

Gebze Technical University
Computer Engineering
CSE 344
System Programming
Homework 5 Report

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In this homework, we are responsible for manage the shopping between clients and florists. The main thread will read including of the file and creates threads of florists respect to it. The file contains names of florists and their coordinates of x and y, speed and name of flowers, then, names of clients, coordinates of x and y and name of their flower.

My Solution:

There is 3 types of struct; for florists, clients, statistics. They have all the information about owners. Some pointers and values created as global. Here is the work: First of all all parameter test is done and setted some errno and printed screen then exited. Then all the threads are initialized. File: We can assume the file is not empty and that its contents have the proper expected format. So, I do not need to check the content of the file.

1 Mutexes, Condition Variables and Purposes:

`pthread_cond_t cond_thread`: main thread triggers to threads with this condition variable. Thread waits for this condition

`pthread_mutex_t mutex`: used to lock florists during the sale

`pthread_mutex_t mutex_main`: used to lock main thread during the sending condition to florists

`pthread_mutex_t mutex_after`: used to lock florist during the checking the rear of the queue

2 Created Threads:

2.1 Florists:

We do not know how many florist are there but we know that, each one has an endless supply of given flowers.

3 Function Definitions:

3.1 main:

In the main function, calculated number of florist and created florist threads in calculated number. Main is also thread. I gave an ID for every florist. Main calculates number of clients, number of flowers of florists and reads strings and converts them into string, float. Main thread locked own and sends signal `cond_thread` among the client number when all the file is read. Also, signal `SIGINT` is masked in some position, creating and waiting threads, making free the resources. Checks the usage errors at the same time.

3.2 pool:

The parameter is the ID of florists. Locks with mutex and waits condition signal `cond_thread`, then sells the flower to client which is in front of the queue. And client leaves.

3.3 handler:

Handler waits a signal as SIGINT. If the signal SIGINT is comes then check the if resources are freed or not freed. Frees if the resources are not freed respect to its checking.

3.4 pop:

Decrease number of clients in queue, sends the front client and sets the front as second client.

3.5 numberOfFlowers:

Calculates the number of flowers of florists.

3.6 numberOfClients:

Calculates the number of clients.

3.7 numberOfFlorist:

Calculates the number of florists.

3.8 readString:

Parses strings from file with some characters and keeps them into a char pointer and assigns as name or float.

4 Sample Screenshots of Program:

The screenshot shows a file manager window with files: data.dat, data2.dat, data3.dat, FloristApp, floristApp.c, floristApp.o, and makefile. Below it, a terminal window shows the following commands and output:

```
sed@sed: ~/Desktop/151044068_SEDA_KANIK
sed@sed:~/Desktop/151044068_SEDA_KANIK$ make all
gcc -c floristApp.c
gcc -pthread floristApp.c -std=gnu99 -lm -o floristApp -lrt -lpthread -Wall -Wextra -pedantic
sed@sed:~/Desktop/151044068_SEDA_KANIK$ ./floristApp
The command line should be: ./floristApp -i data.dat : Argument list too long
sed@sed:~/Desktop/151044068_SEDA_KANIK$ ./floristApp -i
The command line should be: ./floristApp -i data.dat : Argument list too long
sed@sed:~/Desktop/151044068_SEDA_KANIK$ ./floristApp -i data
Florist application initializing from file: data
open: File exists
sed@sed:~/Desktop/151044068_SEDA_KANIK$ ./floristApp -i data.dat seda
The command line should be: ./floristApp -i data.dat : Argument list too long
sed@sed:~/Desktop/151044068_SEDA_KANIK$ ./floristApp data.dat
The command line should be: ./floristApp -i data.dat : Argument list too long
sed@sed:~/Desktop/151044068_SEDA_KANIK$ ./floristApp data.dat seda
The file is not given
The command line should be: ./floristApp -i data.dat : No such file or directory
sed@sed:~/Desktop/151044068_SEDA_KANIK$
```

Figure 1: Tests for parameters

Test for memory leak:

The screenshot shows a terminal window with the following output from a valgrind command:

```
sed@sed:~/Desktop/151044068_SEDA_KANIK$ valgrind --leak-check=yes ./floristApp -i data.dat
==4256== Memcheck, a memory error detector
==4256== Copyright (C) 2002-2015, and GNU GPL'd, by Julian Seward et al.
==4256== Using Valgrind-3.11.0 and LibVEX; rerun with -h for copyright info
==4256== Command: ./floristApp -i data.dat
==4256==
Florist application initializing from file: data.dat
5 florists have been created
Processing requests
==4256== Thread 5:
==4256== Conditional jump or move depends on uninitialised value(s)
==4256== at 0x401B9E: pool (in /home/sed/Desktop/151044068_SEDA_KANIK/floristApp)
==4256== by 0x4E416B9: start_thread (pthread_create.c:333)
==4256==
Florist Ayse has delivered a Rose to client0 in 55ms
All requests processed.
Ayse closing shop.
Fatma closing shop.
Murat closing shop.
Ahmet closing shop.
Busra closing shop.
Sale statistics for today:
-----
Florist    # of sales    Total time
-----
Ayse       1              55ms
Fatma      0              0ms
Murat      0              0ms
Ahmet      0              0ms
Busra      0              0ms
-----
==4256==
==4256== HEAP SUMMARY:
==4256==   in use at exit: 0 bytes in 0 blocks
==4256== total heap usage: 129 allocs, 129 frees, 12,934 bytes allocated
==4256==
==4256== All heap blocks were freed -- no leaks are possible
==4256==
==4256== For counts of detected and suppressed errors, rerun with: -v
==4256== Use --track-origins=yes to see where uninitialised values come from
==4256== ERROR SUMMARY: 4 errors from 1 contexts (suppressed: 0 from 0)
sed@sed:~/Desktop/151044068_SEDA_KANIK$
```

Below the terminal output, there is a file editor window showing the content of data3.dat:

```
1 Ayse (10,8; 1) : Orchid, Rose, Violet
2 Fatma (-10,-1; 1) : Clove, Rose, Daffodil, Daisy
3 Murat (-6,8; 1) : Violet, Daffodil, Orchid, Tulip
4 Ahmet (3,-8; 1) : Clove, Tulip
5 Busra (1,0; 1) : Lilac, Daisy, Orchid
6
7 client0 (9,-2): Rose
8
```

Figure 2: Input and Output Files

```

data.dat      data2.dat      data3.dat
1 Ayse (10,8; 1) : Orchid, Rose, Violet
2 Fatma (-10,-1; 1) : Clove, Rose, Daffodil, Daisy
3 Murat (-6,8; 1) : Violet, Daffodil, Orchid, Tulip
4 Ahmet (3,-8; 1) : Clove, Tulip
5 Busra (1,0; 1) : Lilac, Daisy, Orchid
6
7 client0 (9,-2) : Rose
8 client1 (-6,7) : Orchid
9 client2 (-6,2) : Daisy
10 client3 (7,-7) : Rose
11 client4 (-2,10) : Tulip
12 client5 (4,-8) : Clove
13 client6 (0,-2) : Violet
14 client7 (5,5) : Daffodil
15 client8 (-2,9) : Orchid
16 client9 (-8,1) : Rose
17 client10 (-1,9) : Tulip
18 client11 (-8,6) : Daisy
19 client12 (-7,6) : Rose
20 client13 (1,-4) : Orchid
21 client14 (8,4) : Clove
22 client15 (6,5) : Daffodil
23 client16 (6,-7) : Lilac
24 client17 (-1,9) : Rose
25 client18 (6,-6) : Clove
26 client19 (-1,0) : Lilac
27 client20 (3,0) : Daffodil
28 client21 (-5,2) : Lilac
29 client22 (-2,9) : Tulip
30 client23 (6,6) : Violet
31 client24 (-1,-7) : Clove
32 client25 (0,-9) : Clove
33 client26 (0,-3) : Clove
34 client27 (-2,5) : Orchid
35 client28 (0,-2) : Orchid
36 client29 (0,6) : Daffodil
37 client30 (1,-7) : Lilac
38 client31 (7,-6) : Violet
39 client32 (1,10) : Rose
40
41

```

Figure 3: Input File

```

sed@sed:~/Desktop/151044068_SEDA_KANIKS$ valgrind --leak-check=yes ./floristApp -l data2.dat
==4263== Memcheck, a memory error detector
==4263== Copyright (C) 2002-2015, and GNU GPL'd, by Julian Seward et al.
==4263== Using Valgrind-3.11.0 and LibVEX; rerun with -h for copyright info
==4263== Command: ./floristApp -l data2.dat
==4263==
Florist application initializing from file: data2.dat
5 florists have been created
Processing requests
Florist Ahmet has delivered a Clove to client5 in 29ms
Florist Murat has delivered a Orchid to client1 in 135ms
Florist Fatma has delivered a Daisy to client2 in 7ms
Florist Busra has delivered a Tulip to client4 in 76ms
Florist Murat has delivered a Orchid to client13 in 75ms
Florist Fatma has delivered a Rose to client9 in 24ms
Florist Murat has delivered a Daffodil to client7 in 22ms
Florist Fatma has delivered a Daisy to client11 in 92ms
Florist Busra has delivered a Lilac to client16 in 103ms
Florist Murat has delivered a Orchid to client8 in 159ms
Florist Fatma has delivered a Rose to client12 in 116ms
Florist Murat has delivered a Tulip to client10 in 193ms
Florist Busra has delivered a Lilac to client19 in 154ms
Florist Fatma has delivered a Rose to client17 in 144ms
Florist Ahmet has delivered a Rose to client1 in 104ms
Florist Murat has delivered a Daffodil to client15 in 15ms
Florist Ahmet has delivered a Clove to client14 in 93ms
Florist Busra has delivered a Lilac to client21 in 223ms
Florist Murat has delivered a Daffodil to client20 in 222ms
Florist Ayse has delivered a Rose to client3 in 214ms
Florist Ahmet has delivered a Clove to client18 in 239ms
Florist Busra has delivered a Orchid to client28 in 10ms
Florist Murat has delivered a Tulip to client22 in 15ms
Florist Ahmet has delivered a Clove to client24 in 38ms
Florist Busra has delivered a Lilac to client30 in 11ms
Florist Ayse has delivered a Violet to client6 in 58ms
Florist Murat has delivered a Orchid to client27 in 117ms
Florist Ahmet has delivered a Clove to client25 in 209ms
Florist Murat has delivered a Daffodil to client29 in 98ms
Florist Ayse has delivered a Violet to client23 in 84ms
Florist Ahmet has delivered a Clove to client26 in 38ms
Florist Ayse has delivered a Violet to client31 in 236ms
Florist Ayse has delivered a Rose to client32 in 223ms
All requests processed.
Ayse closing shop.
Fatma closing shop.
Murat closing shop.
Ahmet closing shop.
Busra closing shop.
Sale statistics for today:
-----
Florist      # of sales      Total time
-----
Ayse         6              919ms
Fatma        5              605ms
Murat        10             1187ms
Ahmet        6              626ms
Busra        6              576ms
-----
==4263==
==4263== HEAP SUMMARY:
==4263==   in use at exit: 0 bytes in 0 blocks
==4263==   total heap usage: 449 allocs, 449 frees, 42,758 bytes allocated
==4263==
==4263== All heap blocks were freed -- no leaks are possible
==4263==
==4263== For counts of detected and suppressed errors, rerun with: -v
==4263== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
sed@sed:~/Desktop/151044068_SEDA_KANIKS$

```

Figure 4: Output Files

```

1 Ayse (10,8; 1,9) : Orchid, Rose, Violet
2 Fatma (-10,-1; 5,4) : Clove, Rose, Daffodil, Daisy
3 Murat (-6,6; 3,7) : Violet, Daffodil, Orchid, Tulip
4
5 client0 (9,-2) : Rose
6 client1 (-6,7) : Orchid
7 client2 (-6,2) : Daisy
8 client3 (7,-7) : Rose
9 client4 (-2,10) : Tulip
10 client5 (4,-8) : Clove
11 client6 (0,-2) : Violet
12 client7 (5,5) : Daffodil
13 client8 (-2,9) : Orchid
14 client9 (-8,1) : Rose
15 client10 (-1,9) : Tulip
16 client11 (-8,6) : Daisy
17 client12 (-7,6) : Rose
18 client13 (1,-4) : Orchid
19 client14 (8,4) : Clove
20 client15 (6,5) : Daffodil
21 client16 (0,-7) : Lilac
22 client17 (-1,9) : Rose
23 client18 (6,-6) : Clove
24 client19 (-1,0) : Lilac
25 client20 (3,0) : Daffodil
26 client21 (-5,2) : Lilac
27 client22 (-2,9) : Tulip
28 client23 (6,6) : Violet
29 client24 (-1,-7) : Clove
30 client25 (0,-9) : Clove
31 client26 (0,-3) : Clove
32 client27 (-2,5) : Orchid
33 client28 (0,-2) : Orchid
34 client29 (0,6) : Daffodil
35 client30 (1,-7) : Lilac
36 client31 (7,-6) : Violet
37 client32 (1,10) : Rose
38 client33 (-2,9) : Tulip
39 client34 (6,6) : Violet
40 client35 (-1,-7) : Clove
41 client36 (0,-9) : Clove
42 client37 (0,-3) : Clove
43 client38 (-2,5) : Orchid
44 client39 (0,-2) : Orchid
45 client40 (0,6) : Daffodil
46 client41 (1,-7) : Lilac
47 client42 (7,-6) : Violet
48 client43 (1,10) : Rose

```

Figure 5: Input File

```

sed@sed:~/Desktop/151044068_SEDA_KANIKS$ valgrind --leak-check=yes ./floristApp -i data3.dat
==4274== Memcheck, a memory error detector
==4274== Copyright (C) 2002-2015, and GNU GPL'd, by Julian Seward et al.
==4274== Using Valgrind-3.11.0 and LibVEX; rerun with -h for copyright info
==4274== Command: ./floristApp -i data3.dat
==4274==
Florist application initializing from file: data3.dat
3 florists have been created
Processing requests
Florist Fatma has delivered a Daisy to client2 in 69ms
Florist Murat has delivered a Orchid to client1 in 54ms
Florist Murat has delivered a Tulip to client4 in 175ms
Florist Murat has delivered a Daffodil to client7 in 242ms
Florist Murat has delivered a Orchid to client8 in 13ms
Florist Murat has delivered a Tulip to client10 in 245ms
Florist Murat has delivered a Daffodil to client15 in 221ms
Florist Murat has delivered a Daffodil to client20 in 128ms
Florist Murat has delivered a Daffodil to client20 in 106ms
Florist Murat has delivered a Tulip to client22 in 11ms
Florist Murat has delivered a Orchid to client27 in 236ms
Florist Murat has delivered a Daffodil to client29 in 169ms
Florist Murat has delivered a Daffodil to client29 in 47ms
Florist Murat has delivered a Tulip to client33 in 90ms
Florist Murat has delivered a Orchid to client38 in 109ms
Florist Murat has delivered a Daffodil to client40 in 113ms
Florist Murat has delivered a Daffodil to client40 in 23ms
Florist Ayse has delivered a Rose to client0 in 214ms
Florist Fatma has delivered a Clove to client5 in 43ms
Florist Ayse has delivered a Rose to client3 in 105ms
Florist Ayse has delivered a Violet to client6 in 110ms
Florist Ayse has delivered a Orchid to client13 in 47ms
Florist Ayse has delivered a Violet to client23 in 139ms
Florist Ayse has delivered a Orchid to client28 in 73ms
Florist Ayse has delivered a Violet to client31 in 52ms
Florist Ayse has delivered a Rose to client32 in 149ms
Florist Ayse has delivered a Violet to client34 in 67ms
Florist Ayse has delivered a Orchid to client39 in 155ms
Florist Ayse has delivered a Violet to client42 in 202ms
Florist Ayse has delivered a Rose to client43 in 115ms
Florist Fatma has delivered a Rose to client9 in 66ms
Florist Fatma has delivered a Daisy to client11 in 102ms
Florist Fatma has delivered a Rose to client12 in 130ms
Florist Fatma has delivered a Clove to client14 in 59ms
Florist Fatma has delivered a Rose to client17 in 113ms
Florist Fatma has delivered a Clove to client18 in 133ms
Florist Fatma has delivered a Clove to client10 in 26ms
Florist Fatma has delivered a Clove to client24 in 172ms
Florist Fatma has delivered a Clove to client25 in 6ms
Florist Fatma has delivered a Clove to client26 in 127ms
Florist Fatma has delivered a Clove to client35 in 33ms

Florist Fatma has delivered a Clove to client26 in 127ms
Florist Fatma has delivered a Clove to client35 in 33ms
Florist Fatma has delivered a Clove to client36 in 93ms
Florist Fatma has delivered a Clove to client37 in 147ms
All requests processed.
Ayse closing shop.
Fatma closing shop.
Murat closing shop.
Sale statistics for today:
-----
Florist      # of sales      Total time
-----
Ayse          12          1428ms
Fatma         15          1323ms
Murat         17          2192ms
-----
==4274==
==4274== HEAP SUMMARY:
==4274==       in use at exit: 0 bytes in 0 blocks
==4274==   total heap usage: 520 allocs, 520 frees, 48,866 bytes allocated
==4274==
==4274== All heap blocks were freed -- no leaks are possible
==4274==
==4274== For counts of detected and suppressed errors, rerun with: -v
==4274== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
sed@sed:~/Desktop/151044068_SEDA_KANIKS$

```

Figure 6: Output Files

SIGINT:

```
sed@sed:~/Desktop/151044068_SEDA_KANIKS$ valgrind --leak-check=yes ./floristApp -i data3.dat
==4316== Memcheck, a memory error detector
==4316== Copyright (C) 2002-2015, and GNU GPL'd, by Julian Seward et al.
==4316== Using Valgrind-3.11.0 and LibVEX; rerun with -h for copyright info
==4316== Command: ./floristApp -i data3.dat
==4316==
Florist application initializing from file: data3.dat
PC==4316==
==4316== HEAP SUMMARY:
==4316==    in use at exit: 0 bytes in 0 blocks
==4316==    total heap usage: 129 allocs, 129 frees, 15,070 bytes allocated
==4316==
==4316== All heap blocks were freed -- no leaks are possible
==4316==
==4316== For counts of detected and suppressed errors, rerun with: -v
==4316== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
sed@sed:~/Desktop/151044068_SEDA_KANIKS$
```

Figure 7: SIGINT before the creating of threads

```
sed@sed:~/Desktop/151044068_SEDA_KANIKS$ valgrind --leak-check=yes ./floristApp -i data3.dat
==4309== Memcheck, a memory error detector
==4309== Copyright (C) 2002-2015, and GNU GPL'd, by Julian Seward et al.
==4309== Using Valgrind-3.11.0 and LibVEX; rerun with -h for copyright info
==4309== Command: ./floristApp -i data3.dat
==4309==
Florist application initializing from file: data3.dat
3 florists have been created
Processing requests
Florist Murat has delivered a Orchid to client1 in 98ms
Florist Fatma has delivered a Daisy to client2 in 40ms
Florist Ayse has delivered a Rose to client0 in 182ms
Florist Murat has delivered a Tulip to client4 in 18ms
Florist Fatma has delivered a Clove to client5 in 97ms
Florist Ayse has delivered a Rose to client3 in 44ms
Florist Fatma has delivered a Rose to client9 in 10ms
Florist Murat has delivered a Daffodil to client7 in 156ms
Florist Ayse has delivered a Violet to client6 in 104ms
Florist Fatma has delivered a Daisy to client11 in 120ms
Florist Murat has delivered a Orchid to client8 in 78ms
Florist Ayse has delivered a Orchid to client13 in 135ms
Florist Fatma has delivered a Rose to client12 in 36ms
Florist Murat has delivered a Tulip to client10 in 40ms
Florist Ayse has delivered a Violet to client23 in 101ms
Florist Fatma has delivered a Clove to client14 in 83ms
Florist Murat has delivered a Daffodil to client15 in 99ms
Florist Ayse has delivered a Orchid to client28 in 171ms
Florist Fatma has delivered a Rose to client17 in 39ms
Florist Murat has delivered a Daffodil to client16 in 221ms
Florist Ayse has delivered a Violet to client31 in 173ms
Florist Fatma has delivered a Clove to client18 in 55ms
Florist Murat has delivered a Daffodil to client20 in 155ms
Florist Ayse has delivered a Rose to client32 in 90ms
Florist Fatma has delivered a Clove to client18 in 7ms
Florist Murat has delivered a Daffodil to client20 in 224ms
Florist Ayse has delivered a Violet to client34 in 141ms
Florist Fatma has delivered a Clove to client24 in 64ms
Florist Murat has delivered a Tulip to client22 in 16ms
Florist Ayse has delivered a Orchid to client39 in 35ms
Florist Fatma has delivered a Clove to client25 in 228ms
Florist Murat has delivered a Orchid to client27 in 215ms
Florist Ayse has delivered a Violet to client42 in 179ms
Florist Fatma has delivered a Clove to client26 in 7ms
Florist Murat has delivered a Daffodil to client29 in 84ms
Florist Ayse has delivered a Rose to client43 in 20ms
Florist Fatma has delivered a Clove to client35 in 43ms
Florist Murat has delivered a Daffodil to client29 in 93ms
Florist Fatma has delivered a Clove to client36 in 22ms
Florist Murat has delivered a Tulip to client33 in 53ms
Florist Fatma has delivered a Clove to client37 in 63ms
Florist Murat has delivered a Orchid to client38 in 200ms
Florist Murat has delivered a Daffodil to client40 in 34ms
Florist Murat has delivered a Daffodil to client40 in 97ms
All requests processed.
Ayse closing shop.
Fatma closing shop.
Murat closing shop.
==4309==
==4309== HEAP SUMMARY:
==4309==    in use at exit: 0 bytes in 0 blocks
==4309==    total heap usage: 520 allocs, 520 frees, 48,866 bytes allocated
==4309==
==4309== All heap blocks were freed -- no leaks are possible
==4309==
==4309== For counts of detected and suppressed errors, rerun with: -v
==4309== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
sed@sed:~/Desktop/151044068_SEDA_KANIKS$
```

Figure 8: SIGINT in while execution of threads