Gebze Technical University

Computer Engineering

CSE344 – System Programming

HOMEWORK #1

REPORT

NEVRA GÜRSES

161044071

Nevra Gürses
161044071

1 INTRODUCTION

1.1 Problem Definition

This homework is actually about File input / output and interprocess communication between several files.

Part 1:

There are 2 programs that are program A and program B.These programs are related with each other.Each programs have 2 instances.Instances of program A is reading different input files.Program A reads different files.For every 32 bytes that it read, it converts them 16 complex numbers and after,it writes this 16 complex numbers with comma seperated in first empty row at destination file.The instances of program B is reading destination file of Program A.So it reads complex numbers.It reads random line from file.If line is empty,it makes linear search for finding non empty line.When non empty line is found,it reads 16 complex numbers and delete this line by writing '\n' and calculate discrete Fourier transform.And write this calculation in output file of program B.After each writing operation of program A and program B ,they sleep for time miliseconds.Summary,There are interprocess comminication with program A and program B.Output file of program A is input file of Program B.And each processes of program A and program B must work simultaneously.

Part 2:

Program C reads output file of program B that contains fourier transform calculations.Program C sorts all lines in ascending order with mergesort and writes sorted lines in-place in file.

Summary:Program A ,Program B ,Program C is related with each other.There are interprocess communication between them.And we must make given operations with simultaneously.

2 METHOD

2.1 Problem Solution Approach

Program A: For getting command line arguments,I use getopt function.I recorded input file path,output file path and time.Then I open input file for reading operation and output file for writing operation.Then I start read operation with do-while loop.I read file by 32 byte.After every reading 32 byte,I convert it 16 complex number by convertCompex function.For writing operation,I create a do-while loop again in outer loop.This do-while loop for finding first "empty" space in output file.For finding empty space in output file,I read output file completely and I find first empty line and i write 16 complex number in line.Writing empty line is actually difficult operation.Because in file format,empty line contains only "\n" character.So,for writing 16 complex number in empty line,we must allocate a place for prevent overwriting existing content.I provide this allocation and preventing overwriting operation with several rules and conditions.For provide to work two processes at the same time,I use fcntl function for locking operation.

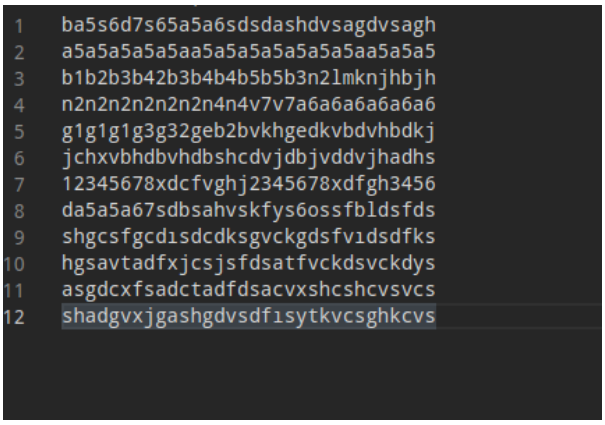
Program B: For getting command line arguments,I use getopt function.I recorded input file path,output file path and time. Then I open input file for reading operation and output file for writing operation.After,I get a random number for reading that line.Then I start read operation with do-while loop.I control lines with several conditions.When current line is equal random number,I make FFT transposition of complex numbers in current line by calling fourierTransform function and I write this calculation in output file.Then I remove that line by calling removeLine function.I make this operations for after lines from random variable and before lines from random variable by linear way.

Program C: For making merge sort in-place,I write several functions.One of them readLineFromFile that reads a line from file.SymboltoDouble function makes characters double to calculations.SizeOfLine function for finding value of a line.WriteLineInFile function writes a line in file.FindFileSize function finds line numbers of a file.I use all of these functions in mergesort for making sort in-place in file.

3 RUNNING RESULTS

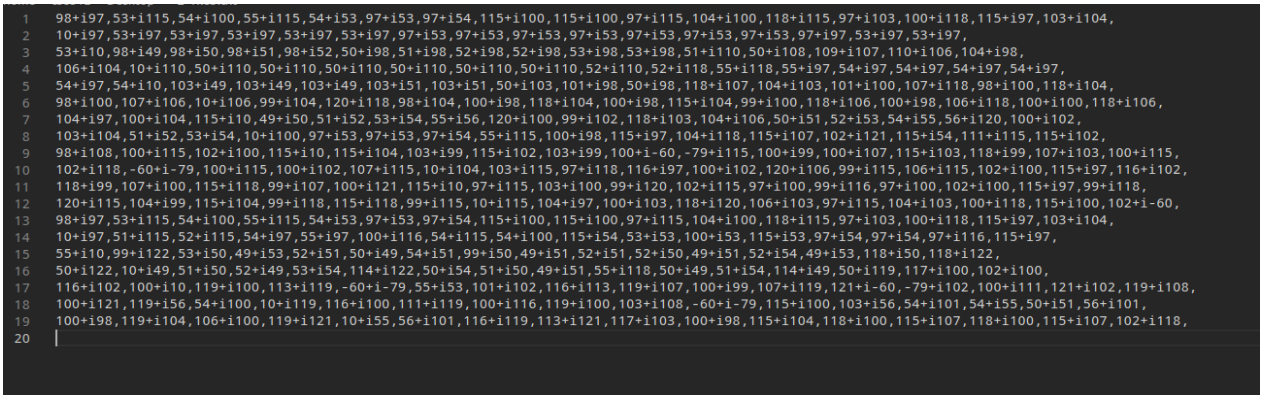
PART-1

3.1 Program A:



File-1 **File-2**

Instance 1 of Program A and instance 2 of Program A work with simultaneously and result File-3 is:



```
1  a1a1a1a1a1a1a1a1a1a1a1a1a1a1a1
2  c5c5c5c5c6c6c7c8cc8c8c9c77cc6c4c
3  b12b3b4n45n665n43b34b434b3b43b42
4  a78a6a6c87a78s6as576as7a5s7s7667
5  b6ta090a8d7ds7das87dad98d7d78d7d
6  b6v6cc54644454r6vbars5a4s45ad4ad
7  a54s5a7ea53advsd4sd4d4s4d64dasd4
8  265etdas67d5sd4s6d5e7s5d47d4d4dd
```

```
1  ba5s6d7s65a5a6sdsdashdvsagdvsagh
2  ae6s5ad3sa43d6saccsa3sa3dsa3dsas
3  a3ss4ae5rtdxys54a364sadeas5edae2
4  6s5aex5drtfzgxe54sedxfgc5satdrxf
5  6rsdtgfx5w6rasdtxfzgrw56rdtsyfxw
6  54weqstradgfxcsftrw56yastrdadasd
```

File-1 **File-2**

Instance 1 of Program A and instance 2 of Program A work with simultaneously and result File-3 is:

```
1  97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,
2  10+i99,53+i99,53+i99,53+i99,53+i99,54+i99,54+i99,55+i99,56+i99,99+i56,99+i56,99+i57,99+i55,55+i99,99+i54,99+i52,
3  99+i10,98+i49,50+i98,51+i98,52+i110,52+i53,110+i54,54+i53,110+i52,51+i98,51+i52,98+i52,51+i52,98+i51,98+i52,51+i98,
4  52+i50,10+i97,55+i56,97+i54,97+i54,99+i56,55+i97,55+i56,115+i54,97+i115,53+i55,54+i97,115+i55,97+i53,115+i55,115+i55,
5  54+i54,55+i10,98+i54,116+i97,48+i57,48+i97,56+i100,55+i100,115+i55,100+i97,115+i56,55+i100,97+i100,57+i56,100+i55,100+i55,
6  56+i100,55+i100,10+i98,54+i118,54+i99,99+i53,52+i54,52+i52,52+i53,52+i114,54+i118,98+i97,114+i115,53+i97,52+i115,52+i53,
7  97+i100,52+i97,100+i10,97+i53,52+i115,53+i97,55+i101,97+i53,51+i97,100+i118,115+i100,52+i115,100+i52,100+i52,115+i52,100+i54,
8  52+i100,97+i115,100+i52,10+i50,54+i53,101+i116,100+i97,115+i54,55+i100,53+i115,100+i52,115+i54,100+i53,101+i55,115+i53,100+i52,
9  98+i97,53+i115,54+i100,55+i115,54+i53,97+i53,97+i54,115+i100,115+i100,97+i115,104+i100,118+i115,97+i103,100+i118,115+i97,103+i104,
10 10+i97,101+i54,115+i53,97+i100,51+i115,97+i52,51+i100,54+i115,97+i99,99+i115,97+i51,115+i97,51+i100,115+i97,51+i100,115+i97,
11 115+i10,97+i51,115+i115,52+i97,101+i53,114+i116,100+i120,121+i115,53+i52,97+i51,54+i52,115+i97,100+i101,97+i115,53+i101,100+i97,
12 101+i50,10+i54,115+i53,97+i101,120+i53,100+i114,116+i102,122+i103,120+i101,53+i52,115+i101,100+i120,102+i103,99+i53,115+i97,116+i100,
13 114+i120,102+i10,54+i114,115+i100,116+i103,102+i120,53+i119,54+i114,97+i115,100+i116,120+i102,122+i103,114+i119,53+i54,114+i100,116+i115,
14 121+i102,120+i119,10+i53,52+i119,101+i113,115+i116,114+i97,100+i103,102+i120,99+i115,102+i116,114+i119,53+i54,121+i97,115+i116,114+i100,
15
```

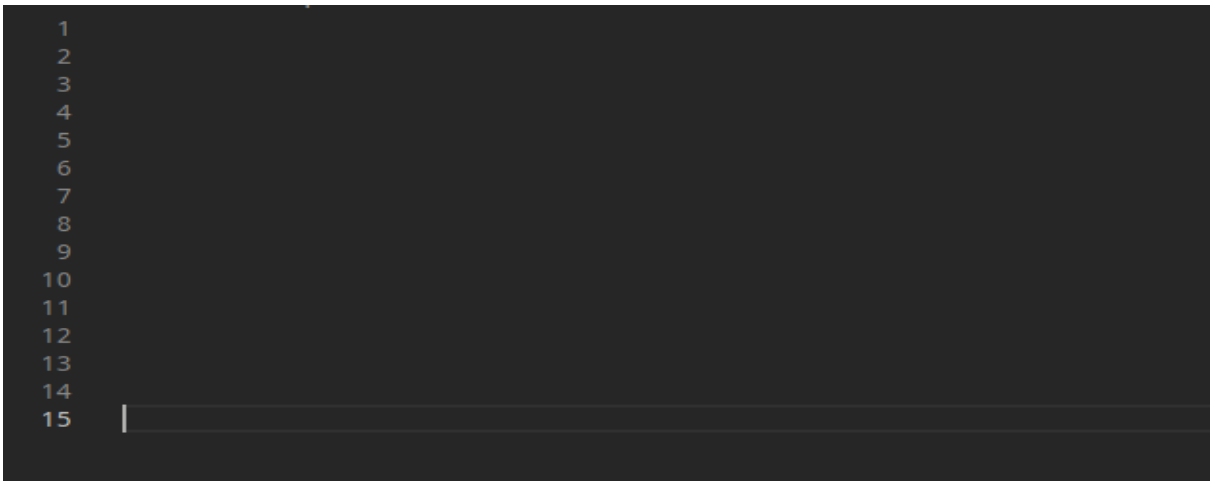
Result is 16 complex numbers per line.

3.2 Program B:

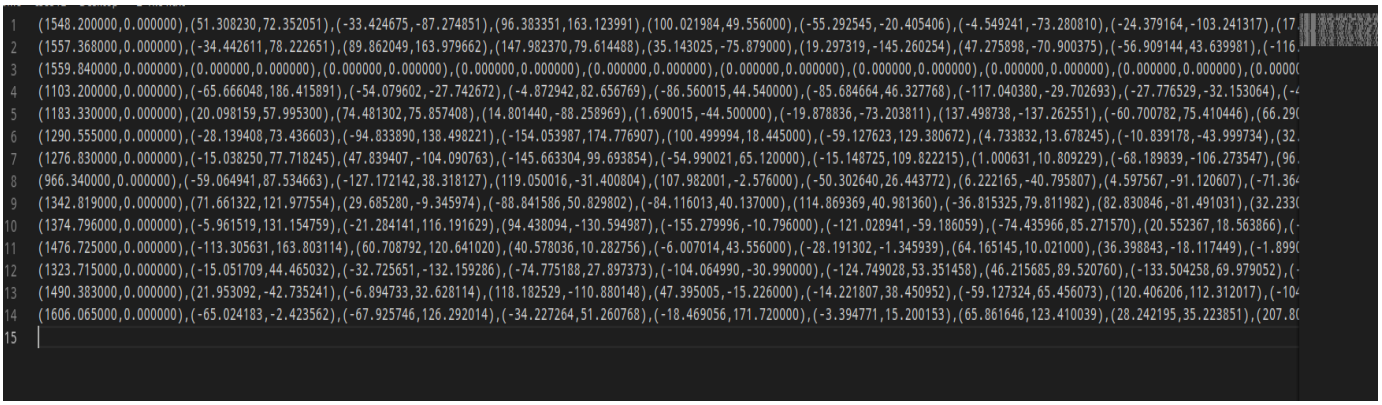
Input file of Program B is File-3 that is output file of Program A.

```
1  97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,97+i49,
2  10+i99,53+i99,53+i99,53+i99,53+i99,54+i99,54+i99,55+i99,56+i99,99+i56,99+i56,99+i57,99+i55,55+i99,99+i54,99+i52,
3  99+i10,98+i49,50+i98,51+i98,52+i110,52+i53,110+i54,54+i53,110+i52,51+i98,51+i52,98+i52,51+i52,98+i51,98+i52,51+i98,
4  52+i50,10+i97,55+i56,97+i54,97+i54,99+i56,55+i97,55+i56,115+i54,97+i115,53+i55,54+i97,115+i55,97+i53,115+i55,115+i55,
5  54+i54,55+i10,98+i54,116+i97,48+i57,48+i97,56+i100,55+i100,115+i55,100+i97,115+i56,55+i100,97+i100,57+i56,100+i55,100+i55,
6  56+i100,55+i100,10+i98,54+i118,54+i99,99+i53,52+i54,52+i52,52+i53,52+i114,54+i118,98+i97,114+i115,53+i97,52+i115,52+i53,
7  97+i100,52+i97,100+i10,97+i53,52+i115,53+i97,55+i101,97+i53,51+i97,100+i118,115+i100,52+i115,100+i52,100+i52,115+i52,100+i54,
8  52+i100,97+i115,100+i52,10+i50,54+i53,101+i116,100+i97,115+i54,55+i100,53+i115,100+i52,115+i54,100+i53,101+i55,115+i53,100+i52,
9  98+i97,53+i115,54+i100,55+i115,54+i53,97+i53,97+i54,115+i100,115+i100,97+i115,104+i100,118+i115,97+i103,100+i118,115+i97,103+i104,
10 10+i97,101+i54,115+i53,97+i100,51+i115,97+i52,51+i100,54+i115,97+i99,99+i115,97+i51,115+i97,51+i100,115+i97,51+i100,115+i97,
11 115+i10,97+i51,115+i115,52+i97,101+i53,114+i116,100+i120,121+i115,53+i52,97+i51,54+i52,115+i97,100+i101,97+i115,53+i101,100+i97,
12 101+i50,10+i54,115+i53,97+i101,120+i53,100+i114,116+i102,122+i103,120+i101,53+i52,115+i101,100+i120,102+i103,99+i53,115+i97,116+i100,
13 114+i120,102+i10,54+i114,115+i100,116+i103,102+i120,53+i119,54+i114,97+i115,100+i116,120+i102,122+i103,114+i119,53+i54,114+i100,116+i115,
14 121+i102,120+i119,10+i53,52+i119,101+i113,115+i116,114+i97,100+i103,102+i120,99+i115,102+i116,114+i119,53+i54,121+i97,115+i116,114+i100,
15
```

After Program B:



File - 3 = All lines removed from File - 3.

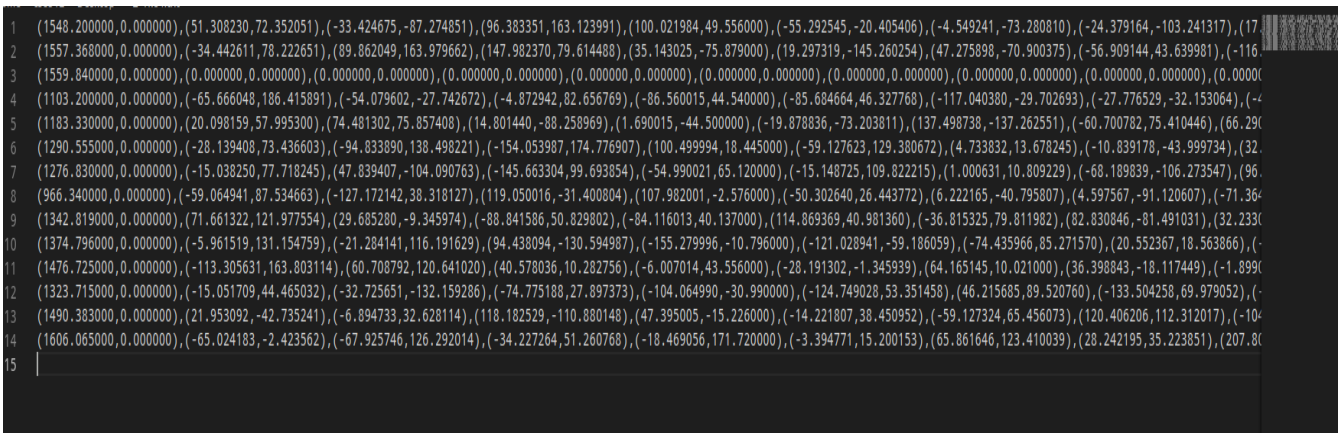


File - 4 =>Fourier Transform is made.

PART 2

3.3 Program C:

Input file of Program C is File-4 that is output file of Program B.



Nevra Gürses
161044071

After MergeSort File-4 is:

```
(1559.840000,0.000000),(0.000000,0.000000),(0.000000,0.000000),(0.000000,0.000000),(0.000000,0.000000),(0.000000,0.000000),(0.000000,0.000000),(0.000000,0.000000),(0.000000,0.000000),(0.0000
(966.340000,0.000000),(-59.064941,87.534663),(-127.172142,38.318127),(119.050016,-31.400804),(107.982001,-2.576000),(-50.302640,26.443772),(6.222165,-40.795807),(4.597567,-91.120607),(-71.364
(1103.200000,0.000000),(-65.666048,186.415891),(-54.079602,-27.742672),(-4.872942,82.656769),(-86.560015,44.540000),(-85.684664,46.327768),(-117.040380,-29.702693),(-27.776529,-32.153064),(-4
(1476.725000,0.000000),(-113.305631,163.803114),(60.708792,120.641020),(40.578036,10.282756),(-6.007014,43.556000),(-28.191302,-1.345939),(64.165145,10.021000),(36.398843,-18.117449),(-1.8990
(1183.330000,0.000000),(20.098159,57.995300),(74.481302,75.857408),(14.801440,-88.258969),(1.690015,-44.500000),(-19.878836,-73.203811),(137.498738,-137.262551),(-60.700782,75.410446),(66.290
(1342.819000,0.000000),(71.661322,121.977554),(29.685280,-9.345974),(-88.841586,50.829802),(-84.116013,40.137000),(114.869369,40.981360),(-36.815325,79.811982),(82.830846,-81.491031),(32.2330
(1490.383000,0.000000),(21.953092,-42.735241),(-6.894733,32.628114),(118.182529,-110.880148),(47.395005,-15.226000),(-14.221807,38.450952),(-59.127324,65.456073),(120.406206,112.312017),(-104
(1276.830000,0.000000),(-15.038250,77.718245),(47.839407,-104.090763),(-145.663304,99.693854),(-54.990021,65.120000),(-15.148725,109.822215),(1.000631,10.809229),(-68.189839,-106.273547),(96.
(1290.555000,0.000000),(-28.139408,73.436603),(-94.833890,138.498221),(-154.053987,174.776907),(100.499994,18.445000),(-59.127623,129.380672),(4.733832,13.678245),(-10.839178,-43.999734),(32.
(1548.200000,0.000000),(51.308230,72.352051),(-33.424675,-87.274851),(96.383351,163.123991),(100.021984,49.556000),(-55.292545,-20.405406),(-4.549241,-73.280810),(-24.379164,-103.241317),(17.
(1374.796000,0.000000),(-5.961519,131.154759),(-21.284141,116.191629),(94.438094,-130.594987),(-155.279996,-10.796000),(-121.028941,-59.186059),(-74.435966,85.271570),(20.552367,18.563866),(-
(1606.065000,0.000000),(-65.024183,-2.423562),(-67.925746,126.292014),(-34.227264,51.260768),(-18.469056,171.720000),(-3.394771,15.200153),(65.861646,123.410039),(28.242195,35.223851),(207.80
(1323.715000,0.000000),(-15.051709,44.465032),(-32.725651,-132.159286),(-74.775188,27.897373),(-104.064990,-30.990000),(-124.749028,53.351458),(46.215685,89.520760),(-133.504258,69.979052),(-
(1557.368000,0.000000),(-34.442611,78.222651),(89.862049,163.979662),(147.982370,79.614488),(35.143025,-75.879000),(19.297319,-145.260254),(47.275898,-70.900375),(-56.909144,43.639981),(-116.
```