

**CSE 344
SYSTEMS PROGRAMMING
FINAL PROJECT**

REPORT

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1 Program Flow

In this program, main idea is to implement a server-client relation. The server and the clients are different programs that must be run in another consoles.

Server

In server program, first of all it must be a daemon process as running. So to make a daemon process, it forks a new child process in the beginning then killing the parent and getting a orphan process. Then setting its id using *setsid()* syscall. Then it reads the arguments file path to read graph, port number to create socket and bind, log file path to write logs.

The server firstly creates and opens the log file with given the path. Then enables the *SIGINT* signal using *sigaction()* syscall. For some synchronization I used unnamed semaphores then initialize these and creating a queue data structure to save socket descriptors. Then reading the file which contains the graph information into graph data structure which is showed in main.h.

In *main()* function, it checks the right arguments are available then the server creates a socket, binds the socket, listens the socket and creates an additional POSIX thread in *main()* function. In an infinite loop, it accepts client using the socket connection and inserts it to queue of socket descriptors. Then posts the semaphore for to awake additional thread that can start to run. All job of main thread is about just that.

In *additionalThread()* function which represents the additional thread's task, it creates a database using a struct which contains an array. Then it creates the initial threads which is given as argument by program runner (s). Additional thread creates an infinite loop and waits the semaphore that is going to be posted by main thread. When it is posted then it evaluates that is system's load less than 0.75 or not. If it is greater equal than 0.75 then it evaluates 0.25 of current threads count and adds a new thread(s) in thread pool and creates these threads in loop. Then posts the semaphore to created server threads. If system's load is less than 0.25 then it just posts the semaphore and waits in infinite loop.

In *serverThread()* function which represents the servers threads' task, it waits in infinite loop using semaphore which is going to be posted by additional thread to awake. Then using POSIX mutex locking the critical region for each server thread that prints the information and pops the queue's first socket descriptor. Then it unlocks the mutex and reads the socket. When a client writes in socket then it continues.

It parses the *i1* and *i2* nodes and prints that it is going to check the

database that contains or not the nodes path. Then it locks the mutex for critical region to read database using *searchInDataBase()* function. If it returns 1 then it means given parameters are collected as found database path and parsing the path into string. If it returns 0 then it means the nodes are **not** already found in database so find the path in graph. It evaluates the path in graph using *evaluatePathBFS()* function.

In *evaluatePathBFS()* function, it checks the graph breadthfirst first using *i1* in graph then checking the all paths of *i1* which is shortest. If *i1* is not in the list then it returns with '# #####' string in buffer. That means there is no path in graph. Otherwise, *evaluatePathBFS()* function parses the shortest path into buffer and inserts it into the database. After database operations, mutex unlocks and writes to socket the path and how long it took to evaluate. Then all threads continues in infinite loop.

In *signalHandler()* function which represents the signal handler for *SIGINT*, it destroys all semaphores, closes socket, frees graph, frees database, destroys mutex, frees database path, frees socket descriptor queue and exits successfully.

Client

The client program is based to idea of creating an request to server and getting response from server. Each client is a process and all of them use socket to communicate with server.

In *main()* function of client, firstly it checks the arguments size is correct then creates the signal handler action struct and applies using *sigaction()* syscall.

Then it gets the arguments in *getArgumentsClient()* function which is similar to server program (using *getopt()* of course). Then it creates the socket and connects to socket with given port and IP address as arguments. In arguments, it also reads the *i1* and *i2* nodes which represents the beginning of path and finishing the path nodes. Then it parses into a buffer string and calls the *clientFunction()* passing socket descriptor and string buffer.

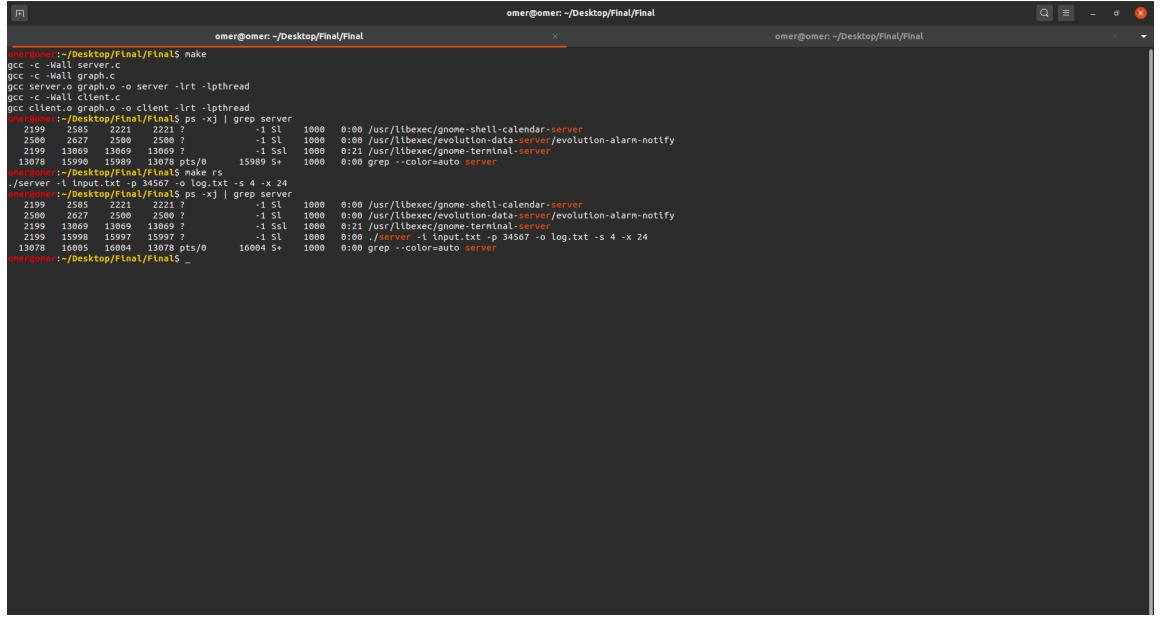
In *clientFunction()* function, it writes the buffer into socket then reads the socket for path and how long it took. Then it compares that the string buffer contains '#' character which represents the path is not found then prints the necessary information to console otherwise it prints the path with timestamp in the beginning.

In *signalHandler()* function, if the client wants to exits using *SIGINT* signal then it exits successfully printing the CTRL-C information.

2 Notes :

- ★ *It compiles and runs successfully for server and client.*
- ★ *SIGINT signal is handled for each programs.*
- ★ *SIGINT signal is used as console command: **kill -SIGINT processId***
- ★ *"-Wall" flag is available to compile no warnings.*
- ★ *Report is written in LaTeX.*
- ★ *There is no memory leak except threads' allocations.*
- ★ *All opened files and socket are closed with SIGINT or normal program flow.*
- ★ *Thread pool is working in dynamically.*
- ★ *All queues, graph structure and other allocations are freed successfully.*
- ★ *There is no busy waiting.*
- ★ *For each information that is printed to screen is started with a timestamp notation.*
- ★ *All print information of server is logged to log file.*
- ★ *Test results are attached to report as images in 3. Part.*
- ★ *To compile all: **make***
- ★ *To run server: **make rs***
- ★ *To run client: **make rc***
- ★ *To run server in valgrind: **make rsv***
- ★ *To run client in valgrind: **make rev***
- ★ *My test file and Makefile are attached to .zip file.*
- ★ *LaTeX source file and screen shots are attached to .zip file.*

3 Test Results

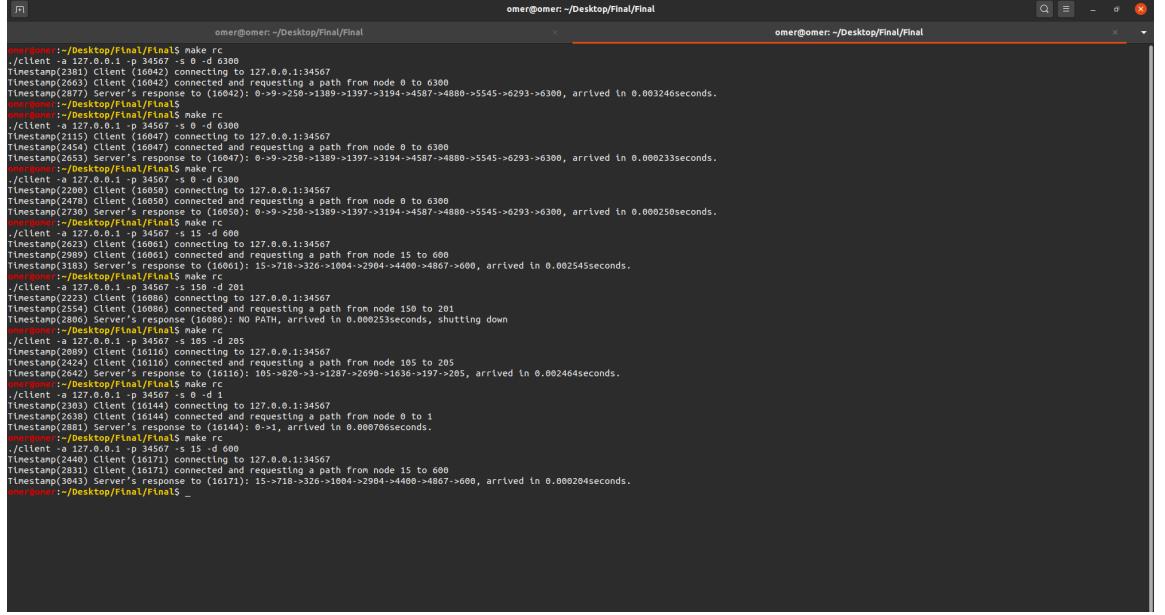


```

omer@omer:~/Desktop/Final/Final$ make
gcc -c -Wall server.c
gcc -c -Wall graph.c
gcc server.o graph.o -o server -lrt -lpthread
gcc -Wall -Wextra -Wall -Werror
gcc client.o graph.o -o client -lrt -lpthread
omer@omer:~/Desktop/Final/Final$ ./server < input.txt > log.txt -s 4 -x 24
omer@omer:~/Desktop/Final/Final$ ps -xj | grep server
 2199  2585  2221 ?          -1 St   1000  0:00 /usr/libexec/gnome-shell-Calendar-server
 2500  2627  2508 ?          -1 Sl   1000  0:00 /usr/libexec/evolution-data-server/evolution-alarm-notify
 2199 13869 13869 ?          -1 Ssl  1000  0:21 /usr/libexec/gnome-terminal-server
13878 15998 15989 13078 pts/0  15989 S+  1000  0:00 grep -color=auto server
omer@omer:~/Desktop/Final/Final$ ./server < input.txt > log.txt -s 4 -x 24
omer@omer:~/Desktop/Final/Final$ ps -xj | grep server
 2199  2585  2221 ?          -1 Sl   1000  0:00 /usr/libexec/gnome-shell-Calendar-server
 2500  2627  2508 ?          -1 Sl   1000  0:00 /usr/libexec/evolution-data-server/evolution-alarm-notify
 2199 13869 13869 ?          -1 Sl   1000  0:00 /usr/libexec/gnome-terminal-server
 2199 15998 15997 ?          -1 Sl   1000  0:00 ./server -1 input.txt -p 34567 -o log.txt -s 4 -x 24
13878 16005 16004 13078 pts/0  16004 S+  1000  0:00 grep -color=auto server
omer@omer:~/Desktop/Final/Final$ 

```

(a) 1. Compile and Server run in Daemon mode.



```

omer@omer:~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 0 -d 6300
Timestamp(2381) Client (16042) connecting to 127.0.0.1:34567
Timestamp(2081) Client (16042) connected and requesting a path from node 0 to 6300
Timestamp(1777) Client (16042)'s response to (16042): 0->9->250->1389->1397->1194->4587->4880->5545->6293->6300, arrived in 0.003246seconds.
omer@omer:~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 0 -d 6300
Timestamp(2381) Client (16042) connecting to 127.0.0.1:34567
Timestamp(2081) Client (16042) connected and requesting a path from node 0 to 6300
Timestamp(1777) Client (16042)'s response to (16042): 0->9->250->1389->1397->1194->4587->4880->5545->6293->6300, arrived in 0.003246seconds.
omer@omer:~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 0 -d 6300
Timestamp(2381) Client (16042) connecting to 127.0.0.1:34567
Timestamp(2081) Client (16042) connected and requesting a path from node 0 to 6300
Timestamp(1777) Client (16042)'s response to (16042): 0->9->250->1389->1397->1194->4587->4880->5545->6293->6300, arrived in 0.003246seconds.
omer@omer:~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 0 -d 6300
Timestamp(2381) Client (16042) connecting to 127.0.0.1:34567
Timestamp(2081) Client (16042) connected and requesting a path from node 0 to 6300
Timestamp(1777) Client (16042)'s response to (16042): 0->9->250->1389->1397->1194->4587->4880->5545->6293->6300, arrived in 0.003246seconds.
omer@omer:~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 0 -d 600
Timestamp(2381) Client (16061) connecting to 127.0.0.1:34567
Timestamp(2081) Client (16061) connected and requesting a path from node 0 to 600
Timestamp(1777) Client (16061)'s response to (16061): 15->718->326->1004->2904->4400->4807->600, arrived in 0.002545seconds.
omer@omer:~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 15 -d 600
Timestamp(2381) Client (16061) connecting to 127.0.0.1:34567
Timestamp(2081) Client (16061) connected and requesting a path from node 15 to 600
Timestamp(1777) Client (16061)'s response to (16061): 15->718->326->1004->2904->4400->4807->600, arrived in 0.002545seconds.
omer@omer:~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 15 -d 201
Timestamp(2223) Client (16080) connecting to 127.0.0.1:34567
Timestamp(2554) Client (16080) connected and requesting a path from node 0 to 201
Timestamp(2242) Client (16080)'s response to (16080): NO PATH, arrived in 0.000253seconds, shutting down
omer@omer:~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 15 -d 205
Timestamp(2653) Client (16061) connecting to 127.0.0.1:34567
Timestamp(2223) Client (16061) connecting to 127.0.0.1:34567
Timestamp(2223) Client (16061) connected and requesting a path from node 0 to 105
Timestamp(2554) Client (16061) connected and requesting a path from node 0 to 105 to 205
Timestamp(2242) Client (16061)'s response to (16061): NO PATH, arrived in 0.000253seconds, shutting down
omer@omer:~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 105 -d 205
Timestamp(2089) Client (16110) connecting to 127.0.0.1:34567
Timestamp(1777) Client (16110)'s response to (16110): 105->820->1287->2690->1636->197->205, arrived in 0.002464seconds.
omer@omer:~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 105 -d 600
Timestamp(2441) Client (16171) connecting to 127.0.0.1:34567
Timestamp(2831) Client (16171) connected and requesting a path from node 105 to 600
Timestamp(3043) Client (16171)'s response to (16171): 15->718->326->1004->2904->4400->4807->600, arrived in 0.000204seconds.
omer@omer:~/Desktop/Final/Final$ 

```

(b) 2. Client run.

```

omer@omer:/Desktop/Final$ make
gcc -c -Wall graph.c
gcc server.o graph.o -o server -lrt -lpthread
gcc -c -Wall client.c
gcc client.o graph.o server.o client -lrt -lpthread
omer@omer:/Desktop/Final$ ps -xj | grep server
2199 2585 2221 ? -1 Sl 1000 0:00 /usr/libexec/gnome-shell-calendar-server
2506 2627 2500 ? -1 Sl 1000 0:00 /usr/libexec/evolution-data-server/evolution-alarm-notify
2199 13069 13069 ? -1 Ssl 1000 0:21 /usr/libexec/gnome-terminal-server
13078 13098 13079 13078 pts/0 15989 S+ 1000 0:00 grep -color=auto server
omer@omer:/Desktop/Final$ ./server -l Input.txt -p 34567 -o log.txt -s 4 -x 24
omer@omer:/Desktop/Final$ ps -xj | grep server
2199 2585 2221 ? -1 Sl 1000 0:00 /usr/libexec/gnome-shell-calendar-server
2506 2627 2500 ? -1 Sl 1000 0:00 /usr/libexec/evolution-data-server/evolution-alarm-notify
2199 13069 13069 ? -1 Ssl 1000 0:21 /usr/libexec/gnome-terminal-server
2199 15998 15997 ? -1 Sl 1000 0:00 ./server -l Input.txt -p 34567 -o log.txt -s 4 -x 24
13078 16201 16200 13078 pts/0 16004 S+ 1000 0:00 grep -color=auto server
omer@omer:/Desktop/Final$ kill -SIGINT 15998
omer@omer:/Desktop/Final$ ps -xj | grep server
2199 2585 2221 ? -1 Sl 1000 0:00 /usr/libexec/gnome-shell-calendar-server
2506 2627 2500 ? -1 Sl 1000 0:00 /usr/libexec/evolution-data-server/evolution-alarm-notify
2199 13069 13069 ? -1 Rsl 1000 0:25 /usr/libexec/gnome-terminal-server
13078 16201 16200 13078 pts/0 16200 S+ 1000 0:00 grep -color=auto server
omer@omer:/Desktop/Final$ _

```

(a) 3. After Client run kill the Server SIGINT.

```

File Edit Selection Find View Goto Tools Project Preferences Help
log.txt x service.c x client.c x graph.c x main.h x Messefile x p2p-Gruelle08.txt x
1 [Timestamp(4613)] Loading graph...
2 [Timestamp(235515)] Graph loaded in 0.2 seconds with 6301 nodes and 20777 edges.
3 Socket successfully created!
4 Socket successfully binded!
5 Server listening!
6 [Timestamp(202869)] Thread #1: waiting for connection
7 [Timestamp(202960)] Thread #0: waiting for connection
8 [Timestamp(202959)] Thread #2: waiting for connection
9 [Timestamp(202950)] A connection to 4 threads has been created
10 [Timestamp(203159)] Thread #3: waiting for connection
11 Server accept the client!
12 [Timestamp(763558)] A connection has been delegated to thread id #0, system load 25.0%
13 [Timestamp(763566)] Thread #0: searching database for a path from node 0 to node 6300
14 [Timestamp(263713)] Thread #1: no path in database, calculating 0->6300
15 [Timestamp(266666)] Thread #1: path calculated: 0->>250->1389->1397->3194->4587->4880->5545->6293->6300
16 [Timestamp(266786)] Thread #0: responding to client and adding path to database
17 Server accept the client!
18 [Timestamp(267390)] A connection has been delegated to thread id #0, system load 25.0%
19 [Timestamp(267337)] Thread #0: searching database for a path from node 0 to node 6300
20 [Timestamp(267621)] Thread #0: path found in database: 0->>250->1389->1397->3194->4587->4880->5545->6293->6300
21 Server accept the client!
22 [Timestamp(267930)] A connection has been delegated to thread id #2, system load 25.0%
23 [Timestamp(268341)] Thread #2: searching database for a path from node 0 to node 6300
24 [Timestamp(268403)] Thread #2: path found in database: 0->>250->1389->1397->3194->4587->4880->5545->6293->6300
25 Server accept the client!
26 [Timestamp(269915)] A connection has been delegated to thread id #3, system load 25.0%
27 [Timestamp(270015)] Thread #3: searching database for a path from node 0 to node 600
28 [Timestamp(269913)] Thread #3: no path in database, calculating 15->600
29 [Timestamp(271462)] Thread #3: path calculated: 15->710->326->1004->4000->4867->600
30 [Timestamp(271587)] Thread #3: responding to client and adding path to database
31 Server accept the client!
32 [Timestamp(271960)] A connection has been delegated to thread id #1, system load 25.0%
33 [Timestamp(272393)] Thread #1: searching database for a path from node 150 to node 201
34 [Timestamp(272498)] Thread #1: no path in database, calculating 150->201
35 [Timestamp(272675)] Thread #1: path not possible from node 150 to 201
36 Server accept the client!
37 [Timestamp(272963)] A connection has been delegated to thread id #0, system load 25.0%
38 [Timestamp(273113)] Thread #0: searching database for a path from node 105 to node 205
39 [Timestamp(269913)] Thread #0: no path in database, calculating 105->205
40 [Timestamp(275573)] Thread #0: path calculated: 105->20->3->1287->2690->1636->197->205
41 [Timestamp(275666)] Thread #0: responding to client and adding path to database
42 Server accept the client!

```

(b) 4. After Server End Log File.

```

-./Desktop/Final/Final/log.txt - Sublime Text (LICENSE UPGRADE REQUIRED)
File Edit Selection Find View Goto Tools Project Preferences Help
log.txt x server.c x client.c x graph.c x main.h x Mscfile x p2p-Gratello0.txt x
30 Timestamp(271587) Thread #3: responding to client and adding path to database.
31 Server accept the client!
32 Timestamp(271968) A connection has been delegated to thread id #1, system load 25.0%
33 Timestamp(272393) Thread #1: searching database for a path from node 150 to node 201
34 Timestamp(272498) Thread #1: no path in database, calculating 150->201
35 Timestamp(272675) Thread #1: path not possible from node 150 to 201
36 Server accept the client!
37 Timestamp(272808) A connection has been delegated to thread id #8, system load 25.0%
38 Timestamp(273033) Thread #8: searching database for a path from node 105 to node 205
39 Timestamp(273268) Thread #8: no path in database, calculating 105->205
40 Timestamp(275573) Thread #2: path calculated: 105->20->3->1287->2690->1636->197->205
41 Timestamp(275666) Thread #8: responding to client and adding path to database
42 Server accept the client!
43 Timestamp(275987) A connection has been delegated to thread id #2, system load 25.0%
44 Timestamp(276465) Thread #2: searching database for a path from node 0 to node 1
45 Timestamp(276553) Thread #2: no path in database, calculating 0->1
46 Timestamp(277087) Thread #2: path calculated: 0->1
47 Timestamp(277313) Thread #2: responding to client and adding path to database
48 Server accept the client!
49 Timestamp(277374) A connection has been delegated to thread id #3, system load 25.0%
50 Timestamp(277814) Thread #3: searching database for a path from node 15 to node 600
51 Timestamp(277875) Thread #3: path found in database: 15->18->26->1904->2904->4400->4867->600
52
53 Termination signal received, waiting for ongoing threads to complete.
54 All threads have terminated, server shutting down.
55

```

(a) 5. After Server End Log File Continue.

```

omer@omer: ~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 0 -d 6300
omer@omer: ~/Desktop/Final/Final$ omer@omer: ~/Desktop/Final/Final
omer@omer: ~/Desktop/Final/Final

```

```

omer@omer: ~/Desktop/Final/Final$ ./client -a 127.0.0.1 -p 34567 -s 0 -d 6300
omer@omer: ~/Desktop/Final/Final$ omer@omer: ~/Desktop/Final/Final

```

```

./client -a 127.0.0.1 -p 34567 -s 0 -d 6300
Timestamp(2990) Client (16562) connecting to 127.0.0.1:34567
Timestamp(3125) Client (16563) connected and requesting a path from node 0 to 6300
Timestamp(5324) Client (16581) connecting to 127.0.0.1:34567
Timestamp(1379) Client (16564) connecting to 127.0.0.1:34567
Timestamp(3179) Client (16562) connected and requesting a path from node 0 to 6300
Timestamp(1326) Client (16565) connected and requesting a path from node 0 to 6300
Timestamp(1584) Client (16566) connected and requesting a path from node 0 to 6300
Timestamp(685) Client (16581) connected and requesting a path from node 0 to 6300
Timestamp(749) Client (16562) connected and requesting a path from node 0 to 6300
Timestamp(1776) Client (16562) connected and requesting a path from node 0 to 6300
Timestamp(410) Client (16593) connecting to 127.0.0.1:34567
Timestamp(814) Client (16579) connecting to 127.0.0.1:34567
Timestamp(943) Client (16579) connected and requesting a path from node 0 to 6300
Timestamp(1060) Client (16591) connected and requesting a path from node 0 to 6300
Timestamp(327) Client (16594) connected and requesting a path from node 0 to 6300
Timestamp(231) Client (16599) connecting to 127.0.0.1:34567
Timestamp(262) Client (16589) connecting to 127.0.0.1:34567
Timestamp(104) Client (16600) connected and requesting a path from node 0 to 6300
Timestamp(878) Client (16680) connected and requesting a path from node 0 to 6300
Timestamp(834) Client (16640) connecting to 127.0.0.1:34567
Timestamp(967) Client (16640) connected and requesting a path from node 0 to 6300
Timestamp(1027) Client (16571) connected and requesting a path from node 0 to 6300
Timestamp(735) Client (16569) connecting to 127.0.0.1:34567
Timestamp(627) Client (16569) connected and requesting a path from node 0 to 6300
Timestamp(1090) Server's response to (16640): 0->0->250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000102seconds.
Timestamp(453) Client (16611) connecting to 127.0.0.1:34567
Timestamp(473) Client (16610) connected and requesting a path from node 0 to 6300
Timestamp(511) Client (16611) connected and requesting a path from node 0 to 6300
Timestamp(230) Client (16612) connecting to 127.0.0.1:34567
Timestamp(365) Client (16612) connected and requesting a path from node 0 to 6300
Timestamp(563) Server's response to (16589): 0->0->250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000272seconds.
Timestamp(445) Client (16613) connecting to 127.0.0.1:34567
Timestamp(1207) Client (16571) connected and requesting a path from node 0 to 6300
Timestamp(735) Server's response to (16569): 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000112seconds.
Timestamp(745) Client (16577) connecting to 127.0.0.1:34567
Timestamp(629) Client (16569) connecting to 127.0.0.1:34567
Timestamp(240) Client (16591) connecting to 127.0.0.1:34567
Timestamp(670) Server's response to (16611): 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000108seconds.
Timestamp(417) Client (16591) connected and requesting a path from node 0 to 6300
Timestamp(563) Server's response to (16589): 0->0->250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000261seconds.
Timestamp(412) Client (16613) connecting to 127.0.0.1:34567
Timestamp(424) Client (16613) connecting to 127.0.0.1:34567
Timestamp(413) Client (16580) connecting to 127.0.0.1:34567
Timestamp(473) Client (16602) connecting to 127.0.0.1:34567
Timestamp(553) Client (16567) connected and requesting a path from node 0 to 6300
Timestamp(220) Client (16598) connecting to 127.0.0.1:34567
Timestamp(413) Client (16598) connected and requesting a path from node 0 to 6300
Timestamp(910) Client (16578) connecting to 127.0.0.1:34567
Timestamp(1161) Client (16578) connected and requesting a path from node 0 to 6300
Timestamp(255) Client (16654) connecting to 127.0.0.1:34567
Timestamp(407) Client (16654) connected and requesting a path from node 0 to 6300

```

(b) 6. Client with 1024 Fork Processes.

```
omer@omer: ~/Desktop/Final/Final
omer@omer: ~/Desktop/Final/Final

Timestamp(417) Client (18587) connecting to 127.0.0.1:34567
Timestamp(239) Client (16028) connecting to 127.0.0.1:34567
Timestamp(458) Client (16025) connecting to 127.0.0.1:34567
Timestamp(1380) Server's response to (1656): 0->+250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.0035995seconds.
Timestamp(1951) Client (16573) connected and requesting a path from node 0 to 6300
Timestamp(501) Client (16031) connecting to 127.0.0.1:34567
Timestamp(618) Client (16033) connected and requesting a path from node 0 to 6300
Timestamp(1380) Server's response to (1656): 0->+250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000052seconds.
Timestamp(681) Client (16034) connecting to 127.0.0.1:34567
Timestamp(264) Client (16044) connecting to 127.0.0.1:34567
Timestamp(655) Server's response to (1657): 0->+250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000006seconds.
Timestamp(1380) Client (16036) connecting to 127.0.0.1:34567
Timestamp(279) Client (16039) connecting to 127.0.0.1:34567
Timestamp(924) Client (16047) connecting to 127.0.0.1:34567
Timestamp(320) Client (18017) connected and requesting a path from node 0 to 6300
Timestamp(1380) Server's response to (1656): 0->+250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000051seconds.
Timestamp(1464) Client (16575) connected and requesting a path from node 0 to 6300
Timestamp(401) Client (16064) connected and requesting a path from node 0 to 6300
Timestamp(230) Client (16079) connecting to 127.0.0.1:34567
Timestamp(1380) Client (16080) connecting to 127.0.0.1:34567
Timestamp(323) Client (16078) connected and requesting a path from node 0 to 6300
Timestamp(1412) Client (16082) connected and requesting a path from node 0 to 6300
Timestamp(270) Client (16015) connecting to 127.0.0.1:34567
Timestamp(1380) Server's response to (1653): 0->+250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000001seconds.
Timestamp(1440) Client (16081) connecting to 127.0.0.1:34567
Timestamp(160) Client (18013) connected and requesting a path from node 0 to 6300
Timestamp(242) Client (16038) connecting to 127.0.0.1:34567
Timestamp(1380) Server's response to (1654): 0->+250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000008seconds.
Timestamp(1440) Client (16083) connecting to 127.0.0.1:34567
Timestamp(160) Client (18013) connected and requesting a path from node 0 to 6300
Timestamp(125) Client (16085) connecting to 127.0.0.1:34567
Timestamp(160) Client (16015) connected and requesting a path from node 0 to 6300
Timestamp(403) Client (16086) connecting to 127.0.0.1:34567
Timestamp(110) Client (16094) connecting to 127.0.0.1:34567
Timestamp(172) Client (16094) connected and requesting a path from node 0 to 6300
Timestamp(275) Client (16065) connecting to 127.0.0.1:34567
Timestamp(1380) Client (16066) connecting and requesting a path from node 0 to 6300
Timestamp(250) Client (16022) connecting to 127.0.0.1:34567
Timestamp(1094) Server's response to (16579): 0->+250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.0000132seconds.
Timestamp(132) Client (16089) connecting to 127.0.0.1:34567
Timestamp(1380) Client (16090) connecting and requesting a path from node 0 to 6300
Timestamp(621) Client (16041) connecting to 127.0.0.1:34567
Timestamp(114) Client (16090) connecting to 127.0.0.1:34567
Timestamp(558) Client (16013) connected and requesting a path from node 0 to 6300
Timestamp(103) Client (17031) connecting to 127.0.0.1:34567
Timestamp(258) Client (16014) connecting to 127.0.0.1:34567
Timestamp(461) Client (16042) connecting to 127.0.0.1:34567
Timestamp(1380) Client (16043) connecting and requesting a path from node 0 to 6300
Timestamp(528) Server's response to (1655): 0->+250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.0000307seconds.
Timestamp(221) Client (17008) connecting to 127.0.0.1:34567
Timestamp(491) Client (16032) connecting to 127.0.0.1:34567
```

(a) 7. Client with 1024 Fork Processes Continue.

```
omer@omer: ~/Desktop/Final/Final
omer@omer: ~/Desktop/Final/Final

Timestamp(210) Server's response to (17080): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000038seconds.
Timestamp(443) Client (17080) connecting to 127.0.0.1:134567
Timestamp(127) Client (17080) connecting to 127.0.0.1:134567
Timestamp(146) Client (17042) connecting to 127.0.0.1:134567
Timestamp(165) Client (17042) connecting to 127.0.0.1:134567
Timestamp(758) Client (17042) connecting to 127.0.0.1:134567
Timestamp(177) Client (17042)'s response to (16680): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000071seconds.
Timestamp(199) Client (17041) connecting to 127.0.0.1:134567
Timestamp(218) Client (17041)'s response to (17077): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000113seconds.
Timestamp(237) Client (16680) connecting to (16645)
Timestamp(256) Client (16680)'s response to (16645): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000111seconds.
Timestamp(111) Client (17093) connecting to 127.0.0.1:134567
Timestamp(242) Client (17063) connecting to 127.0.0.1:134567
Timestamp(261) Client (17063)'s response to (17070): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000046seconds.
Timestamp(522) Client (17064) connecting to (16680)
Timestamp(480) Client (17064)'s response to (16680): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000119seconds.
Timestamp(305) Client (17067) connecting to 127.0.0.1:134567
Timestamp(324) Client (17067)'s response to (17077): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000071seconds.
Timestamp(511) Client (16756) connecting to 127.0.0.1:134567
Timestamp(1342) Client (16741) connecting to 127.0.0.1:134567
Timestamp(493) Client (16601) connected and requesting a path from node 0 to 6300
Timestamp(510) Client (16601)'s response to (16601): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300
Timestamp(719) Client (16597) connected and requesting a path from node 0 to 6300
Timestamp(249) Client (16836) connecting to 127.0.0.1:134567
Timestamp(495) Client (16759) connecting to 127.0.0.1:134567
Timestamp(465) Client (16832) connecting to 127.0.0.1:134567
Timestamp(466) Client (16832)'s response to (16832): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000062seconds.
Timestamp(554) Client (16837) connecting to 127.0.0.1:134567
Timestamp(187) Client (16758) connecting to 127.0.0.1:134567
Timestamp(245) Client (16758)'s response to (16758): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000181seconds.
Timestamp(480) Client (16740)'s response to (16740): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000071seconds.
Timestamp(755) Client (16740) connecting to 127.0.0.1:134567
Timestamp(654) Client (16740)'s response to (16740): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000186seconds.
Timestamp(670) Server's response to (16733): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000098seconds.
Timestamp(541) Server's response to (16744): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000098seconds.
Timestamp(178) Client (16781) connecting to 127.0.0.1:134567
Timestamp(869) Client (16778) connecting to 127.0.0.1:134567
Timestamp(234) Client (16750) connecting to 127.0.0.1:134567
Timestamp(817) Client (16750)'s response to (16750): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000098seconds.
Timestamp(247) Client (16762) connecting to 127.0.0.1:134567
Timestamp(226) Client (16762)'s response to (16762): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000098seconds.
Timestamp(240) Client (16768) connecting to 127.0.0.1:134567
Timestamp(241) Client (16765) connecting to 127.0.0.1:134567
Timestamp(246) Client (16765)'s response to (16765): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000098seconds.
Timestamp(247) Client (16794) connecting to 127.0.0.1:134567
Timestamp(248) Client (16794)'s response to (16794): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000098seconds.
Timestamp(247) Client (16796) connecting to 127.0.0.1:134567
Timestamp(248) Client (16796)'s response to (16796): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000098seconds.
Timestamp(694) Client (16647) connecting to 127.0.0.1:134567
Timestamp(691) Client (16647)'s response to (16647): 0->>-250->1389->1397->3194->4587->4880->5545->6293->6300, arrived in 0.000098seconds.
Timestamp(611) Client (16797) connecting to 127.0.0.1:134567
```

(b) 8. Client with 1024 Fork Processes Continue

```
omer@omer: ~/Desktop/Final/Final
omer@omer: ~/Desktop/Final/Final

Timestamp(57) Client (16851) connected and requesting a path from node 0 to 5300
Timestamp(613) Client (16776) connected and requesting a path from node 0 to 6300
Timestamp(380) Client (16777) connected and requesting a path from node 0 to 6300
Timestamp(799) Client (16843) connected and requesting a path from node 0 to 6300
Timestamp(261) Client (16808) connected and requesting a path from node 0 to 6300
Timestamp(489) Client (16814) connected and requesting a path from node 0 to 6300
Timestamp(511) Client (16823) connected and requesting a path from node 0 to 6300
Timestamp(169) Client (16833) connected and requesting a path from node 0 to 6300
Timestamp(288) Client (16834) connected and requesting a path from node 0 to 6300
Timestamp(1684) Server's response to (16814): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000011seconds.
Timestamp(1654) Server's response to (16818): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000012seconds.
Timestamp(1682) Server's response to (16820): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000012seconds.
Timestamp(127) Client (16821) connected and requesting a path from node 0 to 6300
Timestamp(380) Server's response to (16988): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000008seconds.
Timestamp(380) Server's response to (16988): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000049seconds.
Timestamp(1216) Server's response to (16880): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000038seconds.
Timestamp(1674) Server's response to (16874): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000045seconds.
Timestamp(349) Client (16881) connected and requesting a path from node 0 to 6300
Timestamp(349) Server's response to (16880): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000045seconds.
Timestamp(388) Server's response to (16866): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000011seconds.
Timestamp(397) Server's response to (16967): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000038seconds.
Timestamp(374) Client (16968) connected and requesting a path from node 0 to 6300
Timestamp(374) Server's response to (16772): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000036seconds.
Timestamp(348) Server's response to (16969): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000052seconds.
Timestamp(348) Client (16970) connected and requesting a path from node 0 to 6300
Timestamp(348) Server's response to (16882): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000042seconds.
Timestamp(881) Server's response to (16783): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000042seconds.
Timestamp(165) Client (16815) connected and requesting a path from node 0 to 6300
Timestamp(528) Client (16855) connected and requesting a path from node 0 to 6300
Timestamp(528) Server's response to (16935): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000034seconds.
Timestamp(1119) Server's response to (16954): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000033seconds.
Timestamp(288) Server's response to (16959): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000035seconds.
Timestamp(288) Server's response to (16957): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000037seconds.
Timestamp(434) Client (16855) connected and requesting a path from node 0 to 6300
Timestamp(434) Server's response to (16855): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000036seconds.
Timestamp(362) Server's response to (16897): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000081seconds.
Timestamp(711) Client (16816) connected and requesting a path from node 0 to 6300
Timestamp(711) Server's response to (16816): 0->+250->1389->1397->3194->587->4880->5545->6293->6300, arrived in 0.000031seconds.
Timestamp(765) Client (16826) connected and requesting a path from node 0 to 6300
Timestamp(234) Client (16831) connected and requesting a path from node 0 to 6300
Timestamp(334) Client (16861) connected and requesting a path from node 0 to 6300
Timestamp(16820) Client (16862) connected and requesting a path from node 0 to 6300
Timestamp(16822) Client (16863) connected and requesting a path from node 0 to 6300
Timestamp(1134) Client (16755) connected and requesting a path from node 0 to 6300
Timestamp(401) Client (16856) connected and requesting a path from node 0 to 6300
Timestamp(321) Client (16835) connected and requesting a path from node 0 to 6300
Timestamp(321) Client (16825) connected and requesting a path from node 0 to 6300
Timestamp(454) Client (16825) connected and requesting a path from node 0 to 6300
Timestamp(264) Client (16868) connected and requesting a path from node 0 to 6300
```

(a) 9. Client with 1024 Fork Processes Continue.

(b) 10. Client with 1024 Fork Processes End.

-/Desktop/Final/Final/log.txt - Sublime Text (LICENSE UPGRADE REQUIRED)

```

File Edit Selection Find View Goto Tools Project Preferences Help
log.txt x server.c x client.c x graph.c x main.h x Mainfile x p2p-Gnutella0.txt x

1 Timestamp(4662) Loading graph...
2 Timestamp(237991) Graph loaded in 0.2 seconds with 6301 nodes and 20777 edges.
3 Socket successfully created!
4 Socket successfully binded!
5 Server listening!
6 Timestamp(264434) Thread #1: waiting for connection
7 Timestamp(264534) Thread #0: waiting for connection
8 Timestamp(265256) Thread #2: waiting for connection
9 Timestamp(264646) Thread #3: waiting for connection
10 Timestamp(264789) Thread #3: waiting for connection
11 Server accept the client!
12 Timestamp(265929) A connection has been delegated to thread id #1, system load 25.0%
13 Server accept the client!
14 Timestamp(265211) A connection has been delegated to thread id #0, system load 25.0%
15 Timestamp(265278) Thread #1: searching database for a path from node 0 to node 6300
16 Timestamp(265321) Thread #0: searching database for a path from node 0 to node 6300
17 Timestamp(265387) Thread #1: no path in database, calculating 0->6300
18 SERVER accept the client!
19 Server accept the client!
20 Server accept the client!
21 Server accept the client!
22 Server accept the client!
23 Server accept the client!
24 Server accept the client!
25 Timestamp(267703) Thread #1: path calculated: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
26 Timestamp(267737) Thread #1: responding to client and adding path to database
27 Timestamp(267740) Thread #1: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
28 System load 25.0%
29 Timestamp(267905) Thread #1: searching database for a path from node 0 to node 6300
30 Timestamp(267935) Thread #1: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
31 Timestamp(268020) A connection has been delegated to thread id #1, system load 25.0%
32 Timestamp(268081) Thread #1: searching database for a path from node 0 to node 6300
33 Timestamp(268112) Thread #1: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
34 Timestamp(268187) A connection has been delegated to thread id #1, system load 25.0%
35 Timestamp(268223) Thread #1: searching database for a path from node 0 to node 6300
36 Timestamp(268250) Thread #1: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
37 Timestamp(268337) Thread #1: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
38 Timestamp(268476) A connection has been delegated to thread id #2, system load 25.0%
39 Timestamp(268476) Thread #2: searching database for a path from node 0 to node 6300
40 Timestamp(268525) Thread #3: searching database for a path from node 0 to node 6300
41 Timestamp(268559) Thread #3: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
42 Timestamp(268690) A connection has been delegated to thread id #3, system load 25.0%

```

(a) 11. Log File After Client with 1024 Fork Processes.

-/Desktop/Final/Final/log.txt - Sublime Text (LICENSE UPGRADE REQUIRED)

```

File Edit Selection Find View Goto Tools Project Preferences Help
log.txt x server.c x client.c x graph.c x main.h x Mainfile x p2p-Gnutella0.txt x

102 SERVER accept the client!
103 Server accept the client!
104 Timestamp(273449) System load 75%, pool extended to 12 threads
105 Timestamp(273577) Thread #4: searching database for a path from node 0 to node 6300
106 Timestamp(273700) Thread #4: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
107 Timestamp(273726) System load 75%, pool extended to 15 threads
108 Timestamp(273866) A connection has been delegated to thread id #4, system load 6.7%
109 Timestamp(273881) Thread #13: searching database for a path from node 0 to node 6300
110 Timestamp(274013) Thread #13: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
111 Timestamp(274159) Thread #13: waiting for connection
112 Timestamp(274183) A connection has been delegated to thread id #4, system load 6.7%
113 Timestamp(274270) Thread #10: waiting for connection
114 Timestamp(274343) Thread #14: waiting for connection
115 Timestamp(274403) Thread #12: waiting for connection
116 Server accept the client!
117 Timestamp(274559) A connection has been delegated to thread id #13, system load 6.7%
118 Timestamp(274638) Thread #13: searching database for a path from node 0 to node 6300
119 Timestamp(274658) Thread #13: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
120 Timestamp(274708) Thread #11: waiting for connection
121 Server accept the client!
122 Server accept the client!
123 Server accept the client!
124 Server accept the client!
125 Timestamp(275065) A connection has been delegated to thread id #10, system load 6.7%
126 Timestamp(275115) Thread #10: searching database for a path from node 0 to node 6300
127 Timestamp(275145) Thread #10: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
128 Timestamp(275250) A connection has been delegated to thread id #10, system load 6.7%
129 Timestamp(275291) Thread #10: searching database for a path from node 0 to node 6300
130 Timestamp(275319) Thread #10: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
131 Timestamp(275391) Thread #10: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
132 Timestamp(275428) Thread #10: searching database for a path from node 0 to node 6300
133 Timestamp(275452) Thread #10: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
134 Timestamp(275495) A connection has been delegated to thread id #14, system load 6.7%
135 Server accept the client!
136 Timestamp(275151) Thread #10: searching database for a path from node 0 to node 6300
137 Timestamp(275181) Thread #10: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
138 Timestamp(275094) Thread #14: searching database for a path from node 0 to node 6300
139 Timestamp(276159) Thread #1: searching database for a path from node 0 to node 6300
140 Timestamp(276231) Thread #1: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
141 Timestamp(276350) Thread #2: searching database for a path from node 0 to node 6300
142 Timestamp(276392) Thread #2: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
143 Server accept the client!

```

(b) 12. Log File After Client with 1024 Fork Processes Continue.

```
-Desktop/Final/Final.log.txt - Sublime Text (LICENSE UPGRADE REQUIRED)

File Edit Selection Find View Goto Tools Project Preferences Help

log.txt x service.c client.c main.h x Moskito x p2p-SnatchIt08.txt x

1124 Timestamp(15280) Thread #2: searching database for a path from node 0 to node 6300
1125 Timestamp(15281) Thread #3: path found in database: 0->+250->1389->1397->1914->4587->4880->5545->6293->6300
1126 Timestamp(15342) A connection has been delegated to thread id #3, system load 4.2%
1127 Timestamp(15363) Thread #3: searching database for a path from node 0 to node 6300
1128 Timestamp(15278) Thread #3: path found in database: 0->+250->1389->1397->1914->4587->4880->5545->6293->6300
1129 Timestamp(15319) A connection has been delegated to thread id #3, system load 4.2%
1130 Timestamp(15338) Thread #3: searching database for a path from node 0 to node 6300
1131 Timestamp(15353) Thread #3: path found in database: 0->+250->1389->1397->1914->4587->4880->5545->6293->6300
1132 Timestamp(15389) A connection has been delegated to thread id #3, system load 4.2%
1133 Timestamp(15408) Thread #3: searching database for a path from node 0 to node 6300
1134 Timestamp(15422) Thread #3: path found in database: 0->+250->1389->1397->1914->4587->4880->5545->6293->6300
1135 Timestamp(15442) A connection has been delegated to thread id #3, system load 4.2%
1136 Timestamp(15482) Thread #3: searching database for a path from node 0 to node 6300
1137 Timestamp(15496) Thread #3: path found in database: 0->+250->1389->1397->1914->4587->4880->5545->6293->6300
1138 Timestamp(15535) A connection has been delegated to thread id #3, system load 4.2%
1139 Timestamp(15580) Thread #20: searching database for a path from node 0 to node 6300
1140 Timestamp(15574) Thread #20: path found in database: 0->+250->1389->1397->3194->4587->4880->5545->6293->6300
1141 Timestamp(15612) A connection has been delegated to thread id #20, system load 4.2%
1142 Timestamp(15639) Thread #2: searching database for a path from node 0 to node 6300
1143 Timestamp(15662) Thread #2: path found in database: 0->+250->1389->1397->3194->4587->4880->5545->6293->6300
1144 Timestamp(15680) Thread #11: searching database for a path from node 0 to node 6300
1145 Timestamp(15707) Thread #11: path found in database: 0->+250->1389->1397->3194->4587->4880->5545->6293->6300
1146 Timestamp(15744) A connection has been delegated to thread id #2, system load 4.2%
1147 Timestamp(15763) Thread #23: searching database for a path from node 0 to node 6300
1148 Timestamp(15829) Thread #23: path found in database: 0->+250->1389->1397->3194->4587->4880->5545->6293->6300
1149 Timestamp(15855) Thread #10: searching database for a path from node 0 to node 6300
1150 Timestamp(15875) A connection has been delegated to thread id #11, system load 4.2%
1151 Timestamp(15897) Thread #12: searching database for a path from node 0 to node 6300
1152 Timestamp(15922) Thread #11: searching database for a path from node 0 to node 6300
1153 Timestamp(15935) Thread #12: path found in database: 0->+250->1389->1397->3194->4587->4880->5545->6293->6300
1154 Timestamp(16003) Thread #11: path found in database: 0->+250->1389->1397->3194->4587->4880->5545->6293->6300
1155 Timestamp(16054) A connection has been delegated to thread id #12, system load 4.2%
1156 Timestamp(16093) Thread #12: searching database for a path from node 0 to node 6300
1157 Timestamp(16121) Thread #12: path found in database: 0->+250->1389->1397->3194->4587->4880->5545->6293->6300
1158 Timestamp(16135) A connection has been delegated to thread id #23, system load 4.2%
1159 Timestamp(16174) A connection has been delegated to thread id #12, system load 4.2%
1160 Timestamp(16213) A connection has been delegated to thread id #11, system load 4.2%
1161 Timestamp(16270) Thread #11: searching database for a path from node 0 to node 6300
1162 Timestamp(16283) Thread #11: path found in database: 0->+250->1389->1397->3194->4587->4880->5545->6293->6300
1163 Timestamp(16362) Thread #6: searching database for a path from node 0 to node 6300
1164 Timestamp(16347) Thread #6: path found in database: 0->+250->1389->1397->3194->4587->4880->5545->6293->6300
1165 Timestamp(16358) A connection has been delegated to thread id #11, system load 4.2%
```

(a) 13. Log File After Client with 1024 Fork Processes Continue.

-/Desktop/Final/Final/log.txt - Sublime Text (LICENSE UPGRADE REQUIRED)

File Edit Selection Find View Goto Tools Project Preferences Help

log.txt server.c client.c graph.c match.c main.c zip-Createfile0.txt

```
1002 [Timestamp(361204)] Thread #3: searching database for a path from node 0 to node 0s00
1003 [Timestamp(361587)] Thread #0: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
1004 [Timestamp(361643)] A connection has been delegated to thread id #2, system load 4.2%
1005 [Timestamp(361650)] Thread #2: searching database for a path from node 0 to node 0s00
1006 [Timestamp(361657)] Thread #2: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
1007 [Timestamp(361685)] A connection has been delegated to thread id #2, system load 4.2%
1008 [Timestamp(361872)] Thread #2: searching database for a path from node 0 to node 6300
1009 [Timestamp(361910)] Thread #2: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
1010 [Timestamp(361976)] A connection has been delegated to thread id #2, system load 4.2%
1011 [Timestamp(362083)] Thread #2: searching database for a path from node 0 to node 6300
1012 [Timestamp(362085)] Thread #2: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
1013 [Timestamp(362085)] A connection has been delegated to thread id #2, system load 4.2%
1014 [Timestamp(362114)] Thread #2: searching database for a path from node 0 to node 6300
1015 [Timestamp(362141)] Thread #2: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
1016 [Timestamp(362161)] A connection has been delegated to thread id #2, system load 4.2%
1017 [Timestamp(362242)] Thread #2: searching database for a path from node 0 to node 6300
1018 [Timestamp(362266)] Thread #2: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
1019 [Timestamp(362330)] A connection has been delegated to thread id #2, system load 4.2%
1020 [Timestamp(362356)] Thread #2: searching database for a path from node 0 to node 6300
1021 [Timestamp(362378)] Thread #2: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
1022 [Timestamp(362439)] A connection has been delegated to thread id #2, system load 4.2%
1023 [Timestamp(362514)] A connection has been delegated to thread id #2, system load 4.2%
1024 [Timestamp(362541)] Thread #2: searching database for a path from node 0 to node 6300
1025 [Timestamp(362587)] Thread #2: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
1026 [Timestamp(362650)] A connection has been delegated to thread id #2, system load 4.2%
1027 [Timestamp(362682)] Thread #2: searching database for a path from node 0 to node 6300
1028 [Timestamp(362703)] Thread #2: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
1029 [Timestamp(362785)] A connection has been delegated to thread id #2, system load 4.2%
1030 [Timestamp(362817)] A connection has been delegated to thread id #9, system load 4.2%
1031 [Timestamp(362865)] Thread #23: searching database for a path from node 0 to node 6300
1032 [Timestamp(362903)] Path #23: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
1033 Server accept the client!
1034 Server accept the client!
1035 Server accept the client!
1036 Server accept the Client!
1037 Server accept the Client!
1038 Server accept the Client!
1039 Server accept the Client!
1040 Server accept the Client!
1041 Server accept the Client!
1042 Server accept the Client!
1043 Server accept the Client!
```

(b) 14. Log File After Client with 1024 Fork Processes Continue.

-/Desktop/Final/Final/log.txt - Sublime Text (LICENSE UPGRADE REQUIRED)

```

File Edit Selection Find View Goto Tools Project Preferences Help
log.txt x server.c x client.c x graph.c x main.h x Moscfile x p2p-Gruelle08.txt x

2229 Timestamp(386433) Thread #20: path found in database: 0->250->1389->1397->3194->4587->4880->5545->6293->6300
2230 Timestamp(386527) A connection has been delegated to thread id #13, system load 4.2%
2231 Timestamp(386600) A connection has been delegated to thread id #3, system load 4.2%
2232 Timestamp(386611) Thread #13: searching database for a path from node 0 to node 6300
2233 Timestamp(386616) Thread #3: searching database for a path from node 0 to node 6300
2234 Timestamp(386603) Thread #13: path found in database: 0->250->1389->1397->3194->4587->4880->5545->6293->6300
2235 Timestamp(386721) A connection has been delegated to thread id #16, system load 4.2%
2236 Timestamp(386750) A connection has been delegated to thread id #18, system load 4.2%
2237 Timestamp(386779) Thread #16: searching database for a path from node 0 to node 6300
2238 Timestamp(386796) Thread #18: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2239 Timestamp(386822) Thread #18: searching database for a path from node 0 to node 6300
2240 Timestamp(386839) Thread #18: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2241 Timestamp(386944) A connection has been delegated to thread id #14, system load 4.2%
2242 Timestamp(387009) Thread #14: searching database for a path from node 0 to node 6300
2243 Timestamp(387026) Thread #14: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2244 Timestamp(387100) Thread #21: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2245 Timestamp(387150) A connection has been delegated to thread id #13, system load 4.2%
2246 Timestamp(387178) Thread #13: searching database for a path from node 0 to node 6300
2247 Timestamp(387191) Thread #13: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2248 Timestamp(387279) A connection has been delegated to thread id #23, system load 4.2%
2249 Timestamp(387303) Thread #23: searching database for a path from node 0 to node 6300
2250 Timestamp(387317) Thread #23: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2251 Server accept the client!
2252 Timestamp(387330) A connection has been delegated to thread id #21, system load 4.2%
2253 Server accept the client!
2254 Server accept the client!
2255 Timestamp(387440) Thread #21: searching database for a path from node 0 to node 6300
2256 Timestamp(387584) Thread #21: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2257 Timestamp(387658) A connection has been delegated to thread id #7, system load 4.2%
2258 Timestamp(387714) Thread #7: searching database for a path from node 0 to node 6300
2259 Timestamp(387677) A connection has been delegated to thread id #6, system load 4.2%
2260 Timestamp(387768) Thread #6: searching database for a path from node 0 to node 6300
2261 Timestamp(387778) Thread #7: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2262 Timestamp(387788) Thread #7: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2263 Server accept the client!
2264 Timestamp(388016) A connection has been delegated to thread id #19, system load 4.2%
2265 Server accept the client!
2266 Server accept the client!
2267 Timestamp(388080) Thread #19: searching database for a path from node 0 to node 6300
2268 Server accept the client!
2269 Server accept the client!
2270 Timestamp(388098) Thread #19: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300

```

(a) 15. Log File After Client with 1024 Fork Processes Continue.

-/Desktop/Final/Final/log.txt - Sublime Text (LICENSE UPGRADE REQUIRED)

```

File Edit Selection Find View Goto Tools Project Preferences Help
log.txt x server.c x client.c x graph.c x main.h x Moscfile x p2p-Gruelle08.txt x

2295 Timestamp(388081) Thread #5: searching database for a path from node 0 to node 6300
2296 Timestamp(388095) Thread #5: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2297 Timestamp(388096) A connection has been delegated to thread id #11, system load 4.2%
2298 Timestamp(389013) Thread #11: searching database for a path from node 0 to node 6300
2299 Timestamp(389026) Thread #11: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2300 Timestamp(389076) Thread #9: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2301 Timestamp(389137) Thread #1: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2302 Timestamp(389237) Thread #0: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2303 Server accept the client!
2304 Timestamp(389407) A connection has been delegated to thread id #12, system load 4.2%
2305 Timestamp(389564) Thread #12: searching database for a path from node 0 to node 6300
2306 Timestamp(389601) Thread #12: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2307 Server accept the client!
2308 Server accept the client!
2309 Timestamp(389533) A connection has been delegated to thread id #22, system load 4.2%
2310 Server accept the client!
2311 Server accept the client!
2312 Timestamp(389601) Thread #22: searching database for a path from node 0 to node 6300
2313 Timestamp(389615) Thread #22: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2314 Timestamp(389734) A connection has been delegated to thread id #2, system load 4.2%
2315 Timestamp(389761) Thread #2: searching database for a path from node 0 to node 6300
2316 Timestamp(389740) A connection has been delegated to thread id #20, system load 4.2%
2317 Timestamp(389808) Thread #20: searching database for a path from node 0 to node 6300
2318 Timestamp(389848) Thread #20: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2319 Timestamp(389884) Thread #2: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2320 Timestamp(389993) A connection has been delegated to thread id #4, system load 4.2%
2321 Timestamp(390011) Thread #4: searching database for a path from node 0 to node 6300
2322 Timestamp(390023) Thread #4: path found in database: 0->9->250->1389->1397->3194->4587->4880->5545->6293->6300
2323
2324 Termination signal received, waiting for ongoing threads to complete.
2325 All threads have terminated, server shutting down.
2326

```

(b) 16. Log File After Client with 1024 Fork Processes End.

```
omer@omer: ~/Desktop/Final/Final
omer@omer:~/Desktop/Final/Final make rcv
valgrind -v --leak-check=full ./client -a 127.0.0.1 -p 34567 -s 0 -d 1
==3147== Memcheck, a memory error detector
==3147== Copyright (C) 2002-2014, and GNU GPL'd, by Julian Seward et al.
==3147== Using LibCordoba version 5.4.0-2014-06-06-011914-28190413 and LIBEXE, rerun with -h for copyright info
==3147== Command: ./client -a 127.0.0.1 -p 34567 -s 0 -d 1
==3147==
==3147.. Valgrind options:
* --leak-check=full
==3147.. Contents of /proc/version:
Linux version 5.4.0-39-generic (buildd@icyle01-amd64-016) (gcc version 9.3.0 (Ubuntu 9.3.0-10ubuntu20)) #43-Ubuntu SMP Fri Jun 19 10:28:31 UTC 2020
==3147.. Arch and hwcap: AMD64, LittleEndian, amd64-cx16-lcmt-rdtscl-sse3-ssse3-avx-avx2-bmi-f16c-rdrand
==3147.. Page sizes: currently 4096, max supported 4096
==3147.. Valgrind library directory: /usr/lib/x86_64-linux-gnu/valgrind
==3147.. Valgrind library file: /usr/lib/x86_64-linux-gnu/valgrind/valgrind
==3147.. Ready sym from /lib/x86_64-linux-gnu/ld-2.31.so
==3147.. Considering /lib/x86_64-linux-gnu/ld-2.31.so...
==3147.. ... CRC mismatch (computed 387817ea wanted d28cf5f)
==3147.. Considering /lib/x86_64-linux-gnu/ld-2.31.so...
==3147.. ... CRC mismatch (computed 387817ea wanted d28cf5f)
==3147.. Considering /usr/lib/debug/lib/x86_64-linux-gnu/ld-2.31.so...
==3147.. ... CRC is valid
==3147.. Ready sym from /usr/lib/x86_64-linux-gnu/valgrind/nemcheck-amd64-linux
==3147.. object doesn't have a symbol table
==3147.. object doesn't have a dynamic symbol table
==3147.. Scheduler: using generic scheduler lock implementation
==3147.. Ready sym from /usr/lib/x86_64-linux-gnu/valgrind/default.supp
==3147.. Embedded gobserver: ready sym from /tmp/vgdb-pipe-to-vgdb-to-3147-by-omer-on-??
==3147.. embedded gobserver: writing to /tmp/vgdb-pipe-to-vgdb-fron-3147-by-omer-on-??
==3147.. embedded gobserver: shared mem /tmp/vgdb-pipe-shared-men-vgdb-3147-by-omer-on-??
==3147.. TO CONTROL THIS PROCESS USING vgdb (which you probably
==3147.. don't want to do, unless you know exactly what you're doing,
==3147.. or are doing some strange experiment):
==3147..   /usr/lib/x86_64-linux-gnu/valgrind/.../bin/vgdb --pid=3147 ...command...
==3147.. TO DEBUG THIS PROCESS USING GDB: start GDB like this
==3147..   /path/to/gdb .client
==3147.. and then give GDB the following command
==3147..   (gdb) target remote /tmp/vgdb-pipe-shared-men-vgdb-3147-by-omer-on-??
==3147..   (gdb) -tcd to optional if only one valgrind process is running
==3147.. REIRE 0x402280 (id:linux-x86_64-50-2:string) redirected to 0x580c9c92 (((?))
==3147.. REIRE 0x4022850 (id:linux-x86_64-50-2:[index]) redirected to 0x580c9fc ((?))
==3147.. Reading syms from /usr/lib/x86_64-linux-gnu/valgrind/vgpreload_core-amd64-linux.so
==3147.. object doesn't have a symbol table
==3147.. Reading syms from /usr/lib/x86_64-linux-gnu/valgrind/vgpreload_nemcheck-amd64-linux.so
==3147.. object doesn't have a symbol table
==3147.. WARNING: new redirection conflicts with existing -- ignoring it
==3147.. old: 0x04022d80 (strlen) R-> (0800.0) 0x580c9ce2 ???
==3147.. new: 0x04022d80 (strlen) R-> (2080.0) 0x043f0668 strlen
```

(a) 17. Run Valgrind Client

```
omer@omer: ~/Desktop/Final/Final
```

```
--3147-- REDIR: 0x492f9800 ({libc.so.6})$tcasecmp redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x49309398 ({libc.so.6})$tcasecmp redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x492f2280 ({libc.so.6})$tstrcmp redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x4930939e ({libc.so.6})$tmemchr redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x493093d8 ({libc.so.6})$tmemchr redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x494c8e00 ({libc.so.6})$memchr redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x494c9a98 ({libc.so.6})$memcpy redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x49307608 ({libc.so.6})$memcpy redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x4930760c ({libc.so.6})$memcpy redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x49427590 ({libc.so.6})$strcmp redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x494275d6 ({libc.so.6})$strcmp redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x49303050 ({libc.so.6})$memset redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x494c9a9c ({libc.so.6})$memset redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x49309376 ({libc.so.6})$memset redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x4942f3b0 ({libc.so.6})$strscnps redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x49309398 ({libc.so.6})$tcasecmp redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x4930939b ({libc.so.6})$tcasecmp redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x492f2350 ({libc.so.6})$tstrcmp redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x4930939d ({libc.so.6})$tmemchr redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x494e9d00 ({libc.so.6})$wcscmp redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x494c9a9b ({libc.so.6})$wcscmp redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x492f2798 ({libc.so.6})$strcmpbkr redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x4930937d ({libc.so.6})$memset redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x4942f3b0 ({libc.so.6})$strscnps redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x493093d8 ({libc.so.6})$memchr redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x49309390 ({libc.so.6})$tcasecmp_1 redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x49305050 ({libc.so.6})$memchr redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x4942f3c0 ({libc.so.6})$strscnps redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x4930838d ({libc.so.6})$tstrcpy redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x49308387 ({libc.so.6})$tstrcpy redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x493093a0 ({libc.so.6})$tcasecmp_1 redirected to 0x48311d0 (_vgnU_ifunc_wrapper)
--3147-- REDIR: 0x49418300 ({libc.so.6})$strchrnul_avx2 redirected to 0x483e8a10 (rindex)
--3147-- REDIR: 0x4941b960 ({libc.so.6})$memset_avx2_unaligned_orms redirected to 0x48428e0 (memset)
--3147-- REDIR: 0x4941b960 ({libc.so.6})$strchrnul_avx2 redirected to 0x483e74d0 (strchrnul)
--3147-- REDIR: 0x4941b960 ({libc.so.6})$strchrnul_avx2 redirected to 0x483e74d0 (strchrnul)
--3147-- REDIR: 0x49414600 ({libc.so.6})$rawmemchr_avx2 redirected to 0x4845580 (rawmemchr)
Timestamp (967555) Client (3147) connecting to 127.0.0.1:34567
Timestamp (921500) Client (3147) connected: /tmp/test-awx-127.0.0.1:34567 (awx-127.0.0.1:34567)
Timestamp (924915) Client (3147) connected and requesting a path from node 0 to 1
Timestamp (924915) Client (3147) response to (3147): >_>, arrived in 0.000181seconds.
--3147-- REDIR: 0x492a8550 ({libc.so.6})$free redirected to 0x483c9d0 (free)
==3147== 
==3147== HEAP SUMMARY:
==3147==     in use at exit: 0 bytes in 0 blocks
==3147==   total heap usage: 0 allocs, 0 frees, 0 bytes allocated
==3147== 
==3147== All heap blocks were freed -- no leaks are possible
==3147== 
==3147== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
omer@omer: ~/Desktop/Final/Final$ _
```

(b) 18. Run Valgrind Client Continue

```
omer@omer: ~/Desktop/Final/Final
omer@omer:~/Desktop/Final/Final$ make
gcc -c -Wall server.c
gcc -c -Wall graph.c
gcc server/graph.o server -lrt -lpthread
gcc -c -Wall client.c
gcc client/graph.o client -lrt -lpthread
omer@omer:~/Desktop/Final/Final$ make rsv
valgrind --leak-check=full ./server < input.txt -p 34567 -o log.txt -s 4 -x 24
==3248== Memcheck, a memory error detector
==3248== Copyright (C) 2002-2017, and GPLv3, by Julian Seward et al.
==3248== Using Valgrind-3.15.0-608cbb1914-20190413 and LttngEx, rerun with -h for copyright info
==3248== Command: ./server -l input.txt -p 34567 -o log.txt -s 4 -x 24
==3248== Valgrind options:
==3248==   -v
==3248==   -leak-check=full
==3248==   Contents or probe-version:
==3248==     Linux version 5.4.0-39-generic (buildd@cyb1-and64-016) (gcc version 9.3.0 (Ubuntu 9.3.0-10ubuntu2)) #43-Ubuntu SMP Fri Jun 19 10:28:31 UTC 2020
==3248==   Arch and hwcap: AMD64 LittleEndian andel-cx15-cx15-cortex-a9-rdscp-sse3-sse3-avx-bmi-f1ec-rdrand
==3248==   CPU: Intel(R) Core(TM) i7-8700K CPU @ 3.70GHz
==3248==   Valgrind library directory: /usr/lib/x86_64-linux-gnu/valgrind
==3248==   Reading sym from /home/omer/Desktop/Final/valgrind
==3248==   Reading sym from /lib/x86_64-linux-gnu/ld-2.31.so
==3248==   Considering shared library /lib/x86_64-linux-gnu/ld-2.31.so
==3248==   Considering /lib/x86_64-linux-gnu/ld-2.31.so..
==3248==     .. CRC mismatch (computed 387817ea vs expected d28cf5ef)
==3248==     Considering shared library /lib/debug/lib/x86_64-linux-gnu/ld-2.31.so..
==3248==     .. CRC is valid
==3248==   Reading sym from /usr/lib/x86_64-linux-gnu/valgrind/memcheck-amd64-linux
==3248==   object doesn't have a symbol table
==3248==   Object doesn't have a dynamic symbol table
==3248==   Scheduler: using generic module lock implementation
==3248==   Reading suppression file: /usr/lib/x86_64-linux-gnu/valgrind/default.supp
==3248== embedded gobserver: reading from /tmp/vgdb-pipe-from-vgdb-to-3248-by-omer-on-??
==3248== embedded gobserver: writing to /tmp/vgdb-pipe-to-vgdb-from-3248-by-omer-on-??
==3248== embedded gobserver: shared mem /tmp/vgdb-pipe-shared-hen-vgd-3248-by-omer-on-??
==3248== embedded gobserver: shared mem /tmp/vgdb-pipe-shared-hen-vgd-3248-by-omer-on-??
==3248==
==3248== TO CONTROL THIS PROCESS USING vgdb (which you probably
==3248== don't want to do, unless you know exactly what you're doing,
==3248== or you're doing some weird strange experiment):
==3248==   /usr/lib/x86_64-linux-gnu/valgrind/.../bin/vgdb --pid=3248 ...command...
==3248==
==3248== TO DEBUG THIS PROCESS USING GDB: start GDB like this
==3248==   gtpathvgdb ./server
==3248== and then give GDB the following command
==3248==   target remote | /usr/lib/x86_64-linux-gnu/valgrind/.../bin/vgdb --pid=3248
==3248==   -pid is optional if only one valgrind process is running
==3248==   (e.g. if you run multiple valgrind processes)
==3248==   REDIR: 0x4022080 (ld-linux-x86-64.so.2:strlen) redirected to 0x580c9ce2(??)
==3248==   REDIR: 0x4022058 (ld-linux-x86-64.so.2:index) redirected to 0x580c9cf3(??)
==3248==   Reading sym from /usr/lib/x86_64-linux-gnu/valgrind/vpreload.core-and64-linu
```

(a) 19. Run Valgrind Server

(b) 20. Run Valgrind Server Continue