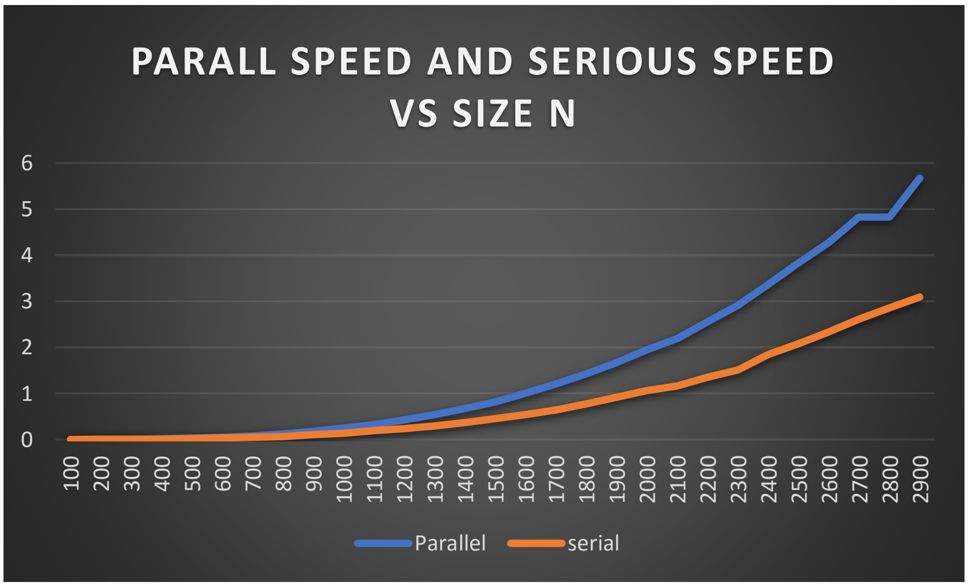
12252511
Zhesi Ning
COMP30250_assignment_4_openMP

In my openMP program for the matrix multiplication part I use atlas call. And use openMP to parallelise the dividing matrix part and multiply them in parallel in order to gain more efficiency. In the experiment we request 8 threads from openMP and pass difference size matrix A and B to the algorithm (where the matrix is square matrix size of n*n), we generate random number to fill in the n*n matrices A and B, for then serial program we use atlas call in cblas as well to maximise the fairness for the comparison.

1) The dependence of the execution time of the program on the matrix size n.

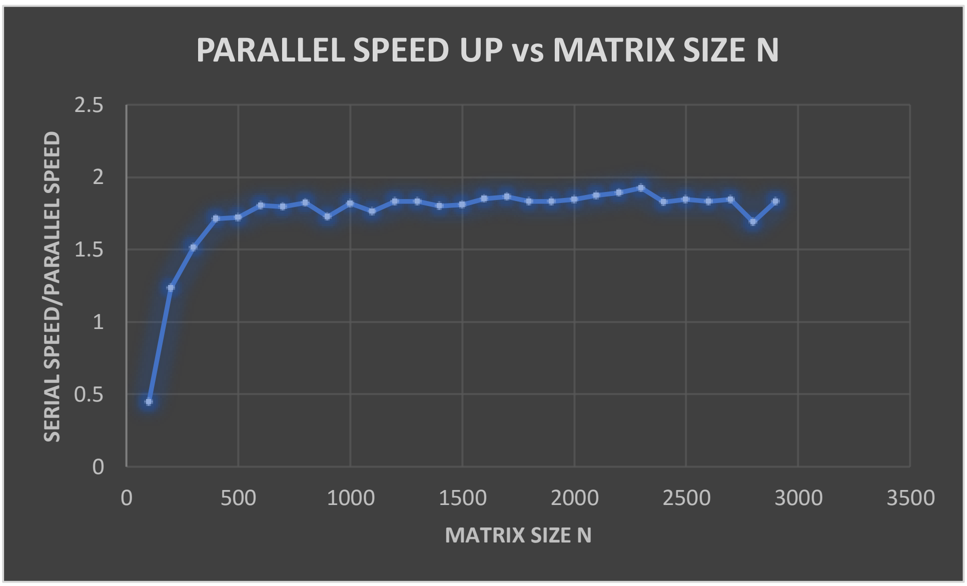
Below graph shows that the dependence between the execution time of the program(blue for openMP parallel altas call program and orange for serial altas call program) on the matrix size n. We notices that regardless which program they both have a linear relation with the matrix size n where n is larger the execution time gets longer. But for small matrix size there are no significant difference between the parallel openMP version and the serial one but while we increase the size of the matrix the advantage of parallelism become really obvious. As shown in the graph.



2) The speedup over a serial counterpart of the program.

As we can observe from the graph below which shows the speedup over a serial counterpart of the program vs the matrix size N, if the matrix size is small then our serial program is actually doing faster than the openMP parallel version. And this is due to the openMP parallelisation overhead. However, after the matrix size n increase to N =200 we can see that our openMP version is 23.2% faster then our serial version. If we go even larger N = 1000 we get almost as twice as faster(openMP) than the serial program.

Matrix size N	Speed up time serial/parallel
100	0.444444444
200	1.232609905
300	1.515930331
400	1.71255357
500	1.720742358
600	1.802692555
700	1.795369838
800	1.823529412
900	1.725781003
1000	1.819156181
1100	1.764859506
1200	1.83031563
1300	1.831207019
1400	1.798335335
1500	1.81034684



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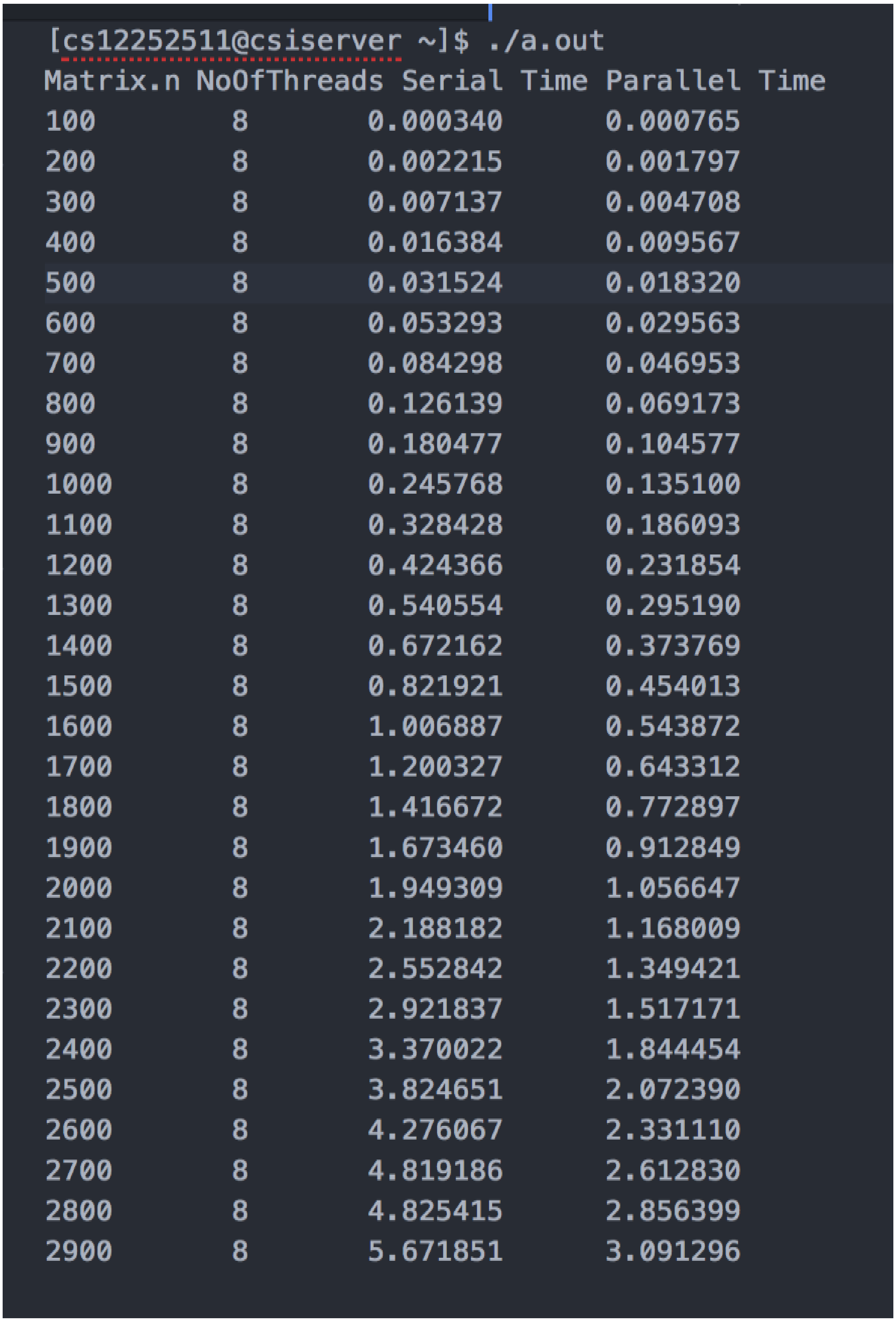
Below is the output of the program.



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[cs12252511@csiserver ~]$ ./a.out
Matrix.n NoOfThreads Serial Time Parallel Time
100          8       0.000340      0.000765
200          8       0.002215      0.001797
300          8       0.007137      0.004708
400          8       0.016384      0.009567
500          8       0.031524      0.018320
600          8       0.053293      0.029563
700          8       0.084298      0.046953
800          8       0.126139      0.069173
900          8       0.180477      0.104577
1000         8       0.245768      0.135100
1100         8       0.328428      0.186093
1200         8       0.424366      0.231854
1300         8       0.540554      0.295190
1400         8       0.672162      0.373769
1500         8       0.821921      0.454013
1600         8       1.006887      0.543872
1700         8       1.200327      0.643312
1800         8       1.416672      0.772897
1900         8       1.673460      0.912849
2000         8       1.949309      1.056647
2100         8       2.188182      1.168009
2200         8       2.552842      1.349421
2300         8       2.921837      1.517171
2400         8       3.370022      1.844454
2500         8       3.824651      2.072390
2600         8       4.276067      2.331110
2700         8       4.819186      2.612830
2800         8       4.825415      2.856399
2900         8       5.671851      3.091296
```