

INSTALLATION OF THE SOFTWARE ASPECT ON CLUSTER MESO@LR

OS detected : CentOS 7

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Largely inspired by “Compiling and Running ASPECT on TACC Stampede2 - geodynamics/aspect Wiki by John Naliboff john.naliboff@nmt.edu »

<https://github-wiki-see.page/m/geodynamics/aspect/wiki/Compiling-and-Running-ASPECT-on-TACC-Stampede2>

Load the required modules and set environment variables :

```
module purge
module load cv-standard
module load gcc/8.5.0 # the choice of the compiler is very
important!!
# and do not forget to add the same compiler in slurm
for running
module load openmpi
module load cmake/3.6.0
# export are not necessary, it will detect automatically
#export FC=mpif90
#export CC=mpicc
#export CXX=mpicxx
#export FF=mpif77
```

DEAL II AND ASPECT MUST BE INSTALLED IMMEDIATELY AFTER!!

INSTALLATION OF DEAL II WITH CANDI

Download candi for deal.II version 9.3.3

This must be done in /home/\$user/work_aspect/bin

```
git clone https://github.com/dealii/candi.git
cd candi
```

3-Configure candi for deal.II version 9.3.3 on cluster

Modifications of candi.cfg as follows:

```
DEAL_CONFOPTS="-DDEAL_II_FORCE_BUNDLED_THREADS=ON -
DDEAL_II_COMPONENT_EXAMPLES:BOOL=OFF"
```

Also modify the line below so that NATIVE_OPTIMIZATIONS is set to true:

```
NATIVE_OPTIMIZATIONS=true
```

Make sure the deal.II version is set to 9.3.3:

```
DEAL_II_VERSION=v9.3.3
```

Place a # in front of all of the other packages (only openblas, hdf5, p4est, trilinos and dealii are required)

```
PACKAGES="${PACKAGES} once:openblas"  
PACKAGES="${PACKAGES} once:hdf5"  
PACKAGES="${PACKAGES} once:p4est"  
PACKAGES="${PACKAGES} once:trilinos"  
PACKAGES="${PACKAGES} dealii"
```

Change OpenBlas built by candi from 0.3.13 to 0.3.7

From the main candi directory, cd into the folder deal.II-toolchain/packages.

Within this folder, open the file openblas.package. Inside openblas.package, Add a # in front of the line VERSION=0.3.13 and the one beneath it that begins with CHECKSUM. These are the first two lines in file.

Next, remove the # at the beginning of the line #VERSION=0.3.7. Also remove the # at the beginning of the next line (#CHECKSUM=48637....)

3-Install deal.II 9.3.3 (~ 30-60 minutes)

```
./candi.sh -j 48 --prefix=/home/$user/work_aspect/deal.II-  
candi/
```

INSTALLATION OF ASPECT

Cloning aspect from github:

```
cd /home/$user/work_aspect/bin  
git clone https://github.com/geodynamics/aspect.git  
cd aspect  
git checkout -b aspect-2.3 origin/aspect-2.3
```

Configure and install:

```
mkdir build  
cd build  
cmake -DCMAKE_BUILD_TYPE=Release -DDEAL_II_DIR=/home/gueydanf/  
work_aspect/bin/deal.II-candi/deal.II-v9.3.3/ ../  
make -j48
```

The executable aspect is in

home/\$user/work_aspect/bin/aspect/build

(On may 13)

Adding the development on visco_plastic rheology

In home/\$user/work_aspect/bin/aspect

```
Cd source/material_model/rheology
```

```
Cp visco_plastic.cc old_visco_plastic.cc # keeping in memory  
the old version
```

At line 237, after:

```
# Step 3b: calculate weakened friction, cohesion and pre_yield  
viscosity and adjust the shear stress accordingly
```

Modified

```
const double current_cohesion =  
drucker_prager_parameters.cohesions[j] * weakening_factors[0];  
const double current_friction =  
drucker_prager_parameters.angles_internal_friction[j] *  
weakening_factors[1];  
viscosity_pre_yield *= weakening_factors[2];  
current_stress *= weakening_factors[2];
```

By this new version

```
const double current_cohesion =  
drucker_prager_parameters.cohesions[j] * weakening_factors[0];  
const double current_friction =  
drucker_prager_parameters.angles_internal_friction[j] *  
weakening_factors[1];  
// FG- Modification to account for temperature dependant  
weakening  
double temp0=550.+273.;  
double temp1=temp0+50.;  
double temp2=temp1+100.;  
double temp3=temp2+150;  
double temp=temperature_for_viscosity;  
double weak=weakening_factors[2];  
double weakmax=weakening_factors[2];  
if (temp<=temp0) {weak=1.;}  
if (temp>temp0 && temp<=temp1) {  
    weak=(weakmax-1.)/(temp1-temp0)*(temp-temp0)+1;}  
if (temp>temp2 && temp<=temp3) {
```

```
    weak=(1.-weakmax)/(temp3-temp2)*(temp-temp2)+weakmax;}
if (temp >=temp3) { weak=1.;}
viscosity_pre_yield *= weak;
current_stress *= weak;
// end of FG modifications
// older version (only the two lines below, FG)
//viscosity_pre_yield *= weakening_factors[2];
//current_stress *= weakening_factors[2];
```

Recompile only aspect:

```
module purge
module load cv-standard
module load gcc/8.5.0
module load openmpi
module load cmake/3.6.0

cd /home/$user/work_aspect/bin/aspect/build
make -j48
```