6.1-2 ubuntu5).

RAPID files can be downloaded from Cedric's website (http://www.geo.utexas.edu/scientist/david/rapid.htm).

Installation Procedures

 # Assuming the packages are located at: /home/tingting/RAPID_Software

mpich2-1.0.8 installation

cd /home/tingting/RAPID_Software

tar xfz mpich2-1.0.8.tar.gz

mkdir -p /tmp/tingting/mpich2-1.0.8

cd /tmp/tingting/mpich2-1.0.8

~/RAPID_Software/mpich2-1.0.8/configure --disable-cxx -prefix=/home/tingting/mpich2-install |& tee c.txt

make |& tee m.txt

make install |& tee mi.txt

export PATH=/home/tingting/mpich2-install/bin:$PATH

cd

touch .mpd.conf

chmod 600 .mpd.conf

 # write the password into this file in the format "secretword=tingtingting"

 # here is the pair of command enclosing any mpiexec or mpdtrace command:

mpd &

mpdallexit

petsc-3.1-p6 installation:

cd /home/tingting/RAPID_Software

tar xfz petsc-3.1-p6.tar.gz

cd petsc-3.1-p6/

export PETSC_DIR=$PWD

 # outdated command: ./config/configure.py --download-f-blas-lapack=1

./config/configure.py --download-f-blas-lapack=1 --with-clanguage=C++

make PETSC_DIR=/home/tingting/RAPID_Software/petsc-3.1-p6 PETSC_ARCH=linux-gnu-c-debug all

mpd &

make PETSC_DIR=/home/tingting/RAPID_Software/petsc-3.1-p6 PETSC_ARCH=linux-gnu-c-debug test

mpdallexit

tao-1.10.1-p3 installation:

cd /home/tingting/RAPID_Software

tar xfz tao-1.10.1-p3.tar.gz

export PETSC_DIR=/home/tingting/RAPID_Software/petsc-3.1-p6

export PETSC_ARCH=linux-gnu-c-debug

export TAO_DIR=/home/tingting/RAPID_Software/tao-1.10.1-p3

make all

make tao_testexamples >& examples_log

make tao_testfortran >& fortran_log

netcdf-3.6.3 installation:

cd /home/tingting/RAPID_Software

tar xfz netcdf-3.6.3.tar.gz

./configure

make check

sudo make install

Run RAPID model

 # Assuming rapid files are located at: /home/tingting/RAPID

Modify “makefile” in rapid

 # insert netCDF stuff into “makefile” (Modified “makefile” is attached in the end)

Add two paths into “include” and then add corresponding path name into the rest part in “ makefile”. NCINCPATH follows “-I”, NCLIBPATH follows “-L”.

NCINCPATH= /home/tingting/RAPID_Software/netcdf-3.6.3/f90

NCLIBPATH= /home/tingting/RAPID_Software/netcdf-3.6.3/f90

Compile RAPID

export PATH=/home/tingting/mpich2-install/bin:$PATH

export PETSC_DIR=/home/tingting/RAPID_Software/petsc-3.1-p6

export PETSC_ARCH=linux-gnu-c-debug

export TAO_DIR=/home/tingting/RAPID_Software/tao-1.10.1-p3

export netcdf_DIR=/home/tingting/RAPID_Software/netcdf-3.6.3

tar –xzf rapid_model_20110716.tar.gz

tar –xzf rapid_input_San_Guad_20110716.tar.gz

cd /home/tingting/RAPID/rapid

ln -s rapid_namelist_San_Guad rapid_namelist *(# only required in the first time for running RAPID)*

make clean

make rapid

Run RAPID

mpd &

mpirun -np 1 ./rapid

mpdallexit

Appendix (modified makefile)

#modified/added texts are in red

```
include ${TAO_DIR}/bmake/tao_common

NCINCPATH=/home/tingting/RAPID_Software/netcdf-3.6.3/f90

NCLIBPATH=/home/tingting/RAPID_Software/netcdf-3.6.3/f90


rapid:  rapid_main.o \
        rapid_read_namelist.o \
        rapid_create_obj.o \
        rapid_net_mat.o \
        rapid_obs_mat.o \
        rapid_routing.o \
        rapid_routing_param.o \
        rapid_phiroutine.o \
        rapid_destro_obj.o \
        rapid_var.o \
        tao_chkopts
        -${FLINKER} -o \
        rapid \
        rapid_main.o \
        rapid_read_namelist.o \
        rapid_create_obj.o \
        rapid_net_mat.o \
        rapid_routing.o \
        rapid_routing_param.o \
        rapid_obs_mat.o \
```

```
	rapid_phiroutine.o \
	rapid_destro_obj.o \
	rapid_var.o \
	${TAO_FORTRAN_LIB} ${TAO_LIB} ${PETSC_LIB} -L ${TACC_NETCDF_LIB} ${NCLIBPATH} -lnetcdf
	${RM} rapid_main.o

dummy:
	echo ${PETSC_FORTRAN_LIB}

rapid_main.o:	rapid_main.F90 rapid_var.o tao_chkopts
	-${FLINKER} -c rapid_main.F90 ${PETSC_INCLUDE} ${TAO_INCLUDE} \
	-I ${TACC_NETCDF_INC} ${NCINCPATH}

rapid_destro_obj.o:	rapid_destro_obj.F90 rapid_var.o tao_chkopts
	-${FLINKER} -c rapid_destro_obj.F90 ${PETSC_INCLUDE} ${TAO_INCLUDE}

rapid_phiroutine.o:	rapid_phiroutine.F90 rapid_var.o tao_chkopts
	-${FLINKER} -c rapid_phiroutine.F90 ${PETSC_INCLUDE} ${TAO_INCLUDE} \
	-I ${TACC_NETCDF_INC} ${NCINCPATH}

rapid_routing.o:	rapid_routing.F90 rapid_var.o tao_chkopts
	-${FLINKER} -c rapid_routing.F90 ${PETSC_INCLUDE} ${TAO_INCLUDE} \
	-I ${TACC_NETCDF_INC} ${NCINCPATH}

rapid_routing_param.o:	rapid_routing_param.F90 rapid_var.o tao_chkopts
```

```
	-${FLINKER} -c rapid_routing_param.F90 ${PETSC_INCLUDE} ${TAO_INCLUDE}

rapid_obs_mat.o:	rapid_obs_mat.F90 rapid_var.o tao_chkopts
	-${FLINKER} -c rapid_obs_mat.F90 ${PETSC_INCLUDE} ${TAO_INCLUDE}

rapid_net_mat.o:	rapid_net_mat.F90 rapid_var.o tao_chkopts
	-${FLINKER} -c rapid_net_mat.F90 ${PETSC_INCLUDE} ${TAO_INCLUDE}

rapid_create_obj.o:	rapid_create_obj.F90 rapid_var.o tao_chkopts
	-${FLINKER} -c rapid_create_obj.F90 ${PETSC_INCLUDE} ${TAO_INCLUDE}

rapid_read_namelist.o: rapid_read_namelist.F90 rapid_var.o tao_chkopts
	-${FLINKER} -c rapid_read_namelist.F90

rapid_var.o:	rapid_var.F90 tao_chkopts
	-${FLINKER} -c rapid_var.F90 ${PETSC_INCLUDE} ${TAO_INCLUDE}

clean::
	rm -f *.o *.mod rapid
```