Assignment 2 , 159.735, 2020 S2

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Ass2 report

古斯塔夫森定律描述的是随着程序并行化比例的提高，加速比与处理器个数成正比的比例（斜率）也在增加。

The experiment uses multiple processors to sort random numbes in parallel to verify gustafson's law.

Amdahl's Law In an ideal environment, as the number of processors increases, the operating speed will increase. When the number of processors is not limited, the operating efficiency has nothing to do with the number of processors. It is related to the ratio of the calculation time required for the Serial section and Parallelizable sections. The maximum speedup limit will be 1/f.

1. User’s Guide

I use macOS as a development platform. And it only supports 4 processors maximum.

macOS env：

```  
mmpic++ ass\_1.cpp - out  
mpirun -n 4 out  
```

At the same time, I deployed the program to Mighty for testing. Get the final experimental results.

Mighty env：

Login mighty as user 20004769

```ssh  
mpicc ass\_1.cpp first  
mpirun -n 4 first  
emacs first.pbs &  
qsub first.pbs  
```

2．experiment results

This experiment uses a single factor multi-group controlled experiment. The amount of calculation N remains unchanged (N = 300000000). Use different numbers of processors for comparison. The experiment records the running time of the Master processor and slave processors at the same time. Among them, the Master processor is not only responsible for allocating tasks; it is also responsible for part of the parallel computing. Due to many slave processors data, I processed the experimental data and took the average of the slave processors and slave processors that took the longest time as records. Furthermore, calculate the time used for communication. The results are as follows:

Table1

1. Conclusion