Many-body-simulation using OpenMP

System Specifications (Departmental Server):

- **IP**: 10.5.18.108
- **CPU**: Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.40GHz
- 2 CPU x 8 Core x 2 threads
- **RAM** : 256 GB
- **OS** : CentOS Linux release 7.4.1708 (Core)
- **GPU 3D controller card** : NVIDIA GK110BGL [Tesla K40c] 2880 cores
- **Processor core clock**: 745 MHz

Libraries Required

- We executed the code on Linux (departmental server), but it should work the same on Windows, MacOS provided the necessary libraries/headers are installed.
    - GL/glew.h
    - GLFW/glfw3.h
    - GL/glut.h
    - GL/glu.h
    - omp.h
- Run the below command in the terminal to install required libraries.

`sudo apt-get install libglfw3 libglfw3-dev libglew-dev libglu1-mesa-dev freeglut3-dev mesa-common-dev libomp-dev`

Run the code

Step 1: `$ make`

Step 2: Run the following commands after step 1 to generate simulation,

```
$ ./sim {trajectory file path} {numthreads} > simulation_log.txt
$ ./graphics {trajectory file path}
```

- {trajectory file path} - denotes the output file path that is generated by openmp code, please provide filename with .dat extension(binary file format). For ex, 'trajectory1.dat'
- {numthreads} - denotes number of OpenMP threads.

Files

- **many-body-sim-program.cpp** - Contains the source code to simulate motion of particles in the box,generates coordinates in .bat file as output
- **graphics-program.cpp** - Contains source code to visually simulate the above generated coordinates using opengl library.
- **makefile** - Generates executables for above programs and has other necessary commands like clean

- **scalability.txt** - Contains scalability analysis of our OpenMP code for 1,2,4,8 threads.
- **simulation_log{1,2,4,8}.txt** - Program generated simulation logs as mentioned in assignment.
- **ReadMe.pdf** - Contains details on execution instructions

---

Google Drive Link for simulation logs:

- We uploaded the .dat files, simulation_log{1,2,4,8}.txt and scalability.txt files generated for execution of our code for 1,2,4,8 threads in [this google drive link](#).

Note:

- To remove executables and .dat files, run the following command, `$ make clean`
- In simulation_log.txt, we are printing wall time taken by every **100th** step (to avoid large file size).
- In our submission, the simulation_log.txt files for numthreads = {1, 2} are incomplete, as we couldn't complete those simulations on time. We will upload those files in the above drive link as soon as the simulation is done.