

# OpenMP Performance

	Time in seconds (NVHPC)				Time in seconds (GNU GCC)			
<b>Serial time</b>	4.907738				6.369754			
<b>Parallel threads</b>	2	4	8	16	2	4	8	16
<b>Parallel time</b>	2.780051	1.447587	0.814226	0.408386	2.968330	1.487720	0.845733	0.440940

## Command Line Instructions

### OpenMP on CPUs

#### Batch script + Compile

```
[xsun2@bridges2-login014 openmp]$ cat parall_script
#!/bin/bash
#SBATCH -A see200002p          # specify the project or allocation number
#SBATCH -p RM-shared          # RM-shared partition
#SBATCH -J myjob              # Job name
#SBATCH --mail-user=sunxinyi@udel.edu
#SBATCH --mail-type=ALL

#SBATCH -N 1                  # Number of nodes, not cores (16 cores/node)
#SBATCH -n 16                 # Number of cores requested in total

#SBATCH -t 00:30:00          # set maximum run time of 30 minutes

export OMP_NUM_THREADS=16

./paralle_nvc
./paralle_gcc

[xsun2@bridges2-login014 openmp]$ gcc mm_p.c -fopenmp -o paralle_gcc
[xsun2@bridges2-login014 openmp]$ module load nvhpc/21.7
[xsun2@bridges2-login014 openmp]$ nvc -acc -gpu=cc70 -Minfo=accel mm_p.c -o paralle_nvc
```

## Execution Time(CPUs)

### Threads(2)

```
[xsun2@bridges2-login014 openmp]$ more slurm-5266574.out
entered main function!const set-up done!matrix initialization done!matrix multiplication done!2.780051
entered main function!const set-up done!matrix initialization done!matrix multiplication done!2.968330
[xsun2@bridges2-login014 openmp]$ vim parall_script
[xsun2@bridges2-login014 openmp]$
```

nvc → 2.780051  
gcc → 2.968330

## Thread(4)

```
[xsun2@bridges2-login014 openmp]$ ls
gcc_parallel mm_p.c mm_s.c mms_nvc script slurm-5266349.out slurm-5266574.out
makefile mm_parallel mms parall_script script_nvc_source slurm-5266427.out slurm-5266596.out
[xsun2@bridges2-login014 openmp]$ more slurm-5266596.out
entered main function!const set-up done!matrix initialization done!matrix multiplication done!1.447587
entered main function!const set-up done!matrix initialization done!matrix multiplication done!1.487720
[xsun2@bridges2-login014 openmp]$
```

## Thread(8)

```
[xsun2@bridges2-login014 openmp]$ more slurm-5266604.out
entered main function!const set-up done!matrix initialization done!matrix multiplication done!0.814226
entered main function!const set-up done!matrix initialization done!matrix multiplication done!0.845733
[xsun2@bridges2-login014 openmp]$
```

## Thread(16)

```
[xsun2@bridges2-login014 openmp]$ ls
gcc_parallel mm_parallel mms_nvc script_nvc_source slurm-5266574.out slurm-5266615.out
makefile mm_s.c parall_script slurm-5266349.out slurm-5266596.out
mm_p.c mms script slurm-5266427.out slurm-5266604.out
[xsun2@bridges2-login014 openmp]$ more slurm-5266615.out
entered main function!const set-up done!matrix initialization done!matrix multiplication done!0.408386
entered main function!const set-up done!matrix initialization done!matrix multiplication done!0.440940
[xsun2@bridges2-login014 openmp]$
```

# Extra

## Execution Time(different matrix size)

NVHPC				GCC		
Size	512	1024	2048	512	1024	2048
Serial	0.264033	4.907738	66.976535	0.721901	6.369754	53.613831
Parallel	0.260403	0.814226	63.617135	0.120143	0.845733	8.387561