Task Description of Group Competition

The group competition is committed to the friendship among the teams. The group competition in ASC24 Final Competition uses ParaSeis, a seismic wave simulation software, as the competition application.

1. Task description

There are four test cases based on real world terrain with different seismic wave magnitude provided. Please simulate them and submit the results. Following is the structure of the directories:

```
ParaSeis
    |___lib                                   (Library files of ParaSeis)
    |___lib.src.latest                        (Required libraries of ParaSeis)
    |___src                                   (Source code of ParaSeis)
    |___MeshPartition                         (Mesh partition program)
    |___3dpartition                           (Mesh partition program)
    |___case1_mesh                            (Should NOT be changed)
    |___case2_mesh                            (Should NOT be changed)
    |___case3_mesh                            (Should NOT be changed)
    |___case4_mesh                            (Should NOT be changed)
    |___case1
    |___case2
    |___case3
    |___case4
```

2. Installing ParaSeis

2.1 Required Libraries

To install the required libraries, go into the "lib.src.latest" directory, then type ./install and follow the installation instructions. Make sure the files are installed in the default "../lib" path.

2.2 Installing ParaSeis

go into the "src" directory, then type make, and the executable "ddm" will be generated.

3. Running ParaSeis

3.1 Mesh generation and partition

- Change directory to MeshPartition folder. In file 'part' change value to designated decomposed block number, i.e., the MPI ranks you would like to run with, for example, 64.
- Type 'make clean', to clean up the previous compilation.
- Type 'make' to generate designated executable mesh generation file.

- Type 'case1.sh' (Here we take case1 as an example. If you are running case2, just type 'case2.sh') to copy data files to current folder
- Type './MeshPartition' to harvest the mesh files (idelem, idnode).
- Change directory to *3dpartition* folder.
- Type 'gfortran -o Partition3d Partition3d.f'.
- Type 'case1.sh'(Here we take case1 as an example. If you are running case2, just type 'case2.sh') to copy data files to current folder
- Type './ Partition3d" to harvest the mesh files (3didnode, 3didelem).

3.2 Mesh preprocess

- Change directory to *src/mesh* folder. In file 'mesh.f' change variable 'numblk' to designated decomposed block number, i.e., the MPI ranks you would like to run with, for example, 64.
- Type 'gfortran -o mesh mesh.f' to generate designated executable mesh generation file.
- Type './prep.sh' to copy mesh files to current folder.
- Type './mesh' to harvest the mesh files.
- Type './case1_cpcaldat.sh' to copy the mesh files to the case folder. (Here we take case1 as an example. If you are running case2, just type 'case2_cpcaldat.sh')

3.3 Run the program

Copy the executable file, i.e. ddm, to the "casex" folder, then submit your job using the "runit" script with the command below. There will be detailed information in the log file "runit.log".

```
$nohup ./runit > runit.log 2>&1 &
```

Below is the content of "runit" script. You may change 64 to other value according to 'numblk' mentioned above. Please do not delete "date" and "time" in the "runit" script.

```
$cat runit
    date
    time mpirun –np 64 ./ddm
    date
```

A successful run of ParaSeis will generate files like unod.* and unodb.*.

4. Total runtime of ParaSeis

The total runtime could be found in the last few lines of the "runit.log" file like below. **Please fill in this total runtime into the Performance Report Card for each case.**

```
"The total runtime is      528.919100000000        sec"
```

5. Important Note

When submitting the test results file, it is crucial to include a text document named "code modification explanation" detailing your modifications and optimizations alongside the modified source code. This is necessary unless no modifications have been made to the application source code. This document should detail the specific changes made to the code, list the original and modified versions of the code, and provide any other necessary information. Additionally, please ensure that the modifications comply with the ASC24 final competition rules. It is important to note that failure to provide an explanation document or the optimized source code will result in point penalty.

6. Result Submission

(1)The Performance Report Card;

(2) Output files including unod.* and unodb.* for each case;

(3) The "runit" script and the log file "runit.log" for each case;

(4) The src directory with all modified source code and binary executables in it;

(5) A text document named "code_modification_explanation" to detail the specific changes made to the code, list the original and modified of the code with the file name, and provide any other necessary information.

(6) Please arrange your output files to be submitted in the directory structure as described below. Redarding to 'GroupID_UniversityName', replace 'ID' and 'UniversityName' with yours. For example, for Zhejiang University, it is GroupA_Zhejiang_University.

```
GroupID_UniversityName
    |___ParaSeis
            |___case1
                    |___runit
                    |___runit.log
                    |___ unod.*
                    |___ unodb.*
            |___case2
                    |___runit
                    |___runit.log
                    |___ unod.*
                    |___ unodb.*
            |___case3
                    |___runit
                    |___runit.log
                    |___ unod.*
                    |___ unodb.*
            |___case4
                    |___runit
                    |___runit.log
                    |___ unod.*
                    |___ unodb.*
            |___a text document named "code_modification_explanation"
            |___src
```

Note: If the required files are not submitted or the logs and result files are not stored in the specified directory structure, you will get 0 points.