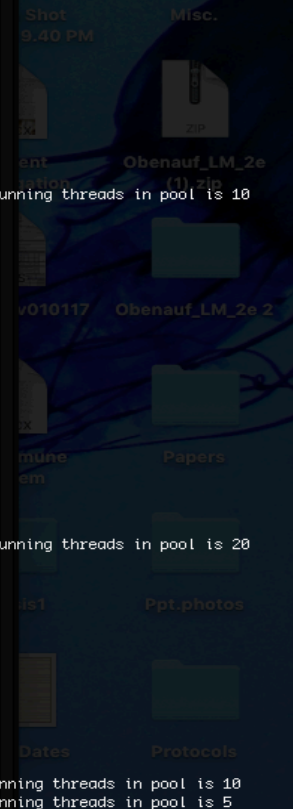


Caleb Gray

There is a client class that sets up a array of clients for testing. The server class takes in the requests from the clients and processes them in a Job class. The job class contains the command and the two ints that will be manipulated. The job class contains getters and and the ability to print to the gui. The ThreadPool class contains the TheadWorker class, which is responsible for processing the data. The data is stored in the MyMonitor class. This class contains synchronized methods that allow for enqueue and dequeue from a shared queue. It also checks to see if the queue is full and needs to close off any new clients. The threadpool class holds an array that contains thread workers. It contains methods that increase and decrease the size of the threadpool based on the instructions of the threadmanager. It is also responsible for starting and stopping the threads in the threadpool. The threadmanager is a thread in itself that runs for the life of the server its job is to watch the size of the queue and the number of jobs. If the number of jobs to number of threads ratio reaches a certain threshold then it is responsible for calling on the threadpool class to increase or decrease the size of the thread pool. When the increasePool method is called an appropriate number of threads are created and then the startPool method is called to start the threads. The same in reverse happens for the decreasePool method. When the KILL command is entered then all of the threads are interrupted and closed then the when they are completed and the clients are closed then the main thread is exited.

This is a run for increasing and decreasing the thread pool

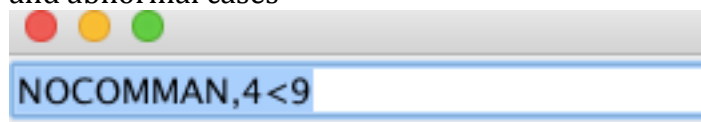
```
Worker thread id=5 processed service request SUB,10,9 at the time 2017-02-15T16:30:19.912
Worker thread id=4 processed service request MUL,2,3 at the time 2017-02-15T16:30:19.913
Worker thread id=3 processed service request DIV,4,2 at the time 2017-02-15T16:30:19.912
Worker thread id=1 processed service request ADD,4,5 at the time 2017-02-15T16:30:19.913
Worker thread id=2 processed service request ADD,4,5 at the time 2017-02-15T16:30:19.912
Worker thread id=6 processed service request SUB,10,9 at the time 2017-02-15T16:30:20.447
Worker thread id=8 processed service request DIV,4,2 at the time 2017-02-15T16:30:20.447
Worker thread id=9 processed service request ADD,4,5 at the time 2017-02-15T16:30:20.447
Worker thread id=10 processed service request SUB,10,9 at the time 2017-02-15T16:30:20.448
Worker thread id=7 processed service request MUL,2,3 at the time 2017-02-15T16:30:20.447
ThreadManager doubled the number of threads in the pool at 2017-02-15T16:30:20.447, now total running threads in pool is 10
Worker thread id=2 processed service request MUL,2,3 at the time 2017-02-15T16:30:21.018
Worker thread id=5 processed service request ADD,4,5 at the time 2017-02-15T16:30:21.018
Worker thread id=1 processed service request MUL,2,3 at the time 2017-02-15T16:30:21.018
Worker thread id=4 processed service request DIV,4,2 at the time 2017-02-15T16:30:21.018
Worker thread id=3 processed service request SUB,10,9 at the time 2017-02-15T16:30:21.018
Worker thread id=6 processed service request DIV,4,2 at the time 2017-02-15T16:30:21.448
Worker thread id=8 processed service request ADD,4,5 at the time 2017-02-15T16:30:21.448
Worker thread id=7 processed service request SUB,10,9 at the time 2017-02-15T16:30:21.448
Worker thread id=9 processed service request MUL,2,3 at the time 2017-02-15T16:30:21.449
Worker thread id=10 processed service request DIV,4,2 at the time 2017-02-15T16:30:21.449
Worker thread id=11 processed service request ADD,4,5 at the time 2017-02-15T16:30:21.449
Worker thread id=12 processed service request SUB,10,9 at the time 2017-02-15T16:30:21.449
Worker thread id=13 processed service request MUL,2,3 at the time 2017-02-15T16:30:21.449
Worker thread id=14 processed service request DIV,4,2 at the time 2017-02-15T16:30:21.450
Worker thread id=15 processed service request ADD,4,5 at the time 2017-02-15T16:30:21.450
Worker thread id=16 processed service request SUB,10,9 at the time 2017-02-15T16:30:21.450
Worker thread id=17 processed service request MUL,2,3 at the time 2017-02-15T16:30:21.450
Worker thread id=18 processed service request DIV,4,2 at the time 2017-02-15T16:30:21.450
ThreadManager doubled the number of threads in the pool at 2017-02-15T16:30:21.450, now total running threads in pool is 20
Worker thread id=19 processed service request ADD,4,5 at the time 2017-02-15T16:30:21.451
Worker thread id=20 processed service request SUB,10,9 at the time 2017-02-15T16:30:21.451
Worker thread id=2 processed service request MUL,2,3 at the time 2017-02-15T16:30:22.019
Worker thread id=1 processed service request ADD,4,5 at the time 2017-02-15T16:30:22.019
Worker thread id=5 processed service request DIV,4,2 at the time 2017-02-15T16:30:22.019
Worker thread id=4 processed service request SUB,10,9 at the time 2017-02-15T16:30:22.019
Worker thread id=3 processed service request MUL,2,3 at the time 2017-02-15T16:30:22.019
Worker thread id=6 processed service request DIV,4,2 at the time 2017-02-15T16:30:22.448
Worker thread id=8 processed service request ADD,4,5 at the time 2017-02-15T16:30:22.448
Worker thread id=7 processed service request SUB,10,9 at the time 2017-02-15T16:30:22.449
Worker thread id=10 processed service request DIV,4,2 at the time 2017-02-15T16:30:22.449
Worker thread id=9 processed service request MUL,2,3 at the time 2017-02-15T16:30:22.449
ThreadManager halved the number of threads in the pool at 2017-02-15T16:30:22.451, now total running threads in pool is 10
ThreadManager halved the number of threads in the pool at 2017-02-15T16:30:23.452, now total running threads in pool is 5
```



next is the kill command

```
New connection with client# 8 at Socket[addr=/127.0.0.1,port=59553,localport=9898]
New connection with client# 9 at Socket[addr=/127.0.0.1,port=59554,localport=9898]
Connection with client# 9 closed
Exit
[Worker thread id=2 processed service request ADD,4,5 at the time 2017-02-15T18:16:34.040
Worker thread id=4 processed service request SUB,10,9 at the time 2017-02-15T18:16:34.041
Worker thread id=1 processed service request ADD,4,5 at the time 2017-02-15T18:16:34.041
Worker thread id=3 processed service request SUB,10,9 at the time 2017-02-15T18:16:34.042
Thread-2 is terminating
Thread-3 is terminating
Thread-4 is terminating
Worker thread id=5 processed service request ADD,4,5 at the time 2017-02-15T18:16:34.042
Thread-1 is terminating
Thread-5 is terminating
Worker thread id=6 processed service request MUL,2,3 at the time 2017-02-15T18:16:34.889
Worker thread id=9 processed service request DIV,4,2 at the time 2017-02-15T18:16:34.889
ThreadManager doubled the number of threads in the pool at 2017-02-15T18:16:34.890, now total running th
Worker thread id=6 processed service request MUL,2,3 at the time 2017-02-15T18:16:34.889
Worker thread id=7 processed service request MUL,2,3 at the time 2017-02-15T18:16:34.889
Worker thread id=10 processed service request DIV,4,2 at the time 2017-02-15T18:16:34.890
Worker thread id=8 processed service request MUL,2,3 at the time 2017-02-15T18:16:35.890
Worker thread id=9 processed service request DIV,4,2 at the time 2017-02-15T18:16:35.890
Worker thread id=7 processed service request SUB,10,9 at the time 2017-02-15T18:16:35.890
Worker thread id=10 processed service request MUL,2,3 at the time 2017-02-15T18:16:35.891
Worker thread id=11 processed service request DIV,4,2 at the time 2017-02-15T18:16:35.891
Worker thread id=8 processed service request ADD,4,5 at the time 2017-02-15T18:16:35.890
Worker thread id=12 processed service request ADD,4,5 at the time 2017-02-15T18:16:35.891
Worker thread id=13 processed service request ADD,4,5 at the time 2017-02-15T18:16:35.891
Worker thread id=14 processed service request SUB,10,9 at the time 2017-02-15T18:16:35.891
Worker thread id=15 processed service request ADD,4,5 at the time 2017-02-15T18:16:35.892
Worker thread id=16 processed service request SUB,10,9 at the time 2017-02-15T18:16:35.892
Worker thread id=17 processed service request MUL,2,3 at the time 2017-02-15T18:16:35.892
Worker thread id=18 processed service request MUL,2,3 at the time 2017-02-15T18:16:35.892
Worker thread id=19 processed service request DIV,4,2 at the time 2017-02-15T18:16:35.892
ThreadManager doubled the number of threads in the pool at 2017-02-15T18:16:35.892, now total running th
Worker thread id=20 processed service request DIV,4,2 at the time 2017-02-15T18:16:35.893
Worker thread id=6 processed service request SUB,10,9 at the time 2017-02-15T18:16:36.894
Worker thread id=9 processed service request MUL,2,3 at the time 2017-02-15T18:16:36.894
Worker thread id=7 processed service request DIV,4,2 at the time 2017-02-15T18:16:36.895
Worker thread id=10 processed service request DIV,4,2 at the time 2017-02-15T18:16:36.895
Worker thread id=13 processed service request DIV,4,2 at the time 2017-02-15T18:16:36.895
Worker thread id=11 processed service request SUB,10,9 at the time 2017-02-15T18:16:36.895
Worker thread id=18 processed service request MUL,2,3 at the time 2017-02-15T18:16:36.895
Thread-11 is terminating
Thread-18 is terminating
Thread-13 is terminating
Thread-6 is terminating
Thread-7 is terminating
Worker thread id=8 processed service request ADD,4,5 at the time 2017-02-15T18:16:36.895
Thread-10 is terminating
```

and abnormal cases



Hello, you are client #0.

Enter a line with only a period to quit

Invalid input

Invalid input