

Wenbo Wang

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GitHub: <https://github.com/wenbowanghaha/cs6650>

Assignment 1

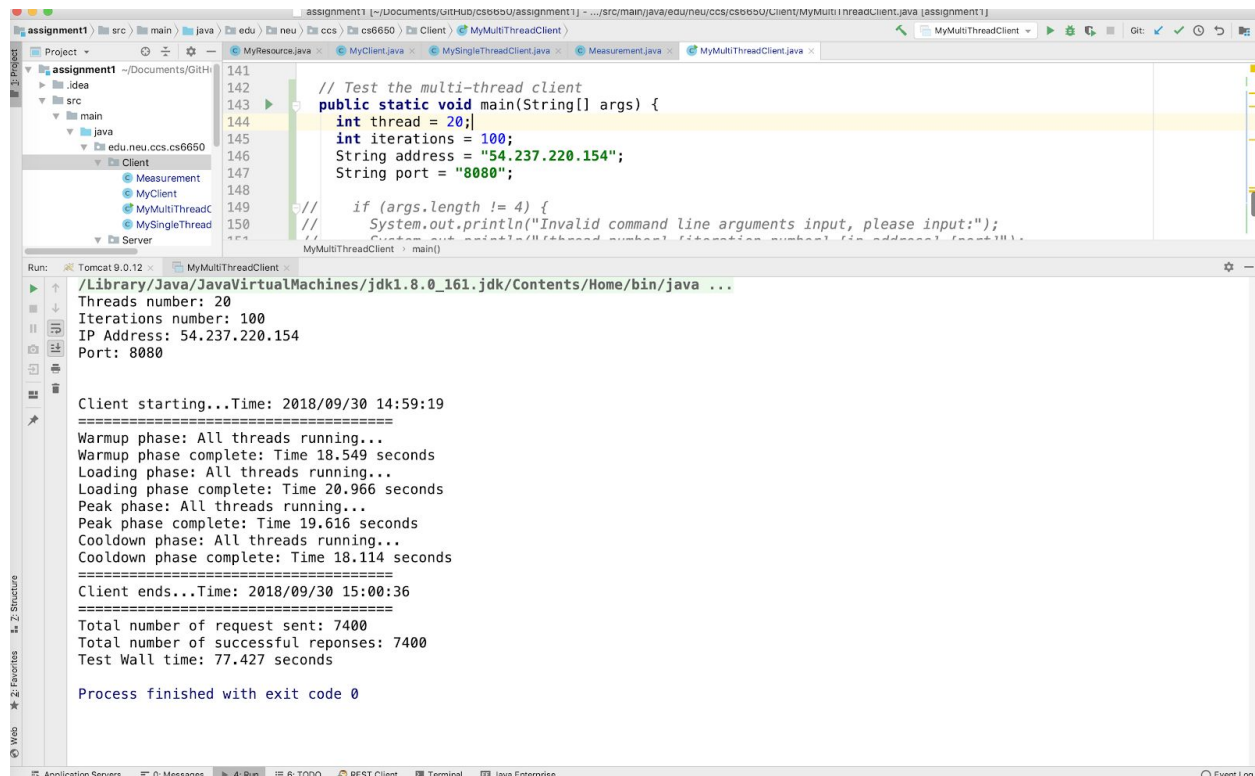
Design Overview:

First I set up both server and client classes, and then basing on the client, I created single thread client and multi-thread client, which has the main function as the entry point of the program. Plus, I created another class to record all the measurements for each thread, make the metrics calculations convenient.

My Github: <https://github.com/wenbowanghaha/cs6650>

Step 4:

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The screenshot shows an IDE with a project named 'assignment1'. The code editor displays the following Java code for 'MyMultiThreadClient.java':

```
141 // Test the multi-thread client
142
143 public static void main(String[] args) {
144     int thread = 20;
145     int iterations = 100;
146     String address = "54.237.220.154";
147     String port = "8080";
148
149     // if (args.length != 4) {
150     //     System.out.println("Invalid command line arguments input, please input:");
151     //     System.out.println("Thread number, iterations number, ip address, port");
152     //     return;
153     // }
154     MyMultiThreadClient client = new MyMultiThreadClient(thread, iterations, address, port);
155     client.main();
156 }
```

The Run window shows the following output:

```
/Library/Java/JavaVirtualMachines/jdk1.8.0_161.jdk/Contents/Home/bin/java ...
Threads number: 20
Iterations number: 100
IP Address: 54.237.220.154
Port: 8080

Client starting...Time: 2018/09/30 14:59:19
=====
Warmup phase: All threads running...
Warmup phase complete: Time 18.549 seconds
Loading phase: All threads running...
Loading phase complete: Time 20.966 seconds
Peak phase: All threads running...
Peak phase complete: Time 19.616 seconds
Cooldown phase: All threads running...
Cooldown phase complete: Time 18.114 seconds
=====
Client ends...Time: 2018/09/30 15:00:36
=====
Total number of request sent: 7400
Total number of successful reponses: 7400
Test Wall time: 77.427 seconds

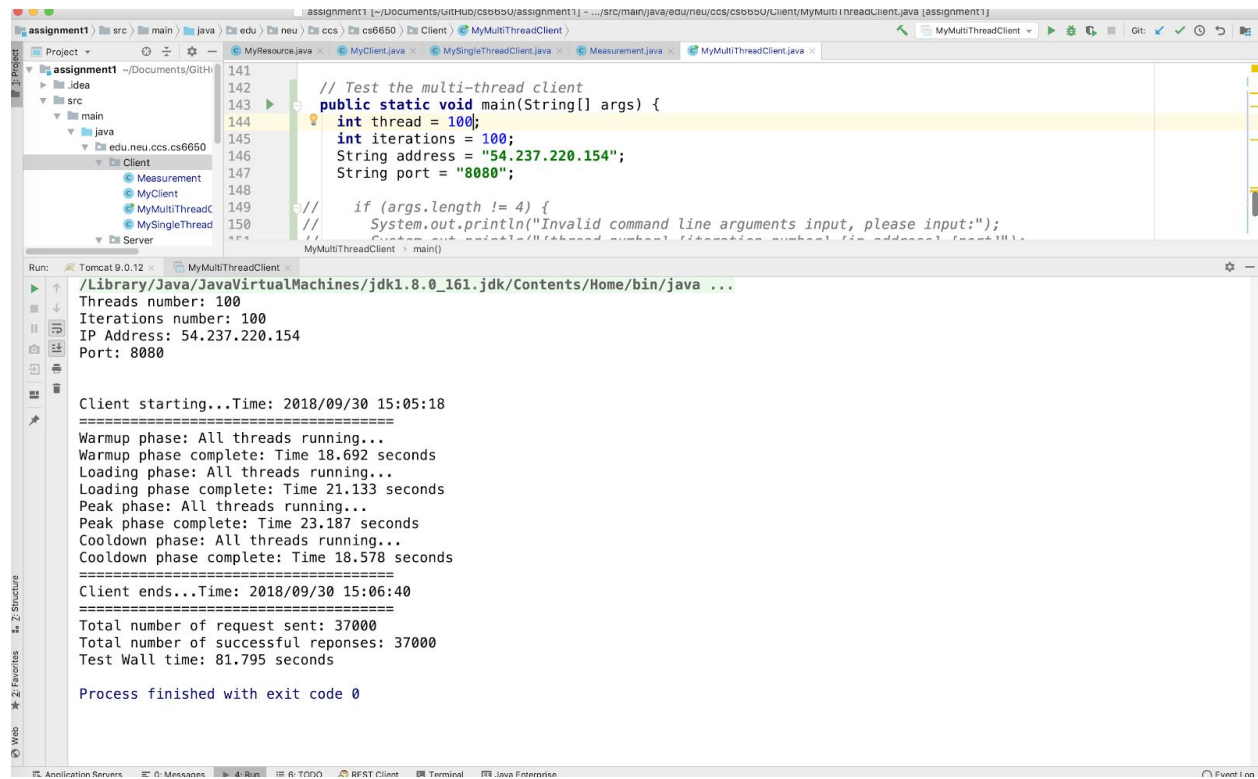
Process finished with exit code 0
```

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The screenshot shows an IDE with a project named 'assignment1'. The main file is 'MyMultiThreadClient.java'. The code defines a multi-threaded client that sends requests to a server. The output window shows the execution results, including the number of threads, iterations, IP address, port, and the time taken for the test.

```
// Test the multi-thread client
public static void main(String[] args) {
    int thread = 100;
    int iterations = 100;
    String address = "54.237.220.154";
    String port = "8080";

    if (args.length != 4) {
        System.out.println("Invalid command line arguments input, please input:");
    }
    // System.out.println("Thread number: " + thread + ", iterations number: " + iterations + ", IP address: " + address + ", port: " + port);
    MyMultiThreadClient.main();
}
```

Run: Tomcat 9.0.12 x MyMultiThreadClient x

/Library/Java/JavaVirtualMachines/jdk1.8.0_161.jdk/Contents/Home/bin/java ...

Threads number: 100
Iterations number: 100
IP Address: 54.237.220.154
Port: 8080

Client starting...Time: 2018/09/30 15:05:18
=====

Warmup phase: All threads running...
Warmup phase complete: Time 18.692 seconds
Loading phase: All threads running...
Loading phase complete: Time 21.133 seconds
Peak phase: All threads running...
Peak phase complete: Time 23.187 seconds
Cooldown phase: All threads running...
Cooldown phase complete: Time 18.578 seconds
=====

Client ends...Time: 2018/09/30 15:06:40
=====

Total number of request sent: 37000
Total number of successful reponses: 37000
Test Wall time: 81.795 seconds

Process finished with exit code 0

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Step 5:

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The screenshot shows an IDE with a project named 'assignment1'. The code editor displays the following Java code for 'MyMultiThreadClient.java':

```
178 // Test the multi-thread client
179 public static void main(String[] args) {
180     int thread = 20;
181     int iterations = 100;
182     String address = "54.237.220.154";
183     String port = "8080";
184 }
```

The Run window shows the output of the program:

```
Run: Tomcat 9.0.12 x MyMultiThreadClient x
/Library/Java/JavaVirtualMachines/jdk1.8.0_161.jdk/Contents/Home/bin/java ...
Threads number: 20
Iterations number: 100
IP Address: 54.237.220.154
Port: 8080

Client starting...Time: 2018/09/30 16:26:09
=====
Warmup phase: All threads running...
Warmup phase complete: Time 18.467 seconds
Loading phase: All threads running...
Loading phase complete: Time 18.475 seconds
Peak phase: All threads running...
Peak phase complete: Time 21.317 seconds
Cooldown phase: All threads running...
Cooldown phase complete: Time 18.107 seconds
=====
Client ends...Time: 2018/09/30 16:27:25
=====
Total number of request sent: 7400
Total number of successful responses: 7400
Overall throughput across all phases: 96.64864300080976
Mean Latency: 98.21824645996094
Median Latency: 90.0
95 percentile latency is: 180 milliseconds
99 percentile latency is: 312 milliseconds
=====
Test Wall time: 76.566 seconds

Process finished with exit code 0
```

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The screenshot shows an IDE with a project named 'assignment1'. The main file is 'MyMultiThreadClient.java'. The code is as follows:

```
178 // Test the multi-thread client
179 public static void main(String[] args) {
180     int thread = 100;
181     int iterations = 100;
182     String address = "54.237.220.154";
183     String port = "8080";
184 }
```

The Run window shows the following output:

```
Run: Tomcat 9.0.12 x MyMultiThreadClient x
/Library/Java/JavaVirtualMachines/jdk1.8.0_161.jdk/Contents/Home/bin/java ...
Threads number: 100
Iterations number: 100
IP Address: 54.237.220.154
Port: 8080

Client starting...Time: 2018/09/30 16:23:08
=====
Warmup phase: All threads running...
Warmup phase complete: Time 19.531 seconds
Loading phase: All threads running...
Loading phase complete: Time 21.114 seconds
Peak phase: All threads running...
Peak phase complete: Time 22.919 seconds
Cooldown phase: All threads running...
Cooldown phase complete: Time 18.665 seconds
=====
Client ends...Time: 2018/09/30 16:24:30
=====
Total number of request sent: 37000
Total number of successful responses: 37000
Overall throughput across all phases: 448.647993209652
Mean Latency: 104.04275512695312
Median Latency: 96.0
95 percentile latency is: 121 milliseconds
99 percentile latency is: 308 milliseconds
=====
Test Wall time: 82.47 seconds

Process finished with exit code 0
```

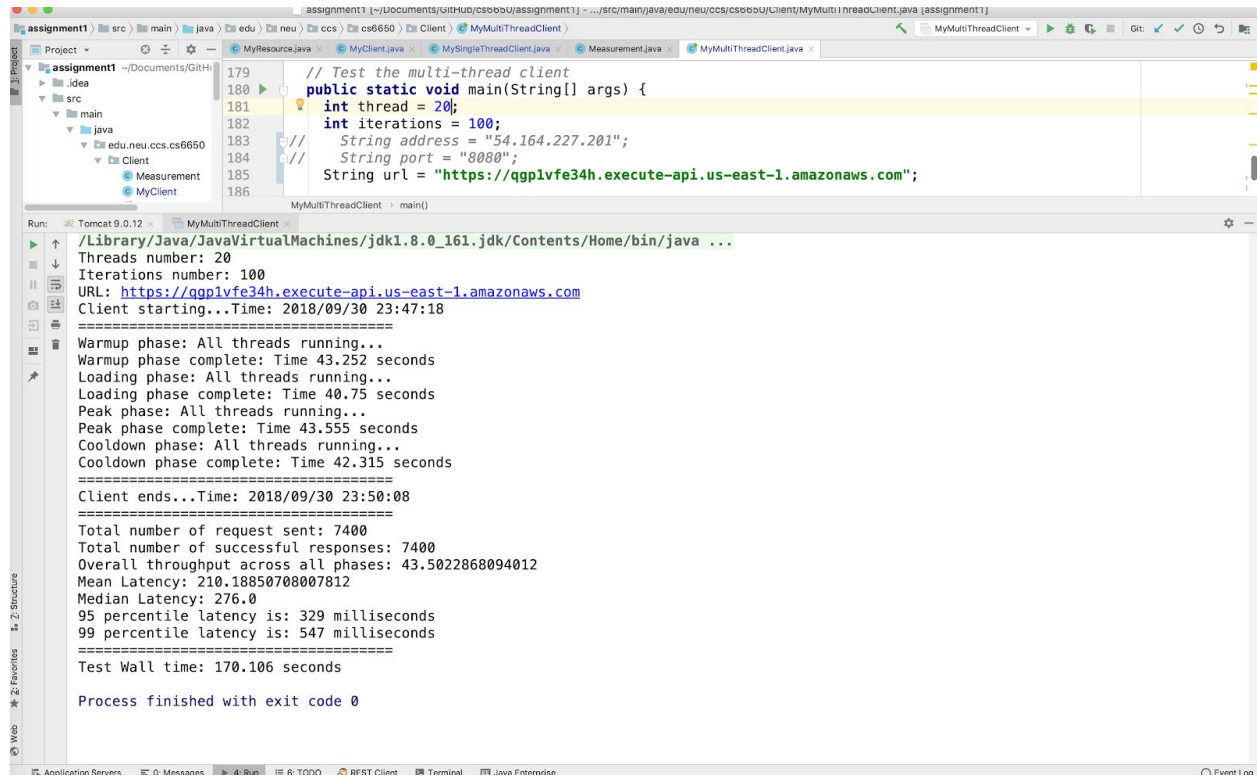
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Step 6:

20/100



The screenshot shows an IDE with a project named 'assignment1'. The code editor displays the following Java code:

```
179 // Test the multi-thread client
180 public static void main(String[] args) {
181     int thread = 20;
182     int iterations = 100;
183     // String address = "54.164.227.201";
184     // String port = "8080";
185     String url = "https://qgplvfe34h.execute-api.us-east-1.amazonaws.com";
186 }
```

The Run window shows the following output:

```
/Library/Java/JavaVirtualMachines/jdk1.8.0_161.jdk/Contents/Home/bin/java ...
Threads number: 20
Iterations number: 100
URL: https://qgplvfe34h.execute-api.us-east-1.amazonaws.com
Client starting...Time: 2018/09/30 23:47:18
=====
Warmup phase: All threads running...
Warmup phase complete: Time 43.252 seconds
Loading phase: All threads running...
Loading phase complete: Time 40.75 seconds
Peak phase: All threads running...
Peak phase complete: Time 43.555 seconds
Cooldown phase: All threads running...
Cooldown phase complete: Time 42.315 seconds
=====
Client ends...Time: 2018/09/30 23:50:08
=====
Total number of request sent: 7400
Total number of successful responses: 7400
Overall throughput across all phases: 43.5022868094012
Mean Latency: 210.18850708007812
Median Latency: 276.0
95 percentile latency is: 329 milliseconds
99 percentile latency is: 547 milliseconds
=====
Test Wall time: 170.106 seconds

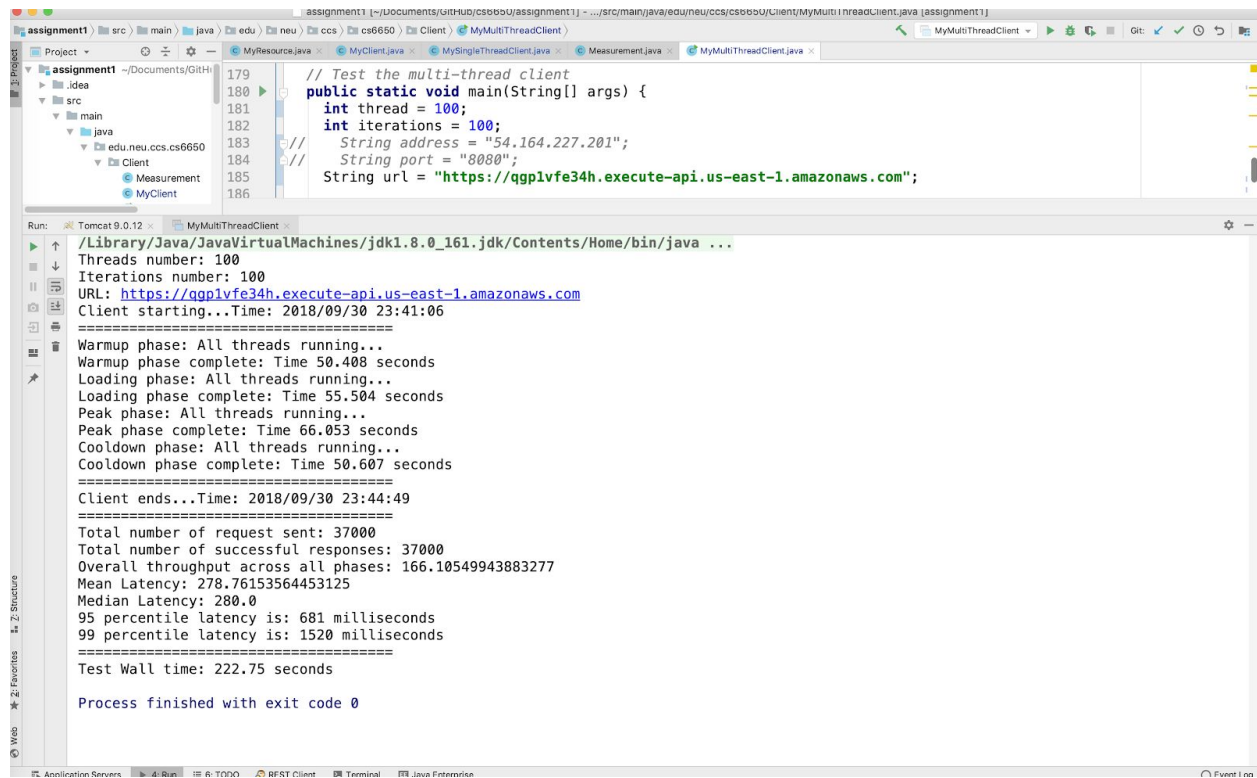
Process finished with exit code 0
```

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The screenshot shows an IDE with a project named 'assignment1'. The main file is 'MyMultiThreadClient.java'. The code defines a multi-threaded client that sends 37,000 requests to a specific URL. The output window shows the following details:

```
Run: Tomcat 9.0.12 x MyMultiThreadClient x
/Library/Java/JavaVirtualMachines/jdk1.8.0_161.jdk/Contents/Home/bin/java ...
Threads number: 100
Iterations number: 100
URL: https://qgplvfe34h.execute-api.us-east-1.amazonaws.com
Client starting...Time: 2018/09/30 23:41:06
=====
Warmup phase: All threads running...
Warmup phase complete: Time 50.408 seconds
Loading phase: All threads running...
Loading phase complete: Time 55.504 seconds
Peak phase: All threads running...
Peak phase complete: Time 66.053 seconds
Cooldown phase: All threads running...
Cooldown phase complete: Time 50.607 seconds
=====
Client ends...Time: 2018/09/30 23:44:49
=====
Total number of request sent: 37000
Total number of successful responses: 37000
Overall throughput across all phases: 166.10549943883277
Mean Latency: 278.76153564453125
Median Latency: 280.0
95 percentile latency is: 681 milliseconds
99 percentile latency is: 1520 milliseconds
=====
Test Wall time: 222.75 seconds

Process finished with exit code 0
```