CSE344 – System Programming

Homeowork 5 Report

1) How Did I Solve This Problem?

In this homework, I checked the first command line arguments. To satisfy the requirements I used to getopt function. Thanks to getopt function I got arguments in the proper way and I got the command line arguments. After the arguments are sufficiently taken, I read the input files and create input matrixes. If the file is wrong, I give error to the end user and I exit the program. Than, I create the threads and I gave them a id to calculate which thread will be work on which columns. If the m is not multiple of 2^n, I round down the 2^n / m column number and the last thread takes the rest of the columns. To distribute the columns, I calculate start and end values according the id number of thread. If the thread size greater than 2^n, threads which's id is greater than 16 doesn't calculate anything according to my decision. To synchronize the threads for moving to DFT calculation part, I use pthread mutex and condition. Threads are wait after the first calculation until the last thread completes. After the last thread finish his jobs, I use broadcast function to run threads. After the calculations are done, I write the results into output file according to csv format.

My Design Decisions

I use error check first mechanism.

I use condition variable and pthread mutex.

I didn't use complex.h library.

2) Requirements That I Achived

I think I achieved almost all the requirements. However, I may not have been able to achieve some requirements.

My Files

Makefile - The makefile.

hw5.c implementation

3) Some Outputs From Program

input1.csv

```
1  asdfdsgasgsdgsadgsadgsdagasdgsdgasdgasdg324ipo5432ijh5t234io5fc1
```

Image 1: Input File1

input2.csv

```
1  sadgsgsaGsadGsdgsdGa'!^4!'^5%'^5!'352saDGsdag2ttewrrtcwetwb545ba
```

Image 2: Input File2

```
samo@samo-HP-Pavilion-Gaming-Laptop-15-cx0xxx:~/Desktop/hw5$ ./hw5 -i input1.csv -j input2.csv -o output.csv -n 3 -m 4
Sun May 22 22:52:13 2022 ------- Two matrices of size 8x8 have been read. The number of threads is 4
Sun May 22 22:52:13 2022 ------- Thread 1 has reached the rendezvous point in 0.000007 seconds.
Sun May 22 22:52:13 2022 ------- Thread 2 has reached the rendezvous point in 0.000007 seconds.
Sun May 22 22:52:13 2022 ------- Thread 3 has reached the rendezvous point in 0.000008 seconds.
Sun May 22 22:52:13 2022 ------- Thread 3 is advancing to the second part
Sun May 22 22:52:13 2022 ------- Thread 4 has reached the rendezvous point in 0.000009 seconds.
Sun May 22 22:52:13 2022 ------- Thread 4 is advancing to the second part
Sun May 22 22:52:13 2022 ------- Thread 2 is advancing to the second part
Sun May 22 22:52:13 2022 ------- Thread 1 is advancing to the second part
Sun May 22 22:52:13 2022 ------- Thread 3 has has finished the second part in 0.000669 seconds.
Sun May 22 22:52:13 2022 ------- Thread 4 has has finished the second part in 0.000723 seconds.
Sun May 22 22:52:13 2022 ------- Thread 2 has has finished the second part in 0.000742 seconds.
Sun May 22 22:52:13 2022 ------- Thread 1 has has finished the second part in 0.000766 seconds.
Sun May 22 22:52:13 2022 ------- The process has written the output file. The total time spent is 0.004888 seconds.
```

Image 3: Terminal Output

output.csv

```
1  4105035.000+(0.000)i,125759.053+(16662.423)i,-250793.000+(15128.000)i,-32333.053+(-149745.577)i,71323.000+(-0.000)i,-32333.053+(149745.577)i,-250793.000+(-15128.000)i,125759.053+(-16662.423)i
2  33485.072+(-402189.901)i,3693.441+(-26856.247)i,-1894.188+(13964.730)i,-10609.121+(-717.923)i,3241.671+(1331.278)i,13322.640+(9583.987)i,5009.434+(10694.583)i,3755.111+(-13715.656)i
3  149771.000+(27778.000)i,20003.372+(6061.671)i,-8557.000+(2542.000)i,952.582+(-2711.662)i,-1269.000+(5562.000)i,-13581.372+(5490.329)i,-3573.000+(1814.000)i,-874.582+(9399.662)i
4  -34267.072+(-98421.901)i,-5848.879+(2166.077)i,-4867.434+(-509.417)i,-6463.441+(-2644.247)i,-4055.671+(-2708.722)i,4170.889+(-13199.656)i,1924.188+(2776.730)i,-5828.640+(-12452.013)i
5  175707.000+(-0.000)i,3528.868+(2486.156)i,-6849.000+(-6816.000)i,3953.132+(-1897.844)i,-6293.000+(-0.000)i,3953.132+(1897.844)i,-6849.000+(6816.000)i,3528.868+(-2486.156)i
6  -34267.072+(98421.901)i,-5828.640+(12452.013)i,1924.188+(-2776.730)i,4170.889+(13199.656)i,-4055.671+(2708.722)i,-6463.441+(2644.247)i,-4867.434+(509.417)i,-5848.879+(-2166.077)i
7  149771.000+(-27778.000)i,-874.582+(-9399.662)i,-3573.000+(-1814.000)i,-13581.372+(-5490.329)i,-1269.000+(-5562.000)i,952.582+(2711.662)i,-8557.000+(-2542.000)i,20003.372+(-6061.671)i
8  33485.072+(402189.901)i,3755.111+(13715.656)i,5009.434+(-10694.583)i,13322.640+(-9583.987)i,3241.671+(-1331.278)i,-10609.121+(717.923)i,-1894.188+(-13964.730)i,3693.441+(26856.247)i
```

Image 4: Output File