Lab 2 OS
Matrix Multiplication

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Code organization

In my code there are some important parts like global variables (mat1,mat2,matout,.....),fundamental functions that control the flow of program like(call0,call1,cal2,.....) ,in the main code the program reads matrices ,creates threads ,calculates multiplication time , and saves output in file.

Assumptions

user must enter the name of file with extension (.txt,.out).

Main Functions

call0() : first method function

call1(): second method function

call2():third method function

getMatrix() : this function read matrix from file after knowing the size and save it in 2D array

allocateMat1():`memory allocation of first matrix after get size`

allocateMat2():`memory allocation of second matrix after get size`

allocateMat3():`memory allocation of output matrix after get size`

`writeOutput():save the result of each method in the output file`

How to compile

- Open terminal in project file
- Write “make -f makefile”
- write”./matmult.out” (files names)

Sample runs

Test1

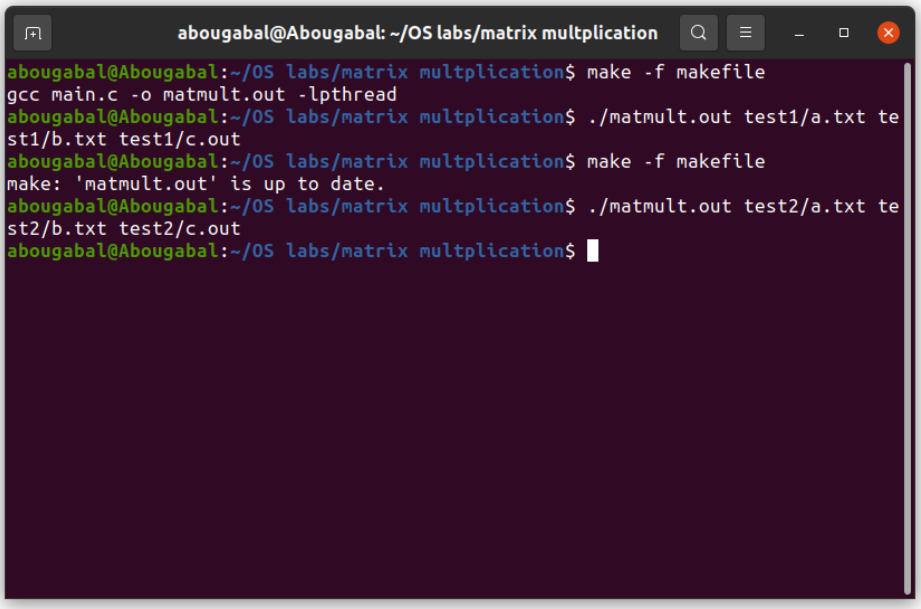
```
 1 415    430    445    460    475    490    505    520    535    550
 2 940    980    1020   1060   1100   1140   1180   1220   1260   1300
 3 1465   1530   1595   1660   1725   1790   1855   1920   1985   2050
 4 1990   2080   2170   2260   2350   2440   2530   2620   2710   2800
 5 2515   2630   2745   2860   2975   3090   3205   3320   3435   3550
 6 3040   3180   3320   3460   3600   3740   3880   4020   4160   4300
 7 3565   3730   3895   4060   4225   4390   4555   4720   4885   5050
 8 4090   4280   4470   4660   4850   5040   5230   5420   5610   5800
 9 4615   4830   5045   5260   5475   5690   5905   6120   6335   6550
10 5140   5380   5620   5860   6100   6340   6580   6820   7060   7300
11
12 Seconds taken 0
13 Microseconds taken: 6
14 Number of Threads: 1
15
16
17 415    430    445    460    475    490    505    520    535    550
18 940    980    1020   1060   1100   1140   1180   1220   1260   1300
19 1465   1530   1595   1660   1725   1790   1855   1920   1985   2050
20 1990   2080   2170   2260   2350   2440   2530   2620   2710   2800
21 2515   2630   2745   2860   2975   3090   3205   3320   3435   3550
22 3040   3180   3320   3460   3600   3740   3880   4020   4160   4300
23 3565   3730   3895   4060   4225   4390   4555   4720   4885   5050
24 4090   4280   4470   4660   4850   5040   5230   5420   5610   5800
25 4615   4830   5045   5260   5475   5690   5905   6120   6335   6550
26 5140   5380   5620   5860   6100   6340   6580   6820   7060   7300
27
28 Seconds taken 0
29 Microseconds taken: 1043
30 Number of Threads: 10
31
32
33 415    430    445    460    475    490    505    520    535    550
34 940    980    1020   1060   1100   1140   1180   1220   1260   1300
35 1465   1530   1595   1660   1725   1790   1855   1920   1985   2050
36 1990   2080   2170   2260   2350   2440   2530   2620   2710   2800
37 2515   2630   2745   2860   2975   3090   3205   3320   3435   3550
38 3040   3180   3320   3460   3600   3740   3880   4020   4160   4300
39 3565   3730   3895   4060   4225   4390   4555   4720   4885   5050
40 4090   4280   4470   4660   4850   5040   5230   5420   5610   5800
41 4615   4830   5045   5260   5475   5690   5905   6120   6335   6550
42 5140   5380   5620   5860   6100   6340   6580   6820   7060   7300
43
44 Seconds taken 0
45 Microseconds taken: 6765
46 Number of Threads: 100
```

```
abougabal@Abougabal: ~/OS labs/matrix multplication
abougabal@Abougabal:~/OS labs/matrix multplication$ make -f makefile
gcc main.c -o matmult.out -lpthread
abougabal@Abougabal:~/OS labs/matrix multplication$ ./matmult.out test1/a.txt te
st1/b.txt test1/c.out
abougabal@Abougabal:~/OS labs/matrix multplication$
```

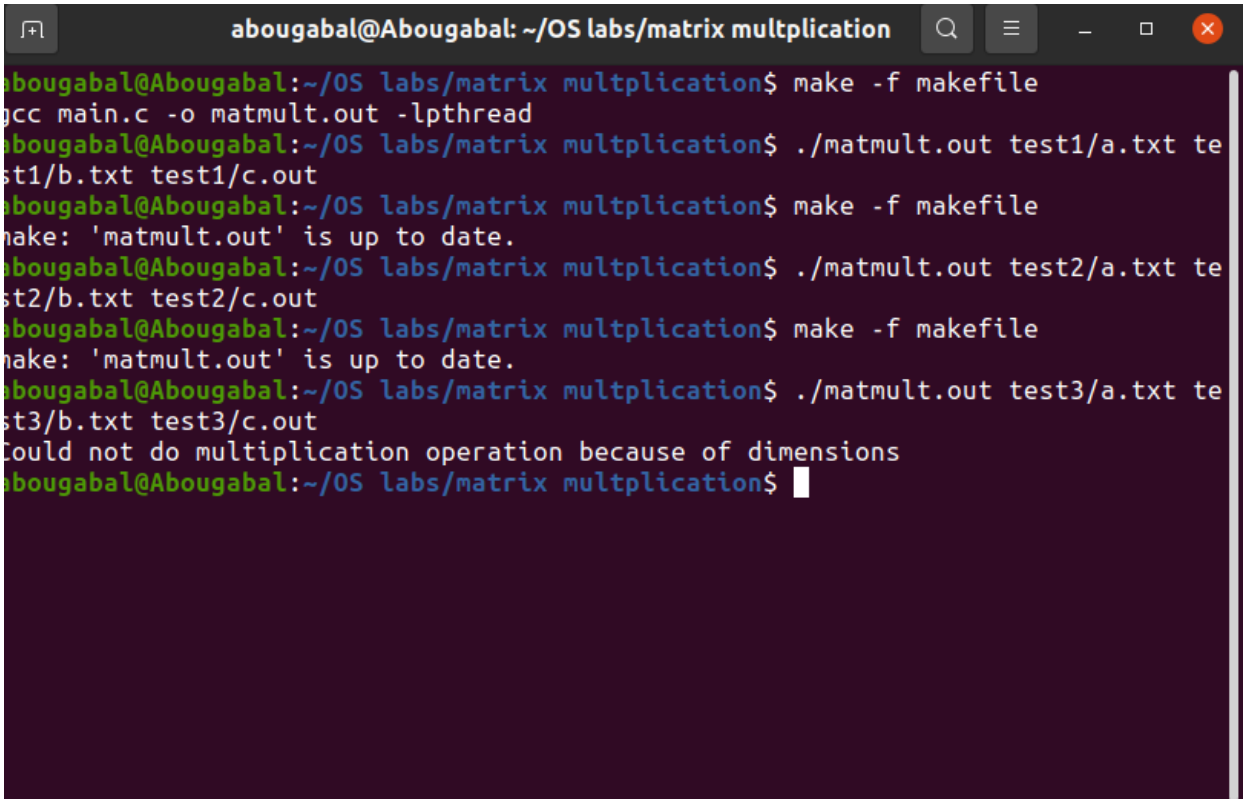
Test2

b.txt | c.out | c.out

```
-1      10      -15     -28
-3      -10     15      -36
5       -2      -9      -20

Seconds taken 0
Microseconds taken: 1
Number of Threads: 1


-1      10      -15     -28
-3      -10     15      -36
5       -2      -9      -20

Seconds taken 0
Microseconds taken: 800
Number of Threads: 3


-1      10      -15     -28
-3      -10     15      -36
5       -2      -9      -20

Seconds taken 0
Microseconds taken: 866
Number of Threads: 12


```



Test 3


abougabal@Abougabal: ~/OS labs/matrix multplication
abougabal@Abougabal:~/OS labs/matrix multplication$ make -f makefile
gcc main.c -o matmult.out -lpthread
abougabal@Abougabal:~/OS labs/matrix multplication$ ./matmult.out test1/a.txt te
st1/b.txt test1/c.out
abougabal@Abougabal:~/OS labs/matrix multplication$ make -f makefile
make: 'matmult.out' is up to date.
abougabal@Abougabal:~/OS labs/matrix multplication$ ./matmult.out test2/a.txt te
st2/b.txt test2/c.out
abougabal@Abougabal:~/OS labs/matrix multplication$ make -f makefile
make: 'matmult.out' is up to date.
abougabal@Abougabal:~/OS labs/matrix multplication$ ./matmult.out test3/a.txt te
st3/b.txt test3/c.out
Could not do multiplication operation because of dimensions
abougabal@Abougabal:~/OS labs/matrix multplication$