

## Gurobi on HPC cluster:

### *What is Gurobi?*

Gurobi is a powerful mathematical optimization software which helps to solve various mathematical problems:

- Linear Programming
- Mixed-integer linear programming
- Quadratic programming
- Mixed-integer quadratic programming
- Quadratically-constrained programming
- Mixed-integer quadratically constrained programming

It uses advanced LP algorithms, QP algorithms and MIP algorithms. Moreover, it offers blazing fast speed from multithreading in HPC environment.

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

[Official Website](#)

[Documentation](#)

### Versions Available:

- Gurobi Optimizer –v9.0.2

### *How to load a version of Gurobi?*

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

```
module load gurobi
```

Verify by using this command:

```
module list
```

It should load python in addition to itself.

### *How to use Gurobi on the cluster?*

There are two methods to run Gurobi on the cluster.

#### The Interactive Way:

To run the program interactively, follow the steps:

```
#Open a bash session on compute node
srun -p main --qos main -n 1 -c 12 --mem 10G --pty bash

#Load the module

module load gurobi

# Start your commands here
gurobi.sh

#Follow with commands to execute

# User can also run scripts in python, C, C++ which uses gurobi using
this method

# Find the example scripts in the following locations
```

```
# /share/apps/gurobi/gurobi902/linux64/examples
```

This method is ideal for a short job run which produces runtime output and to debug the codes.

### The Script:

To run a slurm job, the user must prepare input files. For this example, get input files with,

```
#Copy all the required files to the test folder
cp /share/apps/gurobi/gurobi902/linux64/examples/data/glass4.mps .

# Make a script to run Gurobi
touch script.sbatch
```

Use the following template for the script,

```
#!/bin/bash -l
#SBATCH -J Multi-threaded_gurobi
#SBATCH --ntasks=1
#SBATCH --cpus-per-task=28
#SBATCH --time=0-01:00:00
#SBATCH -p threaded
#SBATCH --qos=threaded

# Load Gurobi
```

```
module load gurobi

# Some variable
MPS_FILE=$1
RES_FILE=$2

# Gurobi will access use the required number of thread
gurobi_cl Threads=${SLURM_CPUS_PER_TASK} ResultFile="${RES_FILE}.sol"
${MPS_FILE}
```

Schedule the job with the following sbatch command.

```
sbatch script.sbatch <mpsfile> <resultfile>
```

In this case,

```
sbatch script.sbatch glass4.mps result_glass
```

All the processed files will be generated in the same directory as the sbatch script.

### ***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>

