Comsol on HPC cluster:

What is Comsol?

Comsol Multiphysics is a finite element analysis, solver, and simulation software for various physics and engineering applications, especially coupled phenomena and Multiphysics. It has intuitive user interfaces and add-on modules which help users to create models and solve a wide range of physics problems.

The full documentation for the Comsol is found in the following links:

Official Website

Learning Center

Gallery

Versions Available:

- Comsol v5.3a

How to load a version of Comsol?

To load a version of Comsol on the HPC, use the following command:

```
module load physical/COMSOL/COMSOL53a
```

Verify by using this command:

```
module list
```

Since it is standalone software, it has no dependencies. Users should only see comsol module listed.

How to use Comsol on the cluster?

To see all the options available, use the following command available,

```
comsol -h
```

GUI Mode

To start GUI of comsol, users need to log in using X11 forwarding. Use the following command to start X11 forwarding while logging in,

```
ssh -X bama@uahpc.ua.edu
```

To launch GUI of comsol, use the following command,

```
srun -p main --qos main -n 1 -c 16  --mem 16G --pty comsol
```

Use the graphical interface to make and edit models. If user needs to process a batch file, use the following slurm script,

```
#!/bin/bash
#SBATCH --job-name=comsol_runex
#SBATCH --nodes=2
#SBATCH --cpus-per-task=16
#SBATCH --mem-per-cpu=1000MB
#SBATCH --time=0-01:00:00
#SBATCH --partition=main
#SBATCH --qos main
```

```
# define input
inp=$1  # First input argument: Name of input without extention
std=$2  # Second input argument: Type of study
ext=mph # We use the same naming scheme as the software default
extention

# define directories
submitdir=${SLURM_SUBMIT_DIR}
workdir=/home/${USER}/${SLURM_JOBID}

# create work directory
mkdir -p ${workdir}

# move input to workdir
cp ${inp}.${ext} ${workdir}

# load necessary modules
module purge
module load physical/COMSOL/COMSOL53a
module load mpi/openmpi/gcc/

# run calculation in workdir
cd ${workdir}

time comsol -clustersimple batch\
            -inputfile ${inp}.${ext}\
            -outputfile ${inp}_out.${ext}\
            -study ${std}\


# move output back
mv *out* $submitdir

# cleanup
cd $submitdir
rm -r ${workdir}
```

Download the test run file form this link,

[Example File]

Run the script with following command,

```
sbatch run_comsol.sh comsol_smalltest std04
```

Format of command:

```
sbatch run_script.sh <filename without mph extension> <study>
```

All the processed files will be in job submission directory.

More info on comsol in HPC,

Comsol on Cluster

Where to find help?

If you are stuck on some part or need help at any point, please contact OIT at the following address.

https://ua-app01.ua.edu/researchComputingPortal/public/oitHelp