PDP Homework#2: Matrix multiplication in MPI

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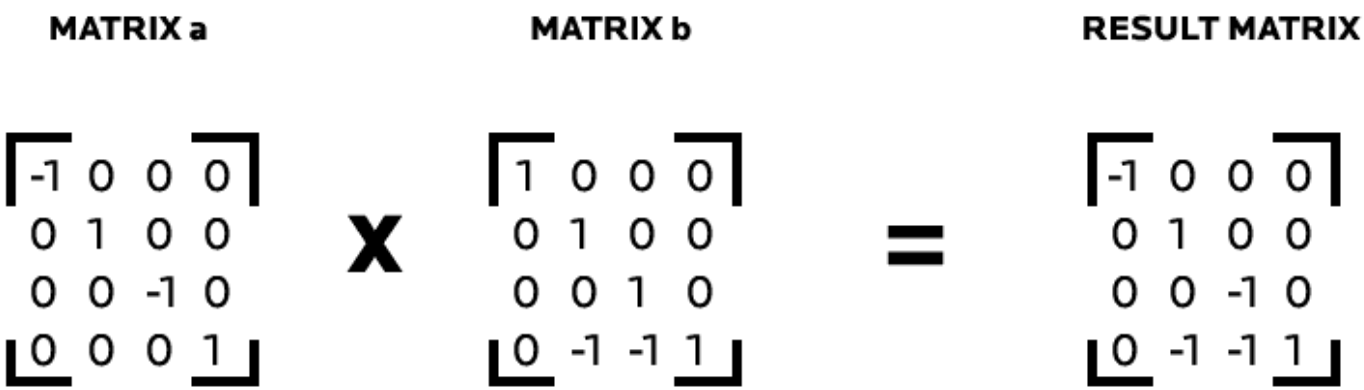
Matrix multiplication



Input & Output

Input

Given n matrices which are NxN

Output

Output the summation of all elements in each self-multiplied matrices, each line output 1 result, there will be n lines.

Example

Given

$$\begin{bmatrix} -1 & 2 \\ 2 & 3 \end{bmatrix}$$

You need to calculate

$$\begin{bmatrix} -1 & 2 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} -1 & 2 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 5 & 4 \\ 4 & 13 \end{bmatrix}$$

And find the summation of all elements

$$5 + 4 + 4 + 13 = 26$$

Goal

Write a MPI version of matrices multiplication

Example program

Obtain and execute the example program

- $ cp -r /tmp/mpi.example .
- $ cd mpi.example
- $ gcc mat.c -o mat -lm
- $ ./mat input11.dat 1 1

Input data representation

- input11.dat: 10 10x10 matrices
- input22.dat: 100 100x100 matrices
- input32.dat: 1000 100x100 matrices
- input42.dat: 10000 100x100 matrices

Environment

There are 6 machines with 12 cores, totally there are **72** cores

- h92
- data01
- data02
- data03
- data04
- data05

You can use all of them at the same time by using **hosts** in mpi.example
$ mpirun -n 72 -hostfile hosts [program] [input_data] [var1] [var2]

Submit

- Files you need to upload
  - mat.mpi.c
  - readme.txt
- You should zip these two files and upload to CEIBA, ex. r01922003.zip
- In readme.txt, please decribe how to run your program, including how many processes you use
  EX. mpirun -n 10 ./mat.mpi input11.dat 1 1

Grading

- If you pass 4 test data in time, you will get 80 points.
- The rest 20 points will be given by another "huge" test data.
- Each week late will take 10% of the final grade.

Note

- Feel free to ask questions on CEIBA, this homework is much harder than the first one.
- If you have any question, e-mail to r01922003@ntu.edu.tw.