

CS6650 Assignment 2 Server Design

Link to repo: <https://github.com/kjb0787/Distributed-Systems-rabbitmq>

There are four packages in my Server. I will describe each of them fully.

1. Servlets package: SkierServlet does not change much compare to the previous design in Assignment1 (client). I used Google Gson package to parse and draft post messages and post them. Only this time I added a rabbitmq sender (in Sender.java) to send the message to rabbitmq.
2. Consumer package: This is just a plain old java program pulling messages out from the rabbitmq, then storing all the post messages into a concurrent hash map. There are 100 threads doing that job in parallel, while only one connection was set up at the beginning of the program.
3. Model package: Here are data models of all data used in post messages abstracted into java classes with getters, such as PostBody.java. Gson can easily build and parse Json with these model java classes.
4. rabbitmqUtils package: This is where the sender resides along with a channel pool I implemented with apache.commons.pool2. All the connections channels to rabbitmq will be fetched from the pool and then returned to the pool after the usage, making channels long-live and caution against churn. The sender has a static method that will be called each time a post request is received from a client and the post body will be sent to rabbitmq as a message. In the channel pool, max pool size is 100 and max wait time is 1 second (1000 ms).

Results

```
"/Applications/IntelliJ IDEA.app/Contents/jbr/Contents/Home/bin/java" -javaagent:/Applications/IntelliJ IDEA.app/
threads: 64, skiers: 20000, num lifts: 40
client start time: 1636757250716
phase one start time: 1636757250729
number of requests in phase one per thread: 250
number of total requests should be: 4000, number of wait threads is: 2
number of successful posts (10%) in phase one: 500
phase one duration: 28667 ms, in seconds: 28.667 s.
phase two start time: 1636757279407
number of requests in phase two per thread: 187
number of total requests should be: 12000, number of wait threads is: 7
number of successful posts (10%) in phase two: 1309
phase two duration: 22072 ms, in seconds: 22.072 s.
phase three start time: 1636757301479
number of requests in phase three per thread: 125
number of total requests should be: 2000, number of wait threads is: 16
number of successful posts (10%) in phase three: 2000
phase three duration: 13163 ms, in seconds: 13.163 s.
whole program duration: 63926 ms, in seconds: 63 s.
number of successful posts for the whole program: 17968
number of failed posts for the whole program: 0
program whole throughput: 285 requests per second
Average response time: 119.17558993766697 ms.
Response time median: 81.0 ms.
99th percentile: 448 ms.
Max response time: 916 ms.
throughput: 285 requests per second

Process finished with exit code 0
|
```

```
"/Applications/IntelliJ IDEA.app/Contents/jbr/Contents/Home/bin/java" -javaagent:/Applications/IntelliJ IDEA.app/Contents/lib/idea_rt.
threads: 128, skiers: 20000, num lifts: 40
client start time: 1636757431603
phase one start time: 1636757431612
number of requests in phase one per thread: 125
number of total requests should be: 4000, number of wait threads is: 4
number of successful posts (10%) in phase one: 625
phase one duration: 12045 ms, in seconds: 12.045 s.
phase two start time: 1636757443679
number of requests in phase two per thread: 93
number of total requests should be: 12000, number of wait threads is: 13
number of successful posts (10%) in phase two: 1302
phase two duration: 7705 ms, in seconds: 7.705 s.
phase three start time: 1636757451384
number of requests in phase three per thread: 62
number of total requests should be: 2000, number of wait threads is: 32
number of successful posts (10%) in phase three: 1984
phase three duration: 5467 ms, in seconds: 5.467 s.
whole program duration: 25248 ms, in seconds: 25 s.
number of successful posts for the whole program: 17888
number of failed posts for the whole program: 0
program whole throughput: 715 requests per second
Average response time: 88.66027504472272 ms.
Response time median: 78.0 ms.
99th percentile: 334 ms.
Max response time: 540 ms.
throughput: 715 requests per second
```

```
"/Applications/IntelliJ IDEA.app/Contents/jbr/Contents/Home/bin/java" -javaagent:/Applications/IntelliJ IDEA.app/Contents/lib/idea_rt.jar
threads: 256, skiers: 20000, num lifts: 40
client start time: 1636757504526
phase one start time: 1636757504536
number of requests in phase one per thread: 62
number of total requests should be: 4000, number of wait threads is: 7
number of successful posts (10%) in phase one: 744
phase one duration: 7784 ms, in seconds: 7.784 s.
phase two start time: 1636757512334
number of requests in phase two per thread: 46
number of total requests should be: 12000, number of wait threads is: 26
number of successful posts (10%) in phase two: 1242
phase two duration: 4182 ms, in seconds: 4.182 s.
phase three start time: 1636757516516
number of requests in phase three per thread: 31
number of total requests should be: 2000, number of wait threads is: 64
number of successful posts (10%) in phase three: 1984
phase three duration: 3992 ms, in seconds: 3.992 s.
whole program duration: 15983 ms, in seconds: 15 s.
number of successful posts for the whole program: 17728
number of failed posts for the whole program: 0
program whole throughput: 1181 requests per second
Average response time: 106.0509927797834 ms.
Response time median: 84.0 ms.
99th percentile: 417 ms.
Max response time: 695 ms.
throughput: 1181 requests per second

Process finished with exit code 0
```

```
"/Applications/IntelliJ IDEA.app/Contents/jbr/Contents/Home/bin/java" -javaagent:/Applications/IntelliJ IDEA.app/Contents/lib/idea_rt.jar
threads: 512, skiers: 20000, num lifts: 40
client start time: 1636757646425
phase one start time: 1636757646433
number of requests in phase one per thread: 31
number of total requests should be: 4000, number of wait threads is: 13
number of successful posts (10%) in phase one: 465
phase one duration: 3292 ms, in seconds: 3.292 s.
phase two start time: 1636757649759
number of requests in phase two per thread: 23
number of total requests should be: 12000, number of wait threads is: 52
number of successful posts (10%) in phase two: 1196
phase two duration: 3176 ms, in seconds: 3.176 s.
phase three start time: 1636757652935
number of requests in phase three per thread: 15
number of total requests should be: 2000, number of wait threads is: 128
number of successful posts (10%) in phase three: 1920
phase three duration: 2613 ms, in seconds: 2.613 s.
whole program duration: 9198 ms, in seconds: 9 s.
number of successful posts for the whole program: 17664
number of failed posts for the whole program: 0
program whole throughput: 1962 requests per second
Average response time: 152.42181838768116 ms.
Response time median: 103.0 ms.
99th percentile: 893 ms.
Max response time: 1234 ms.
throughput: 1962 requests per second
```

Queue threadExQ

Overview

Queued messages

last minute

?

Ready

Unacked

Click to toggle line

0

0

Message rates

last minute

?

Publish

Deliver (manual ack)

Deliver (auto ack)

0.00/s

0.00/s

0.00/s

Consumer ack

Redelivered

Get (manual ack)

0.00/s

0.00/s

0.00/s

Get (auto ack)

Get (empty)

0.00/s

0.00/s

Details

Features

Policy

Operator policy

Effective policy definition

durable: true

State

Consumers

Consumer capacity

idle

100

100%

Messages

Message body bytes

Process memory

0

0 B

579 KiB

Total

Ready

Unacked

In memory

Persistent

Transient, Paged Out

0

0 B

0 B

0 B

0 B

0 B

Consumers (100)

Bonus - 512 threads

```
"/Applications/IntelliJ IDEA.app/Contents/jbr/Contents/Home/bin/java" -javaagent:/Applications/IntelliJ IDEA.app/Contents/lib/idea_rt.jar
threads: 512, skiers: 20000, num lifts: 40
client start time: 1636758982998
phase one start time: 1636758983009
number of requests in phase one per thread: 312
number of total requests should be: 40000, number of wait threads is: 13
number of successful posts (10%) in phase one: 4368
phase one duration: 29838 ms, in seconds: 29.838 s.
phase two start time: 1636759012867
number of requests in phase two per thread: 234
number of total requests should be: 120000, number of wait threads is: 52
number of successful posts (10%) in phase two: 12168
phase two duration: 36203 ms, in seconds: 36.203 s.
phase three start time: 1636759049070
number of requests in phase three per thread: 156
number of total requests should be: 20000, number of wait threads is: 128
number of successful posts (10%) in phase three: 19968
phase three duration: 17209 ms, in seconds: 17.209 s.
whole program duration: 83281 ms, in seconds: 83 s.
number of successful posts for the whole program: 179712
number of failed posts for the whole program: 0
program whole throughput: 2165 requests per second
Average response time: 144.89444778311966 ms.
Response time median: 99.0 ms.
99th percentile: 957 ms.
Max response time: 2447 ms.
throughput: 2165 requests per second

Process finished with exit code 0
```