

## Molpro 2020.1.2

### Webpage

<https://www.molpro.net/>

### Version

2020.1.2

### Build Environment

- GCC 9.3.1 (devtoolset-9)
- Intel Parallel Studio 2018 update4 (mkl and mpi)
- Global Arrays Toolkit 5.7.2

### Files Required

- Molpro\_release.tar.gz (compressed Molpro\_release with tar and gzip)
- ga-5.7.2.tar.gz
- work.patch (/local/apl/lx/molpro2020.1.2/patches/work.patch; to change default working directory)
- binput.patch (/local/apl/lx/molpro2020.1.2/patches/binput.patch; for huge CI calculations)
- token

### Build Procedure

```
#!/bin/sh

GA_VERSION=5.7.2
MOLPRO_VERSION=2020.1.2
MOLPRO_DIRNAME=Molpro_release
PARALLEL=12
BASEDIR=/home/users/${USER}/Software/Molpro/2020.1.2
MOLPRO_TARBALL=${BASEDIR}/${MOLPRO_DIRNAME}.tar.gz
PATCH0=${BASEDIR}/work.patch
PATCH1=${BASEDIR}/binput.patch
TOKEN=${BASEDIR}/token

WORKDIR=/work/users/${USER}
GA_INSTALLDIR=${WORKDIR}/ga-temporary
INSTALLDIR=/local/apl/lx/molpro${MOLPRO_VERSION}

#-----
umask 0022
ulimit -s unlimited

export LANG=
export LC_ALL=C
export OMP_NUM_THREADS=1

cd $WORKDIR
if [ -d ga-${GA_VERSION} ]; then
  mv ga-${GA_VERSION} ga_tmp
  rm -rf ga_tmp &
fi
if [ -d ga-temporary ]; then
  mv ga-temporary ga_tmp_tmp
  rm -rf ga_tmp_tmp &
fi
if [ -d ${MOLPRO_DIRNAME} ]; then
  mv ${MOLPRO_DIRNAME} molpro_tmp
  rm -rf molpro_tmp &
fi
```

```

module purge
module load scl/devtoolset-9
module load intel_parallelstudio/2018update4

#tar zxf /home/users/${USER}/Software/GlobalArrays/${GA_VERSION}/ga-${GA_VERSION}.tar.gz
unzip /home/users/${USER}/Software/GlobalArrays/${GA_VERSION}/ga-${GA_VERSION}.zip
cd ga-${GA_VERSION}

export CFLAGS="-mpc80"
export FFLAGS="-mpc80"
export FCFLAGS="-mpc80"
export CXXFLAGS="-mpc80"

export F77=mpif90
export F90=mpif90
export FC=mpif90
export CC=mpicc
export CXX=mpicxx
export MPIF77=mpif90
export MPICC=mpicc
export MPICXX=mpicxx
export GA_FOPT="-O3"
export GA_COPT="-O3"
export GA_CXXOPT="-O3"

# --with-ofi failed...
./autogen.sh
./configure --with-blas8 \
    --enable-i8 \
    --prefix=${GA_INSTALLDIR}

make -j ${PARALLEL}
make check
make install
cp config.log ${GA_INSTALLDIR}

cd ../
tar zxf ${MOLPRO_TARBALL}
cd ${MOLPRO_DIRNAME}

patch -p0 < ${PATCH0}
patch -p0 < ${PATCH1}

export PATH="${GA_INSTALLDIR}/bin:$PATH" # where ga-config exists

CPPFLAGS="-I${GA_INSTALLDIR}/include" \
LDLDFLAGS="-L${GA_INSTALLDIR}/lib" \
./configure --prefix=${INSTALLDIR} \
    --enable-integer8 \
    --enable-slater

LD_LIBRARY_PATH_ESC=`echo $LD_LIBRARY_PATH | sed -e 's/\//\\\\/g'`
sed -i -e "s/^VERBOSE.*$/VERBOSE=/" \
    -e "s/^LD_ENV=.*$/LD_ENV=$LD_LIBRARY_PATH_ESC/" CONFIG
unset LD_LIBRARY_PATH_ESC

make -j ${PARALLEL}
cp $TOKEN lib/.token

make tuning

## manually modify tuning parameters!
#sed -i -e "s/tuning-mindgm.*/tuning-mindgm 0001/" \
# -e "s/tuning-mindgc.*/tuning-mindgc 0001/" \
# -e "s/tuning-mindgr.*/tuning-mindgr 0001/" \

```

```
# -e "/s/tuning-mindgl.*tuning-mindgl 0001/" \  
# -e "/s/tuning-mindgv.*tuning-mindgv 0001/" lib/tuning.rc  
  
MOLPRO_OPTIONS=-n2 make quicktest  
MOLPRO_OPTIONS=-n2 make test  
  
# failed tests  
# loc_eom3.test and PNO-[RU]CCSD tests  
  
#make install  
#install -m 644 lib/.token ${INSTALLDIR}/molpro*/lib
```

The last two lines, "make install" of molpro and installation of token, were done manually.

## Tests

### Global Arrays Toolkit

- Error on global/testing/elempatch.x (gcc 8 also failed on this test)

### Molpro

- MPI parallel runs failed in the following tests. OpenMP parallel runs finished successfully.
  - h2odim\_pnorccsd.test
  - h2odim\_pno\_singdom.test
  - gly2\_pnorccsd.test
  - form\_pnoccsd.test

## Notes

- According to the official manual, current versions of molpro are well tested with GCC.
  - The performance of GCC version binary seems to be better than that of Intel version.
  - PNO-LCCSD runs are available in this GCC version. (Intel version cannot run them.)
- Some types of run do not work correctly with MPI parallel. On the other hand, OpenMP parallel works well for those kinds of inputs.