

**I used the following library/package versions:**

boost\_1\_70\_0  
eigen-3.3.7  
hdf5-1.10.5  
SAMRAI-v2.4.4  
silo-4.10.2  
zlib-1.2.11

**These are the commands in the order I executed them:**

```
bash
module add openmpi_2.0.3/gcc_4.8.5

cd $HOME/sfw/linux
mkdir boost
cd boost
tar xvfz path/to/boost_1_70_0.tar.gz
mv boost_1_70_0 1.7.0
export BOOST_ROOT=$HOME/sfw/linux/boost/1.7.0
mkdir $BOOST_ROOT/include
ln -s $BOOST_ROOT/boost $BOOST_ROOT/include

cd $HOME/sfw
tar -xvf eigen-eigen-323c052e1731.tar.bz2
mv eigen-eigen-323c052e1731 eigen-3.3.7
mkdir eigen
mv eigen-3.3.7/ eigen/

mkdir hdf5
cd hdf5
tar xvjf $HOME/hdf5-1.10.5.tar.bz2
cd hdf5-1.10.5/
./configure CC=gcc CXX=g++ FC=gfortran F77=gfortran --enable-build-
mode=production --prefix=$HOME/sfw/linux/hdf5/1.10.5
make -j4
make -j4 check
make -j4 install

cd
cd sfw/
cd linux/
```

```
mkdir zlib
cd zlib/
tar xvf $HOME/zlib-1.2.11.tar
mv zlib-1.2.11/ 1.2.11
cd 1.2.11
./configure --prefix=$HOME/sfw/linux/zlib/1.2.11
make install
```

```
cd
cd sfw/linux/
tar xvf $HOME/silo-4.10.2.tar
cd silo-4.10.2/
./configure CC=gcc CXX=g++ FC=gfortran F77=gfortran --prefix=$HOME/sfw/
linux/silo/4.10.2 --with-zlib="$HOME/sfw/linux/zlib/1.2.11/include,$HOME/sfw/
linux/zlib/1.2.11/lib" --disable-silex
make
make install
```

```
cd $HOME/sfw
mkdir petsc
cd petsc
wget http://ftp.mcs.anl.gov/pub/petsc/release-snapshots/petsc-3.10.5.tar.gz
tar xvfz petsc-3.10.5.tar.gz
mv petsc-3.10.5 3.10.5
cd 3.10.5
export PETSC_DIR=$HOME/sfw/petsc/3.10.5
export PETSC_ARCH=linux-opt
./config/configure.py \
  --CC=mpicc \
  --CXX=mpicxx \
  --FC=mpif90 \
  --COPTFLAGS="-O3" \
  --CXXOPTFLAGS="-O3" \
  --FOPTFLAGS="-O3" \
  --LDFLAGS="-L/usr/mpi/gcc/openmpi-2.0.3/lib64 -Wl,-rpath,/usr/mpi/gcc/
openmpi-2.0.3/lib64" \
  --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
export PETSC_DIR=$PWD
export PETSC_ARCH=linux-debug
./configure \
  --CC=mpicc \
  --CXX=mpicxx \
  --FC=mpif90 \
  --with-debugging=1 \
  --download-hypre=1 \
  --with-x=0
make
make test
```

```
cd $HOME/sfw
mkdir samrai
cd samrai
mkdir 2.4.4
cd 2.4.4/
tar xvf $HOME/SAMRAI-v2.4.4.tar
mv SAMRAI/ SAMRAI-2.4.4
cd SAMRAI-2.4.4/
cp $HOME/ibamr-samrai-fixes.patch .
patch -p1 < ibamr-samrai-fixes.patch
```

```
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=mpicc --with-CXX=mpicxx --with-F77=mpifort --with-
hdf5=$HOME/sfw/linux/hdf5/1.10.5 --without-petsc --without-hypre --with-
silo=$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
```

```
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=$HOME/sfw/samrai/2.4.4/linux-g++-opt \
  --with-CC=mpicc \
  --with-CXX=mpicxx \
  --with-F77=mpifort \
  --with-hdf5=$HOME/sfw/linux/hdf5/1.10.5 \
  --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
```

```
mkdir libmesh
```

```
cd libmesh
```

```
mkdir 1.4.1
```

```
cd 1.4.1
```

```
wget https://github.com/libMesh/libmesh/releases/download/v1.4.1/
```

```
libmesh-1.4.1.tar.gz
```

```
tar xvfz libmesh-1.4.1.tar.gz
```

```
mv libmesh-1.4.1 LIBMESH
```

```
cd $HOME/sfw/linux/libmesh/1.4.1
```

```
mkdir objs-debug
```

```
cd objs-debug
```

```
../LIBMESH/configure \
```

```
  --prefix=$HOME/sfw/linux/libmesh/1.4.1/1.4.1-debug \
```

```
--with-methods=dbg \  
PETSC_DIR=$HOME/sfw/petsc/3.10.5 \  
PETSC_ARCH=linux-debug \  
CC=mpicc \  
CXX=mpicxx \  
FC=mpif90 \  
F77=mpif90 \  
--enable-exodus \  
--enable-triangle \  
--disable-boost \  
--disable-openmp \  
--disable-perflog \  
--disable-pthreads \  
--disable-strict-lgpl \  
--disable-glibcxx-debugging
```

```
make  
make install
```

```
cd $HOME/sfw/linux/libmesh/1.4.1  
mkdir objs-opt  
cd objs-opt  
../LIBMESH/configure \  
--prefix=$HOME/sfw/linux/libmesh/1.4.1/1.4.1-opt \  
--with-methods=opt \  
PETSC_DIR=$HOME/sfw/petsc/3.10.5 \  
PETSC_ARCH=linux-opt \  
CC=mpicc \  
CXX=mpicxx \  
FC=mpif90 \  
F77=mpif90 \  
--enable-exodus \  
--enable-triangle \  
--disable-boost \  
--disable-openmp \  
--disable-perflog \  
--disable-pthreads \  
--disable-strict-lgpl \  
--disable-glibcxx-debugging  
make  
make install
```

```
cd $HOME/sfw
```

```
mkdir ibamr
cd ibamr
wget https://github.com/IBAMR/IBAMR/archive/v0.4.1.tar.gz
tar xf v0.4.1.tar.gz
mv IBAMR-0.4.1 IBAMR
```

```
cd $HOME/sfw/ibamr
mkdir ibamr-objs-dbg
cd ibamr-objs-dbg
```

```
export BOOST_ROOT=$HOME/sfw/linux/boost/1.7.0
export PETSC_ARCH=linux-debug
export PETSC_DIR=$HOME/sfw/petsc/3.10.5
../IBAMR/configure \
  CFLAGS="-g -O1 -Wall" \
  CXXFLAGS="-g -O1 -Wall" \
  FCFLAGS="-g -O1 -Wall" \
  CC=mpicc \
  CXX=mpicxx \
  FC=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/hdf5/1.10.5 \
  --with-silo=$HOME/sfw/linux/silo/4.10.2 \
  --with-boost=$HOME/sfw/linux/boost/1.7.0 \
  --enable-libmesh \
  --with-libmesh=$HOME/sfw/linux/libmesh/1.4.1/1.4.1-debug \
  --with-libmesh-method=dbg \
  --with-zlib=$HOME/sfw/linux/zlib/
```

```
make lib
make examples
```

```
cd $HOME/sfw/ibamr
mkdir ibamr-objs-opt
cd ibamr-objs-opt
export PETSC_ARCH=linux-opt
export PETSC_DIR=$HOME/sfw/petsc/3.10.5
../IBAMR/configure \
  CC=mpicc \
  CXX=mpicxx \
  F77=mpif90 \
```

```
FC=mpif90 \  
MPICC=mpicc \  
MPICXX=mpicxx \  
CFLAGS="-O2 -funroll-loops -Wall" \  
CXXFLAGS="-O2 -funroll-loops -Wall" \  
FCFLAGS="-O3 -funroll-loops -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/hdf5/1.10.5 \  
--with-silo=$HOME/sfw/linux/silo/4.10.2 \  
--with-boost=$HOME/sfw/linux/boost/1.7.0 \  
--enable-libmesh \  
--with-libmesh=$HOME/sfw/linux/libmesh/1.4.1/1.4.1-opt \  
--with-libmesh-method=opt
```

make

make check