Programming Assignment 1

Due Friday 11/14/2025

In this project you will observe the effect of multi-threading on performance.

The two files "data1" and "data2" are attached in zip format.

You are allowed to use AI-generated code for this assignment!

Part 1

1. In the “main”, data is read from data1 file into mat1[1000][1000] double precision array.
2. In the “main”, data is read from data2 file into mat2[1000][1000] double precision array.
3. The “matmul” function computes **`mat3=mat1*mat2`**
4. In the “main”, the mat3[1000][1000] array is written into data3 file.
5. The following line in the main tests the multiply program.
   ```
   printf("%lf %lf %lf %lf\n", mat3[6][0], mat3[5][3], mat3[5][4], mat3[901][7]);
   ```
6. Measure time.

Part 2

1. Split “mat1” into two matrices of sizes [500][1000].
2. Call the “matmul” function twice. One call for each section of “mat1”. You get the same result as in part 1.
3. Measure time. The time should be close to the time in Part1.

Part 3

1. Rewrite the “matmul” function as a thread.
2. Repeat part 1 and measure the time. You should get the same result as in part 1.

Part 4

- Repeat part 3 with 2 threads. You must get a better result than parts 2 and 3.

Part 5

- Repeat with 4 threads. You must get a better result than part 4.

Part 6

- Compare the measured times. Explain the differences.