

PRISMS-plasticity installation manual

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Installing deal.ii

The plasticity code is built upon the deal.ii open source finite element library. The dependencies are CMake, MPI, PETSc and p4est.

CMake

CMake can be downloaded at: <https://cmake.org/download>, which also has installation instructions. It is also available through package managers such as homebrew, yum, and apt. Once installed, be sure to add CMake to your path by entering:

```
$ PATH="/path/to/cmake/Contents/bin": "$PATH"
```

PETSc

<https://www.dealii.org/developer/external-libs/petsc.html>

<http://www.mcs.anl.gov/petsc/download/index.html>

```
tar xzvf petsc-3.9.3.tar.gz
```

```
cd petsc-3.9.3.tar.gz
```

```
export PETSC_DIR=$PWD
```

```
export PETSC_ARCH=August2018
```

```
./config/configure.py --with-cc=gcc --with-cxx=g++ --with-fc=gfortran \
--with-shared=1 --with-x=0 --with-mpi=1 --download-hypre=1 \
--download-fblaslapack --download-mpich
```

```
make PETSC_DIR=$PETSC_DIR PETSC_ARCH=$PETSC_ARCH all
```

```
make PETSC_DIR=/afs/umich.edu/user/s/r/sriharis/Public/petsc-3.9.3 PETSC_ARCH=A
```

```
export PATH=$PATH:$PETSC_DIR/$PETSC_ARCH/bin
```

p4est

<https://www.dealii.org/developer/external-libs/p4est.html>

<http://www.p4est.org/> - Download latest tarball

Use the installation script and install with:

```
wget https://www.dealii.org/developer/external-libs/p4est-setup.sh
```

```
chmod u+x p4est-setup.sh
```

```
./p4est-setup.sh p4est-2.0.tar.gz $PWD/p4est-install
```

```
export P4EST_DIR=p4est-install
```

deal.ii

Once all the dependencies are installed, the library can be compiled using the following steps. Download the tarball from <https://www.dealii.org/download.html>.

```
tar xzvf dealii-9.0.0.tar.gz
mkdir build
```

```
cd build
```

```
cmake -DCMAKE_INSTALL_PREFIX=$HOME/deal_II_AUG18 ../dealii-9.0.0 \
-DDEAL_II_WITH_PETSC=ON -DPETSC_DIR=$PETSC_DIR -DPETSC_ARCH=$PETSC_ARCH \
-DDEAL_II_WITH_P4EST=ON -DP4EST_DIR=$P4EST_DIR \
-DDEAL_II_WITH_MPI=ON
```

‘make’ works in parallel and you can use multiple cores on the CPU to complete installation, using:

```
make -jN install
```

where N is the number of processor cores on your system. Otherwise, the installation takes a lot of time.

If you used the above install prefix then setup the `DEAL_II_DIR` environment variable needed for running projects built upon deal.ii.

Setup plasticity code

```
git clone https://github.com/prisms-center/plasticity
```

```
cd plasticity
export PRISMSplas=$PWD
```

```
cmake .
make -j N
```

```
cd applications/crystalPlasticity
cmake .
make release
```

Running an example simulation

```
cd $PRISMSplas/applications/crystalPlasticity/fcc/simpleTension
```

Running the simple tension example case:

```
mpirun -n 8 $PRISMSplas/applications/main prm.in
```

A detailed explanation of all the user parameters and other example cases is discussed in the PRISMS-plasticity user manual.