Assignment 1

Matrix Multiplication

Instructions: Do not copy material from other sources, if it is necessary, then provide the references. Plagiarized assignment will get negative marks, and can be called for DC action.

Your task for this assignment is to implement simple Matrix Multiplication using <u>forking and pipes.</u> The main process will fork children equal to the number of Multiplication operations. The operands for the multiplication operation will passed to the child by parent through pipe. The child will then multiply the operands and return the result to parent via pipe. The parent will perform the addition ans save the resultant matrix to a file.

Below is an example using 2x2 matrices

$$\begin{bmatrix} A & B \\ C & D \end{bmatrix} \ X \ \begin{bmatrix} E & F \\ G & H \end{bmatrix} = \begin{bmatrix} R1 & R2 \\ R3 & R4 \end{bmatrix}$$

R1 = A x E + B x G
R2 = A x F + B x H
R3 = C x E + D x G
R4 = C x F + D x H

In the above example we can see that to multiply two 2x2 matrices we need to perform 8 multiplication operations and 4 addition operation. In this case you will need to fork 8 children. Once for each multiplication operation.

To compute R1 you will send 'A and E' to one child and 'B and G' to another child to get multiplied. The results will be returned to the parent via pipes and parent will perform the final addition of these results to get R1.

When the parent has finally computed the result it will save the resultant matrix in *resultant.txt.*

Inputs
You will be provided with two files **mat1.txt** and **mat2.txt,** These will contain matrices to be multiplied. **resultant.txt** is to be created by your program.

General Instruction

1. Matrices can be of any dimensions. If multiplication is not possible print error and terminate.
2. Account for extreme cases as well.
3. Make sure to use '–-std=c++11' to maintain compatibility.

4. Memory leaks will loss marks
5. Compilations errors will loss marks.
6. Proper indentation and comments are necessary

Submission: The submission should contain only four following things. If there is one missing then the assignment will be given 0 marks. Additional things will also be penalized.
1. Assign-1.cpp the code of the assignment
2. Mat1.txt
3. Mat2.txt
4. Makefile which makes executing make command in the respective directory compile the code into an executable. After executing make an executable should be created named assign-1.o. Executing that executable should generate all the respective output files.

Contact the TA or myself, for more help and clarification.
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