

IBAMR install on OS X El Capitan Version 10.11.6
August 17, 2016

Install gcc 4.9 using Mac Ports:

```
sudo port install gcc49
```

Setup

```
cd $HOME
mkdir sfw
cd sfw
mkdir linux
```

Boost

```
cd $HOME/sfw/linux
mkdir boost
cd boost/
wget http://sourceforge.net/projects/boost/files/latest/download?source=files
mv download\?source\=files boost_1_61_0.tar.bz2
tar xvjf boost_1_61_0.tar.bz2
mv boost_1_61_0 1.61.0
cd 1.61.0/
export BOOST_ROOT=$HOME/sfw/linux/boost/1.61.0/
```

HDF5

```
cd $HOME/sfw/linux
wget http://www.hdfgroup.org/ftp/HDF5/current/src/hdf5-1.8.17.tar
tar xvf hdf5-1.8.17.tar
cd hdf5-1.8.17
./configure \
CC=gcc-mp-4.9 \
CXX=g++-mp-4.9 \
FC=gfortran-mp-4.9 \
F77=gfortran-mp-4.9 \
--enable-production \
--disable-debug \
--prefix=$HOME/sfw/linux/hdf5/1.8.17
make
make check
make install
```

Silo

*Note: Mac OS X comes with zlib, so no need to install.

```
cd $HOME/sfw/linux
wget https://wci.llnl.gov/content/assets/docs/simulation/computer-codes/silo/
silo-4.10.2/silo-4.10.2.tar.gz
tar xvfz silo-4.10.2.tar.gz
cd silo-4.10.2
./configure \
```

```
CC=gcc-mp-4.9 \  
CXX=g++-mp-4.9 \  
FC=gfortran-mp-4.9 \  
F77=gfortran-mp-4.9 \  
--prefix=$HOME/sfw/linux/silo/4.10.2 \  
--disable-silex
```

```
make  
make check  
make install
```

OpenMPI

```
cd $HOME/sfw/linux/  
wget http://www.open-mpi.org/software/ompi/v1.10/downloads/  
openmpi-1.10.2.tar.gz  
tar xvfz openmpi-1.10.2.tar.gz  
cd openmpi-1.10.2  
./configure \  
CC=gcc-mp-4.9 \  
CXX=g++-mp-4.9 \  
FC=gfortran-mp-4.9 \  
F77=gfortran-mp-4.9 \  
--prefix=$HOME/sfw/linux/openmpi/1.10.2 \  
--disable-mpi-cxx-seek \  
--disable-heterogeneous \  
--enable-orterun-prefix-by-default
```

```
make  
make check  
make install
```

PETSc

```
cd $HOME/sfw  
mkdir petsc  
cd petsc  
wget http://ftp.mcs.anl.gov/pub/petsc/release-snapshots/petsc-3.7.2.tar.gz  
tar xvfz petsc-3.7.2.tar.gz  
mv petsc-3.7.2 3.7.2  
cd 3.7.2/
```

Install a debugging version of PETSc:

```
export PETSC_DIR=$PWD  
export PETSC_ARCH=linux-debug  
./config/configure.py \  
--CC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicc \  
--CXX=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicxx \  
--FC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpif90 \  
--LDFLAGS="-L$HOME/sfw/linux/openmpi/1.10.2/lib -Wl,-rpath,$HOME/sfw/linux/  
openmpi/1.10.2/lib" \  
--with-default-arch=0 \  
--PETSC_ARCH=$PETSC_ARCH \  
--with-debugging=1
```

```
--with-c++-support \
--with-hypre=1 \
--download-hypre=1
```

```
make
make test
```

Install an optimized version of PETSc:

```
export PETSC_DIR=$PWD
export PETSC_ARCH=linux-opt
```

```
./config/configure.py \
--CC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicc \
--CXX=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicxx \
--FC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpif90 \
--COPTFLAGS="-O3" \
--CXXOPTFLAGS="-O3" \
--FOPTFLAGS="-O3" \
--LDFLAGS="-L$HOME/sfw/linux/openmpi/1.10.2/lib -Wl,-rpath,$HOME/sfw/linux/
openmpi/1.10.2/lib" \
--with-default-arch=0 \
--PETSC_ARCH=$PETSC_ARCH \
--with-debugging=0 \
--with-c++-support \
--with-hypre=1 \
--download-hypre=1 \
--with-x=0
```

```
make
make test
```

SAMRAI

*download SAMRAI-v2.4.4.tar.gz from <http://computation.lnl.gov/projects/samrai/software>

```
cd $HOME/sfw
mkdir samrai
cd samrai
mkdir 2.4.4
cd 2.4.4
tar xvfz SAMRAI-v2.4.4.tar.gz
mv SAMRAI SAMRAI-2.4.4
wget https://github.com/IBAMR/IBAMR/releases/download/v0.1-rc1/SAMRAI-v2.4.4-
patch-121212.gz
cd SAMRAI-2.4.4/
./source/scripts/includes --link
gunzip -c ../SAMRAI-v2.4.4-patch-121212.gz | patch -p2
```

Install a debugging version of SAMRAI:

```
cd $HOME/sfw/samrai/2.4.4
mkdir objs-debug
cd objs-debug/
```

```
../SAMRAI-2.4.4/configure \
```

```
--prefix=$HOME/sfw/samrai/2.4.4/linux-g++-debug \
--with-CC=gcc-mp-4.9 \
--with-CXX=g++-mp-4.9 \
--with-F77=gfortran-mp-4.9 \
--with-MPICC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicc \
--with-hdf5=$HOME/sfw/linux/hdf5/1.8.17 \
--without-hypr \
--with-silo=$HOME/sfw/linux/silo/4.10.2 \
--without-blaslapack \
--without-cubes \
--without-eleven \
--without-kinsol \
--without-petsc \
--without-sundials \
--without-x \
--with-doxygen \
--with-dot \
--enable-debug \
--disable-opt \
--enable-implicit-template-instantiation \
--disable-deprecated
```

```
make
make install
```

Install an optimized version of SAMRAI:

```
cd $HOME/sfw/samrai/2.4.4
mkdir objs-opt
cd objs-opt/
```

```
../SAMRAI-2.4.4/configure \
CFLAGS="-O3" \
CXXFLAGS="-O3" \
FFLAGS="-O3" \
--prefix=$HOME/sfw/samrai/2.4.4/linux-g++-opt \
--with-CC=gcc-mp-4.9 \
--with-CXX=g++-mp-4.9 \
--with-F77=gfortran-mp-4.9 \
--with-MPICC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicc \
--with-hdf5=$HOME/sfw/linux/hdf5/1.8.17 \
--without-hypr \
--with-silo=$HOME/sfw/linux/silo/4.10.2 \
--without-blaslapack \
--without-cubes \
--without-eleven \
--without-kinsol \
--without-petsc \
--without-sundials \
--without-x \
--with-doxygen \
--with-dot \
--disable-debug \
--enable-opt \
--enable-implicit-template-instantiation \
--disable-deprecated
```

```
make
```

```
make install
```

libMesh

```
cd $HOME/sfw/linux
mkdir libmesh
cd libmesh
mkdir 1.0.0
cd 1.0.0/
wget https://github.com/libMesh/libmesh/releases/download/v1.0.0/
libmesh-1.0.0.tar.gz
tar xvfz libmesh-1.0.0.tar.gz
mv libmesh-1.0.0 LIBMESH
```

Install a debugging version of libMesh:

```
cd $HOME/sfw/linux/libmesh/1.0.0
mkdir objs-debug
cd objs-debug/
export BOOST_ROOT=$HOME/sfw/linux/boost/1.61.0/

../LIBMESH/configure \
  --prefix=$HOME/sfw/linux/libmesh/1.0.0/1.0.0-debug \
  --with-methods=dbg \
  PETSC_DIR=$HOME/sfw/petsc/3.7.2 \
  PETSC_ARCH=linux-debug \
  CC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicc \
  CXX=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicxx \
  FC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpif90 \
  F77=$HOME/sfw/linux/openmpi/1.10.2/bin/mpif90 \
  --enable-triangle \
  --disable-cxx11 \
  --disable-openmp \
  --disable-perflog \
  --disable-strict-lgpl \
  --disable-pthreads \
  --disable-cppthreads \
  --disable-unique-ptr
```

```
make
make install
```

**Note: If using libMesh, it is necessary to use an external boost with IBAMR. Change the name of the boost directory in the include folder so IBAMR uses the external library:

```
cd $HOME/sfw/linux/libmesh/1.0.0/1.0.0-debug/include
mv boost/ boost_name_change
```

Install an optimized version of libMesh:

```
cd sfw/linux/libmesh/1.0.0
mkdir objs-opt
cd objs-opt/
export BOOST_ROOT=$HOME/sfw/linux/boost/1.61.0
../LIBMESH/configure \
```

```

--prefix=$HOME/sfw/linux/libmesh/1.0.0/1.0.0-opt \
--with-methods=opt \
PETSC_DIR=$HOME/sfw/petsc/3.7.2 \
PETSC_ARCH=linux-opt \
CC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicc \
CXX=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicxx \
FC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpif90 \
F77=$HOME/sfw/linux/openmpi/1.10.2/bin/mpif90 \
--enable-triangle \
--disable-cxx11 \
--disable-openmp \
--disable-perflog \
--disable-strict-lgpl \
--disable-pthreads \
--disable-cppthreads \
--disable-unique-ptr

```

```

make
make install

```

****Note:** If using libMesh, it is necessary to use an external boost with IBAMR. Change the name of the boost directory in the include folder so IBAMR uses the external library:

```

cd $HOME/sfw/linux/libmesh/1.0.0/1.0.0-opt/include
mv boost/ boost_name_change

```

IBAMR

```

cd $HOME/sfw
mkdir ibamr
cd ibamr
git clone https://github.com/IBAMR/IBAMR.git

```

Install a debugging version of IBAMR:

```

mkdir ibamr-objs-dbg
cd ibamr-objs-dbg
export BOOST_ROOT=$HOME/sfw/linux/boost/1.61.0/
export PETSC_ARCH=linux-debug
export PETSC_DIR=$HOME/sfw/petsc/3.7.2

../IBAMR/configure \
CFLAGS="-g -O1 -Wall" \
CXXFLAGS="-g -O1 -Wall" \
FCFLAGS="-g -O1 -Wall" \
CC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicc \
CXX=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicxx \
FC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpif90 \
CPPFLAGS="-DOMPI_SKIP_MPICXX" \
--with-hypre=$PETSC_DIR/$PETSC_ARCH \
--with-samrai=$HOME/sfw/samrai/2.4.4/linux-g++-debug \
--with-hdf5=$HOME/sfw/linux/hdf5/1.8.17 \
--with-silo=$HOME/sfw/linux/silo/4.10.2 \
--with-boost=$HOME/sfw/linux/boost/1.61.0 \
--enable-libmesh \
--with-libmesh=$HOME/sfw/linux/libmesh/1.0.0/1.0.0-debug \
--with-libmesh-method=dbg

```

```
make lib
make examples
```

Run the IBAMR examples. For example:

```
cd $HOME/sfw/ibamr/ibamr-objs-debug/examples/IB/explicit/ex0
./main2d input2d
```

Install an optimized build of IBAMR:

```
cd $HOME/sfw/ibamr
mkdir ibamr-objs-opt
cd ibamr-objs-opt
export BOOST_ROOT=$HOME/sfw/linux/boost/1.61.0/
export PETSC_ARCH=linux-opt
export PETSC_DIR=$HOME/sfw/petsc/3.7.2

../IBAMR/configure \
CC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicc \
CXX=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicxx \
F77=$HOME/sfw/linux/openmpi/1.10.2/bin/mpif90 \
FC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpif90 \
MPICC=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicc \
MPICXX=$HOME/sfw/linux/openmpi/1.10.2/bin/mpicxx \
CFLAGS="-O3 -Wall" \
CXXFLAGS="-O3 -Wall -std=gnu++11" \
FFLAGS="-O3 -Wall" \
FCFLAGS="-O3 -Wall" \
CPPFLAGS="-DOMPI_SKIP_MPICXX" \
--with-hypre=$PETSC_DIR/$PETSC_ARCH \
--with-samrai=$HOME/sfw/samrai/2.4.4/linux-g++-opt \
--with-hdf5=$HOME/sfw/linux/hdf5/1.8.17 \
--with-silo=$HOME/sfw/linux/silo/4.10.2 \
--with-boost=$HOME/sfw/linux/boost/1.61.0 \
--enable-libmesh \
--with-libmesh=$HOME/sfw/linux/libmesh/1.0.0/1.0.0-opt \
--with-libmesh-method=opt

make
make check
make examples
```

Run the IBAMR examples. For example:

```
cd $HOME/sfw/ibamr/ibamr-objs-opt/examples/IB/explicit/ex0
./main2d input2d
```