CSE 344
SYSTEMS PROGRAMMING

HOMEWORK 05

REPORT

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1. __Program Flow__

In that part, in *main*.c program starts to get arguments from console and initialize the necessary information about path of file that is going to be read. Then it initialize the florists using *initFlorists()* function which is in *florist.c* file. While initializing florists, it parses lines with a format which is given by assignment. It also initialize the condition variable by 0. In main, it also initialize the queue of florists with NULL.

After initialization of florists, the florists' threads are created. While the threads are running, central/main thread reads file which contains clients to insert into the queues. There is a loop for to read all clients and checks the closest florists and inserts the client into the closest florist' queue. After all insertions of clients, main/central thread *broadcasts* the condition variable which is waited by florists' threads. Then threads are joined in main thread and prints the information about results and removes mutex, closes file returns.

In *florist.c*, florist threads waits in condition variable's wait and then it counts total sales. Then it evaluates randomly integer between 1-250 and sums with chevby distance between florist – client. Then it removes the client from florist's queue and prints the information. It keeps doing that until all clients are done.

2. __Notes:__

- To run the program, I write a Makefile which exactly compiles and runs.
- No errors, no warnings I caught showed in test results.
- No zombie threads.
- __CTRL – C__ (__SIGINT__) signal is handled successfully.
- Only POSIX mutex and condition variables are used to provide synchronization between threads.
- To run with __*"valgrind"*__ I create the Makefile to run in valgrind mode using __*"make v"*__ command. It compiles and runs.
- __*"-Wall"*__ flag is added to Makefile in compile time.
- The input file format has to be same exactly in given example file format (data.dat).
- Test results are attached to report as screen shots.

Makefile:

```
Makefile          X    main.c        X    main.h        X    data.dat        X    florist.c        X

1    CC = gcc
2    CFLAGS = -c -Wall
3    GFLAG = -g
4    VALG = valgrind -v
5    THREAD = -lpthread
6
7    all:main run
8
9    main: main.o florist.o client.o
10       $(CC) $(GFLAG) main.o florist.o client.o -o floristApp $(THREAD)
11
12   main.o: main.c
13       $(CC) $(GFLAG) $(CFLAGS) main.c
14
15   florist.o: florist.c
16       $(CC) $(GFLAG) $(CFLAGS) florist.c
17
18   client.o: client.c
19       $(CC) $(GFLAG) $(CFLAGS) client.c
20
21   run:
22       ./floristApp -i data.dat
23
24   v:main runv
25
26   runv:
27       $(VALG) ./floristApp -i data.dat
28
29   clean:
30       rm -rf *o floristApp
```

Console:

```
omer@omer:~/Desktop/HW05/HW05$ make
gcc -g -c -Wall main.c
gcc -g -c -Wall florist.c
gcc -g -c -Wall client.c
gcc -g main.o florist.o client.o -o floristApp -lpthread
./floristApp -i data.dat
Florist application initializing from file: data.dat
3 florists have been created
Processing requests
All requests processed.
Florist Murat has delivered a orchid to client1 in 102ms
Florist Fatma has delivered a clove to client2 in 116ms
Florist Fatma has delivered a rose to client9 in 164ms
Florist Fatma has delivered a clove to client13 in 26ms
Florist Fatma has delivered a clove to client16 in 30ms
Florist Fatma has delivered a daffodil to client18 in 42ms
Florist Fatma has delivered a daffodil to client21 in 44ms
Florist Ayse has delivered a orchid to client4 in 186ms
Florist Ayse has delivered a rose to client7 in 41ms
Florist Ayse has delivered a rose to client8 in 133ms
Florist Ayse has delivered a rose to client19 in 33ms
Florist Ayse has delivered a rose to client22 in 51ms
Florist Ayse has delivered a rose to client23 in 80ms
Florist Ayse has delivered a orchid to client24 in 70ms
Florist Murat has delivered a daffodil to client3 in 39ms
Florist Murat has delivered a violet to client5 in 81ms
Florist Murat has delivered a orchid to client6 in 120ms
Florist Murat has delivered a violet to client10 in 265ms
Florist Murat has delivered a orchid to client11 in 194ms
Florist Murat has delivered a violet to client12 in 52ms
Florist Murat has delivered a orchid to client14 in 117ms
Florist Murat has delivered a orchid to client15 in 203ms
Florist Murat has delivered a daffodil to client17 in 80ms
Florist Murat has delivered a orchid to client20 in 57ms
Ayse closing shop.
Fatma closing shop.
Murat closing shop.
Sale statistics for today:
------------------------------------------------
Florist          # of sales      Total time
------------------------------------------------
Ayse             7               594ms
Fatma            6               422ms
Murat            11              1310ms
------------------------------------------------
omer@omer:~/Desktop/HW05/HW05$ _
```

Make with Valgrind:

```
omer@omer:~/Desktop/HW05/HW05$ make v
gcc -g -c -Wall main.c
gcc -g -c -Wall florist.c
gcc -g -c -Wall client.c
gcc -g main.o florist.o client.o -o floristApp -lpthread
valgrind -v ./floristApp -i data.dat
==13623== Memcheck, a memory error detector
==13623== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==13623== Using Valgrind-3.15.0-608cb11914-20190413 and LibVEX; rerun with -h for copyright info
==13623== Command: ./floristApp -i data.dat
==13623==
--13623-- Valgrind options:
--13623--    -v
--13623-- Contents of /proc/version:
--13623--   Linux version 5.4.0-33-generic (buildd@lcy01-amd64-022) (gcc version 9.3.0 (Ubuntu 9.3.0-10ubuntu2)) #37-Ubuntu SMP Thu May 21 12:53:59 UTC 2020
--13623--
--13623-- Arch and hwcaps: AMD64, LittleEndian, amd64-cx16-lzcnt-rdtscp-sse3-ssse3-avx-avx2-bmi-f16c-rdrand
--13623-- Page sizes: currently 4096, max supported 4096
--13623-- Valgrind library directory: /usr/lib/x86_64-linux-gnu/valgrind
--13623-- Reading syms from /home/omer/Desktop/HW05/HW05/floristApp
--13623-- Reading syms from /lib/x86_64-linux-gnu/ld-2.31.so
--13623--    Considering /lib/x86_64-linux-gnu/ld-2.31.so ..
--13623--    .. CRC mismatch (computed 387b17ea wanted d28cf5ef)
--13623--    Considering /lib/x86_64-linux-gnu/ld-2.31.so ..
--13623--    .. CRC mismatch (computed 387b17ea wanted d28cf5ef)
--13623--    Considering /usr/lib/debug/lib/x86_64-linux-gnu/ld-2.31.so ..
--13623--    .. CRC is valid
--13623-- Reading syms from /usr/lib/x86_64-linux-gnu/valgrind/memcheck-amd64-linux
--13623--    object doesn't have a symbol table
--13623--    object doesn't have a dynamic symbol table
--13623-- Scheduler: using generic scheduler lock implementation.
==13623== Warning: set address range perms: large range [0x10f000, 0x101df000) (defined)
--13623-- Reading suppressions file: /usr/lib/x86_64-linux-gnu/valgrind/default.supp
==13623== embedded gdbserver: reading from /tmp/vgdb-pipe-from-vgdb-to-13623-by-omer-on-???
==13623== embedded gdbserver: writing to   /tmp/vgdb-pipe-to-vgdb-from-13623-by-omer-on-???
==13623== embedded gdbserver: shared mem   /tmp/vgdb-pipe-shared-mem-vgdb-13623-by-omer-on-???
==13623==
==13623== TO CONTROL THIS PROCESS USING vgdb (which you probably
==13623== don't want to do, unless you know exactly what you're doing,
==13623== or are doing some strange experiment):
==13623==   /usr/lib/x86_64-linux-gnu/valgrind/../../bin/vgdb --pid=13623 ...command...
==13623==
==13623== TO DEBUG THIS PROCESS USING GDB: start GDB like this
==13623==   /path/to/gdb ./floristApp
==13623== and then give GDB the following command
==13623==   target remote | /usr/lib/x86_64-linux-gnu/valgrind/../../bin/vgdb --pid=13623
==13623== --pid is optional if only one valgrind process is running
==13623==
--13623-- REDIR: 0x10201d80 (ld-linux-x86-64.so.2:strlen) redirected to 0x580c9ce2 (???)
--13623-- REDIR: 0x10201b50 (ld-linux-x86-64.so.2:index) redirected to 0x580c9cfc (???)
--13623-- Reading syms from /usr/lib/x86_64-linux-gnu/valgrind/vgpreload_core-amd64-linux.so
--13623--    object doesn't have a symbol table
--13623-- Reading syms from /usr/lib/x86_64-linux-gnu/valgrind/vgpreload_memcheck-amd64-linux.so
--13623--    object doesn't have a symbol table
==13623== WARNING: new redirection conflicts with existing -- ignoring it
```

```
==13623== WARNING: new redirection conflicts with existing -- ignoring it
--13623--    old: 0x10201d80 (strlen            ) R-> (0000.0) 0x580c9ce2 ???
--13623--    new: 0x10201d80 (strlen            ) R-> (2007.0) 0x10a1e060 strlen
--13623-- REDIR: 0x101fe560 (ld-linux-x86-64.so.2:strcmp) redirected to 0x10a1efd0 (strcmp)
--13623-- REDIR: 0x102022e0 (ld-linux-x86-64.so.2:mempcpy) redirected to 0x10a22a20 (mempcpy)
--13623-- Reading syms from /lib/x86_64-linux-gnu/libpthread-2.31.so
--13623--    Considering /usr/lib/debug/.build-id/77/5cbbfff814456660786780b0b3b40096b4c05e.debug ..
--13623--    .. build-id is valid
--13623-- Reading syms from /lib/x86_64-linux-gnu/libc-2.31.so
--13623--    Considering /lib/x86_64-linux-gnu/libc-2.31.so ..
--13623--    .. CRC mismatch (computed a6f43087 wanted 6555436e)
--13623--    Considering /lib/x86_64-linux-gnu/libc-2.31.so ..
--13623--    .. CRC mismatch (computed a6f43087 wanted 6555436e)
--13623--    Considering /usr/lib/debug/lib/x86_64-linux-gnu/libc-2.31.so ..
--13623--    .. CRC is valid
--13623-- REDIR: 0x10b0f600 (libc.so.6:memmove) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e900 (libc.so.6:strncpy) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0f930 (libc.so.6:strcasecmp) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e220 (libc.so.6:strcat) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e960 (libc.so.6:rindex) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b10dd0 (libc.so.6:rawmemchr) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b2be60 (libc.so.6:wmemchr) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b2b9a0 (libc.so.6:wcscmp) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0f760 (libc.so.6:mempcpy) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0f590 (libc.so.6:bcmp) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e890 (libc.so.6:strncmp) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e2d0 (libc.so.6:strcmp) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0f6c0 (libc.so.6:memset) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b2b960 (libc.so.6:wcschr) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e7f0 (libc.so.6:strnlen) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e3b0 (libc.so.6:strcspn) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0f980 (libc.so.6:strncasecmp) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e350 (libc.so.6:strcpy) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0fad0 (libc.so.6:memcpy@@GLIBC_2.14) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b2d0d0 (libc.so.6:wcsnlen) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b2b9e0 (libc.so.6:wcscpy) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e9a0 (libc.so.6:strpbrk) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e280 (libc.so.6:index) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0e7b0 (libc.so.6:strlen) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b17d20 (libc.so.6:memrchr) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0f9d0 (libc.so.6:strcasecmp_l) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0f550 (libc.so.6:memchr) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b2bab0 (libc.so.6:wcslen) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0ec60 (libc.so.6:strspn) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0f8d0 (libc.so.6:stpncpy) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0f870 (libc.so.6:stpcpy) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b10e10 (libc.so.6:strchrnul) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10b0fa20 (libc.so.6:strncasecmp_l) redirected to 0x10a101d0 (_vgnU_ifunc_wrapper)
--13623-- REDIR: 0x10bf7300 (libc.so.6:__strrchr_avx2) redirected to 0x10a1da10 (rindex)
--13623-- REDIR: 0x10bfa960 (libc.so.6:__memset_avx2_unaligned_erms) redirected to 0x10a218e0 (memset)
--13623-- REDIR: 0x10bf74d0 (libc.so.6:__strlen_avx2) redirected to 0x10a1df40 (strlen)
--13623-- REDIR: 0x10bf6ee0 (libc.so.6:__strchr_avx2) redirected to 0x10a1dbf0 (index)
--13623-- REDIR: 0x10bf7110 (libc.so.6:__strchrnul_avx2) redirected to 0x10a22540 (strchrnul)
--13623-- REDIR: 0x10bfa4c0 (libc.so.6:__mempcpy_avx_unaligned_erms) redirected to 0x10a22660 (mempcpy)
Florist application initializing from file: data.dat
```

```
Florist application initializing from file: data.dat
--13623-- REDIR: 0x10bf3600 (libc.so.6:__rawmemchr_avx2) redirected to 0x10a22580 (rawmemchr)
--13623-- REDIR: 0x10bfa4e0 (libc.so.6:__memcpy_avx_unaligned_erms) redirected to 0x10a219f0 (memmove)
3 florists have been created
Processing requests
--13623-- REDIR: 0x10b0ac90 (libc.so.6:calloc) redirected to 0x10a1cce0 (calloc)
--13623-- REDIR: 0x10bf29d0 (libc.so.6:__strcmp_avx2) redirected to 0x10a1eed0 (strcmp)
--13623-- REDIR: 0x10b09260 (libc.so.6:malloc) redirected to 0x10a1a780 (malloc)
--13623-- REDIR: 0x10bf8a10 (libc.so.6:__strcpy_avx2) redirected to 0x10a1e090 (strcpy)
All requests processed.
Florist Ayse has delivered a orchid to client4 in 263ms
--13623-- REDIR: 0x10b09850 (libc.so.6:free) redirected to 0x10a1b9d0 (free)
Florist Ayse has delivered a rose to client7 in 253ms
Florist Ayse has delivered a rose to client8 in 144ms
Florist Ayse has delivered a rose to client19 in 190ms
Florist Ayse has delivered a rose to client22 in 66ms
Florist Ayse has delivered a rose to client23 in 242ms
Florist Ayse has delivered a orchid to client24 in 20ms
Florist Murat has delivered a orchid to client1 in 17ms
Florist Murat has delivered a daffodil to client3 in 90ms
Florist Murat has delivered a violet to client5 in 69ms
Florist Murat has delivered a orchid to client6 in 254ms
Florist Murat has delivered a violet to client10 in 71ms
Florist Murat has delivered a orchid to client11 in 75ms
--13623-- Reading syms from /lib/x86_64-linux-gnu/libgcc_s.so.1
--13623--    object doesn't have a symbol table
Florist Murat has delivered a violet to client12 in 54ms
Florist Murat has delivered a orchid to client14 in 245ms
Florist Murat has delivered a orchid to client15 in 245ms
Florist Murat has delivered a daffodil to client17 in 207ms
Florist Murat has delivered a orchid to client20 in 135ms
Florist Fatma has delivered a clove to client2 in 73ms
Florist Fatma has delivered a rose to client9 in 121ms
Florist Fatma has delivered a clove to client13 in 228ms
Florist Fatma has delivered a clove to client16 in 69ms
Florist Fatma has delivered a daffodil to client18 in 86ms
Florist Fatma has delivered a daffodil to client21 in 52ms
Ayse closing shop.
Fatma closing shop.
Murat closing shop.
Sale statistics for today:
-------------------------------------------------
Florist          # of sales      Total time
-------------------------------------------------
Ayse             7               1178ms
Fatma            6               629ms
Murat            11              1462ms
-------------------------------------------------
--13623-- Discarding syms at 0x128675e0-0x12878055 in /lib/x86_64-linux-gnu/libgcc_s.so.1 (have_dinfo 1)
==13623==
==13623== HEAP SUMMARY:
==13623==     in use at exit: 0 bytes in 0 blocks
==13623==   total heap usage: 32 allocs, 32 frees, 15,582 bytes allocated
==13623==
==13623== All heap blocks were freed -- no leaks are possible
```

```
Florist Fatma has delivered a daffodil to client18 in 86ms
Florist Fatma has delivered a daffodil to client21 in 52ms
Ayse closing shop.
Fatma closing shop.
Murat closing shop.
Sale statistics for today:
-------------------------------------------------
Florist          # of sales      Total time
-------------------------------------------------
Ayse             7               1178ms
Fatma            6               629ms
Murat            11              1462ms
-------------------------------------------------
--13623-- Discarding syms at 0x128675e0-0x12878055 in /lib/x86_64-linux-gnu/libgcc_s.so.1 (have_dinfo 1)
==13623==
==13623== HEAP SUMMARY:
==13623==     in use at exit: 0 bytes in 0 blocks
==13623==   total heap usage: 32 allocs, 32 frees, 15,582 bytes allocated
==13623==
==13623== All heap blocks were freed -- no leaks are possible
==13623==
==13623== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
omer@omer:~/Desktop/HW05/HW05$ _
```