358HW1

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1.

1. The serial algorithm performs two operations (one multiplication, one addition) every iteration per point on the matrix. Hence, the number of operations executed in the sequential algorithm is:
2. If the accumulation of the processors using a tree-based combining can be optimally performed in log2(p) steps.

The expression for k is given by , since p can exactly divide n. The runtime for the parallel algorithm for the parallel computation is:

c.

Speed up :

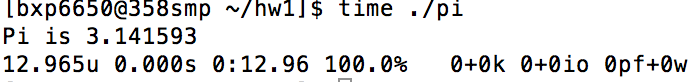
d.

when , Amdahl’s fraction is closed to 0, so it is effective.

2.

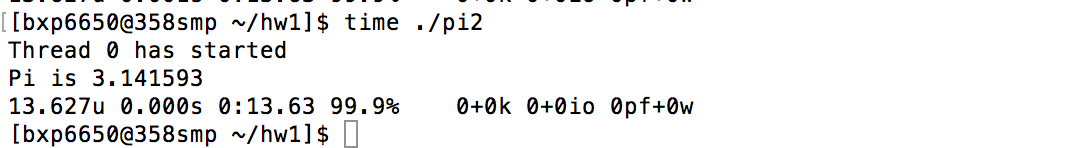
b1. serial

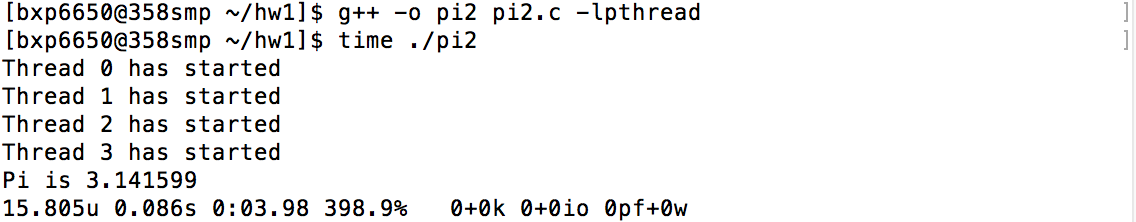
1. running the program in serial mode on one processor:



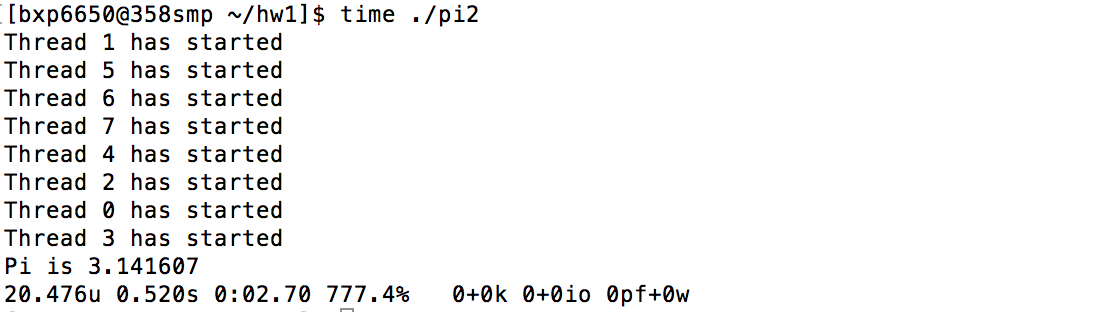
b2. explicit

Running the program in 1 processor:



Running the program in 4 processors:

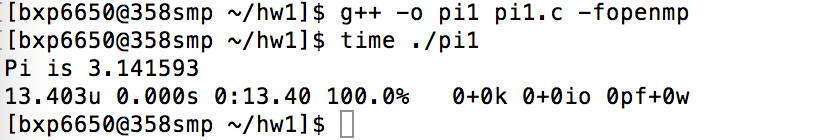
Running the program in 8 processors:



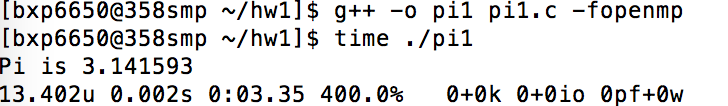
b3. implicit

static scheduling:

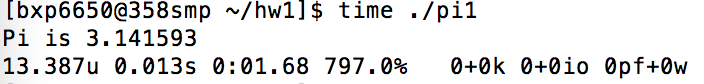
Running the program with 1 processor:



Running the program with 4 processors:



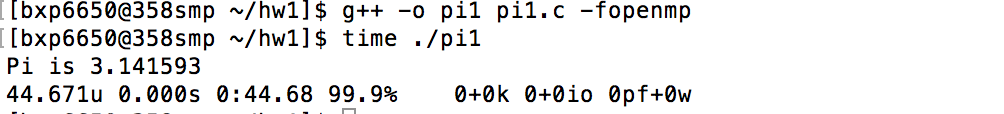
Running the program with 8 processors:



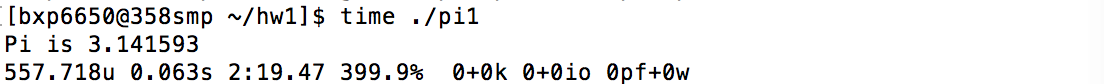
#pragma omp for schedule(static)

Dynamic scheduling:

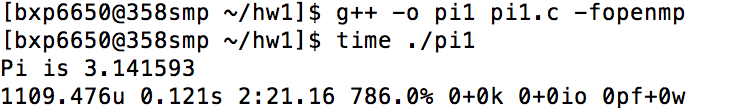
Running the program with 1 processor:



Running the program with 4 processors:



Running the program with 8 processors:

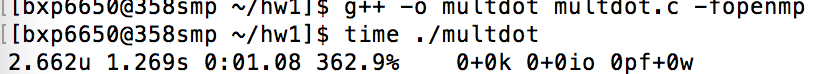


c.

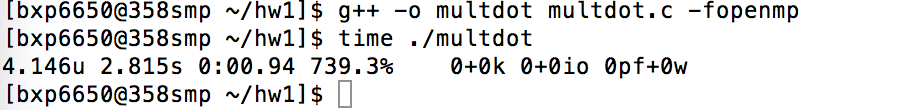
Running the program with 1 processor:

/Users/apple/Library/Containers/com.tencent.qq/Data/Library/Application Support/QQ/Users/258883193/QQ/Temp.db/8C2FCFCF-99D5-4C9E-BAAF-E7BE5384FE57.png

Running the program with 4 processors:



Running the program with 8 processors:



3.

Pthread:

1 processor:

Elapsed time = 481988 ms.

4 processors:

Elapsed time = 122453 ms.

8 processors:

Elapsed time = 115902 ms.

OpenMP:

1 processor:

Elapsed time = 504113 ms.

4 processors:

Elapsed time = 164280ms.

8 processors:

Elapsed time = 120055 ms.