1.Github Repo Link

https://github.com/Johnspeanut/cs6650Assignment2

2. Description of Server Design

2.1 Overview

The server uses Tomcat for executing http request and RabbitMQ for message container. As long as a post request is received, the server will validate the url path as first. If the path is valid, a message object will be constructed based on `LiftRide`. The server then pushes the message object to RabbitMQ queue, where the consumer will pull messsages from it.

2.2 Server package

2.2.1 `SkierServlet` class

This class extends `HttpServlet` and aims to process post requests from client side and push messages to RabmitMQ queue. Creating connections are heavy workloads. In my case,connections are created in `init()` method so that it does not bother to generate them when calling `doPost()` method. Also, the class includes `isUrlValid()`, `isValidSkierLiftUrl()` to validate the http request.

2.2.2 `LiftRide`

This class is to encapsulate a lift ride record. It includes constructor, get methods, and set methods.

2.2.3 `LiftRideRequest`

This class is to encapsulate a lift ride request record. It includes constructor, get methods, and set methods.

2.3 Consumer package

It only includes `Main` class. The message information is saved in a `ConcurrentHashMap`.

2.4 Client package

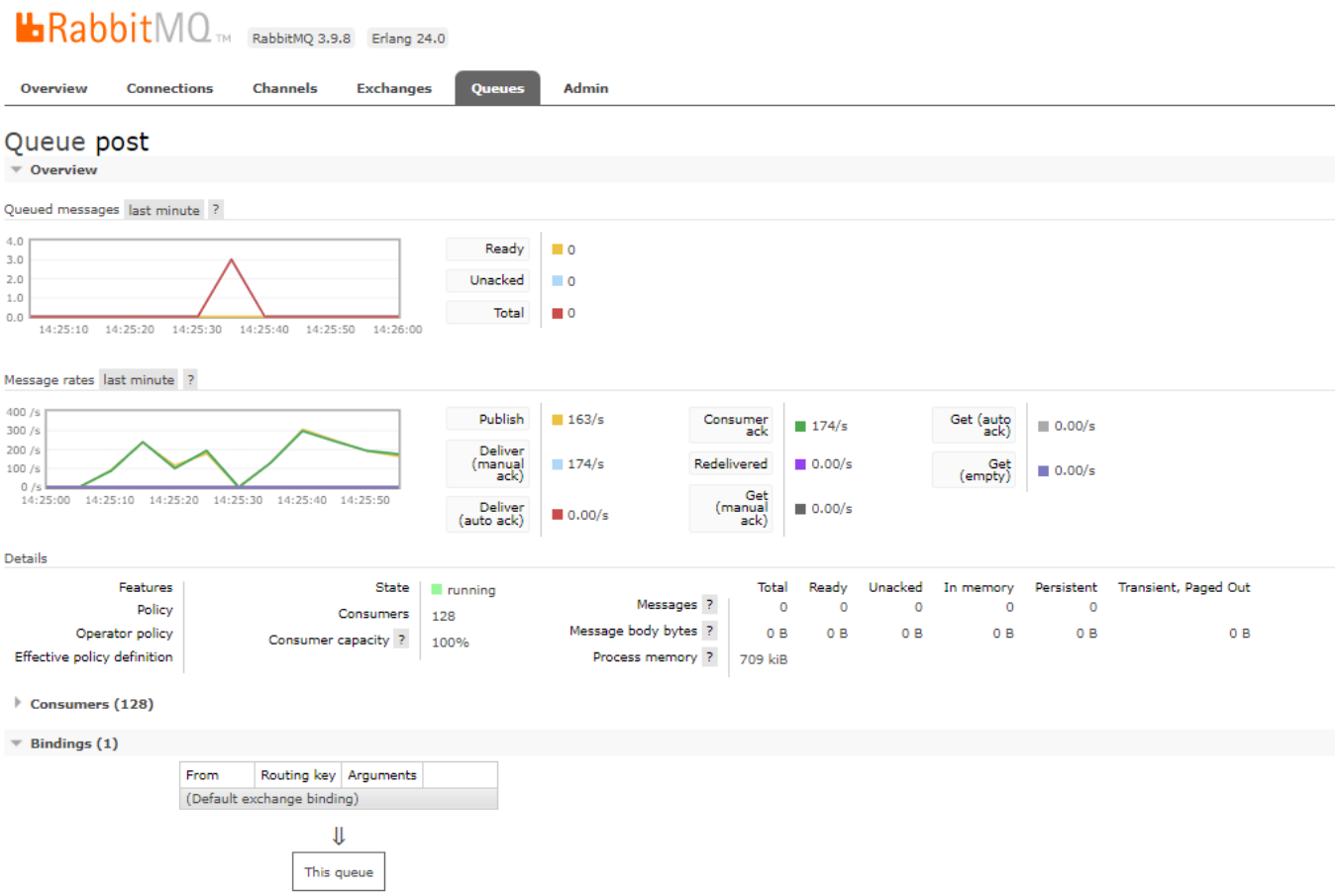
This package incorporates `Counter`, `LiftRideRequest`, `Main`,`Phase`, and `UpicHttpClient` classes. The package aims to send http request to Tomcat promptly.

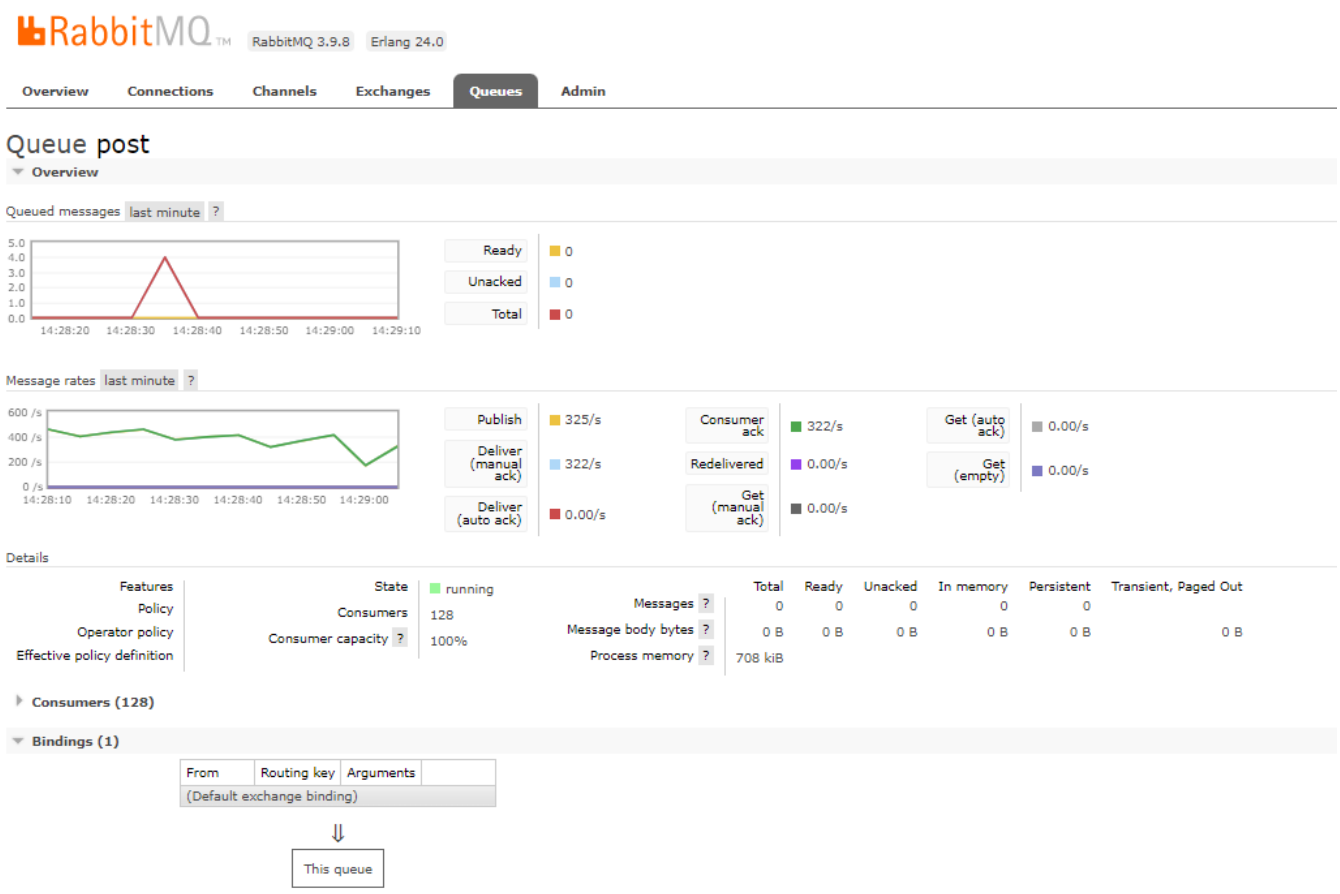
3. Test Runs

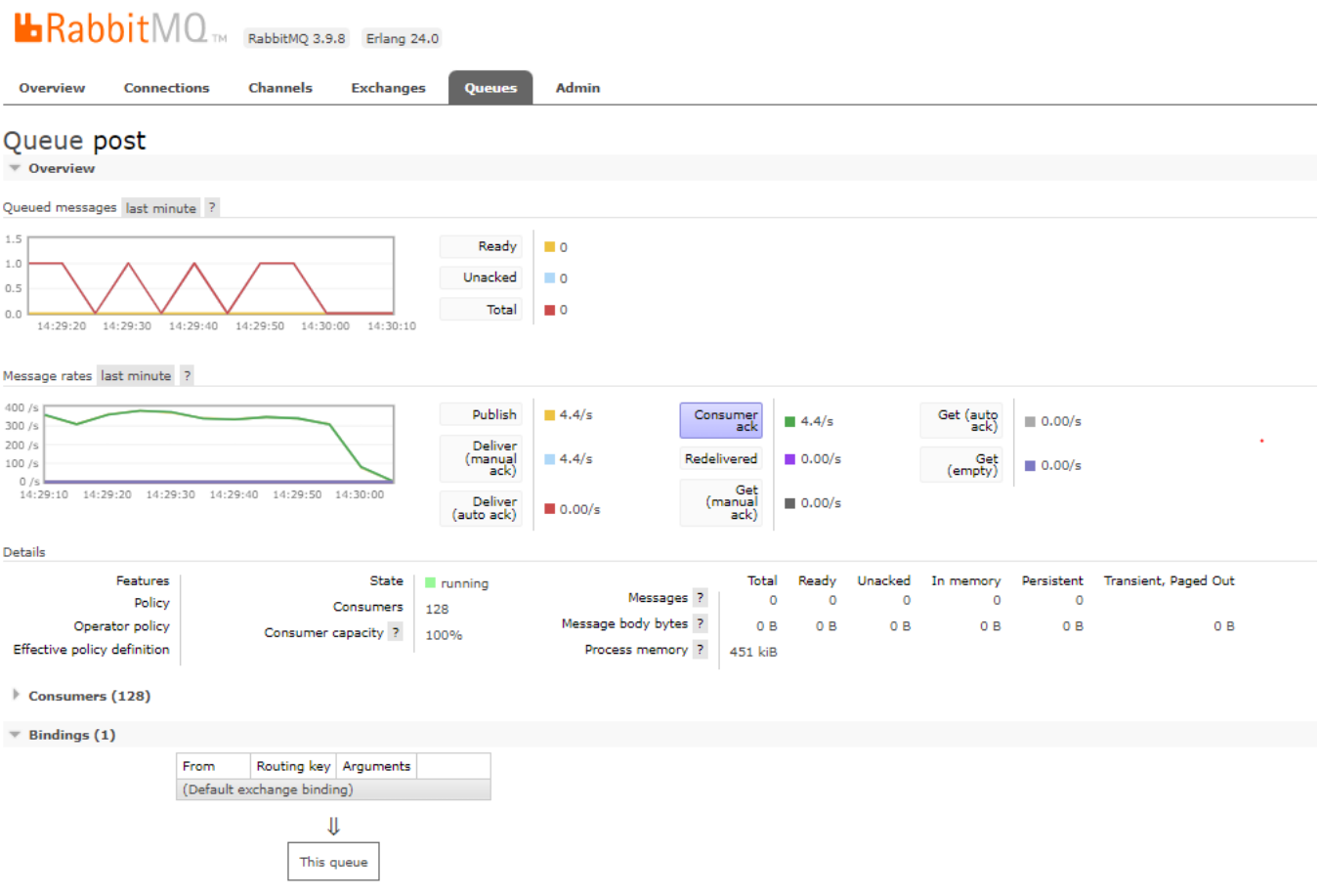
3.1 64-Threads in client

- number of Tomcat servers: 1
- number of channels in each Tomcat server: 64
- number of threads in the consumer: 128

- basicQos for each channel in consumer: 10



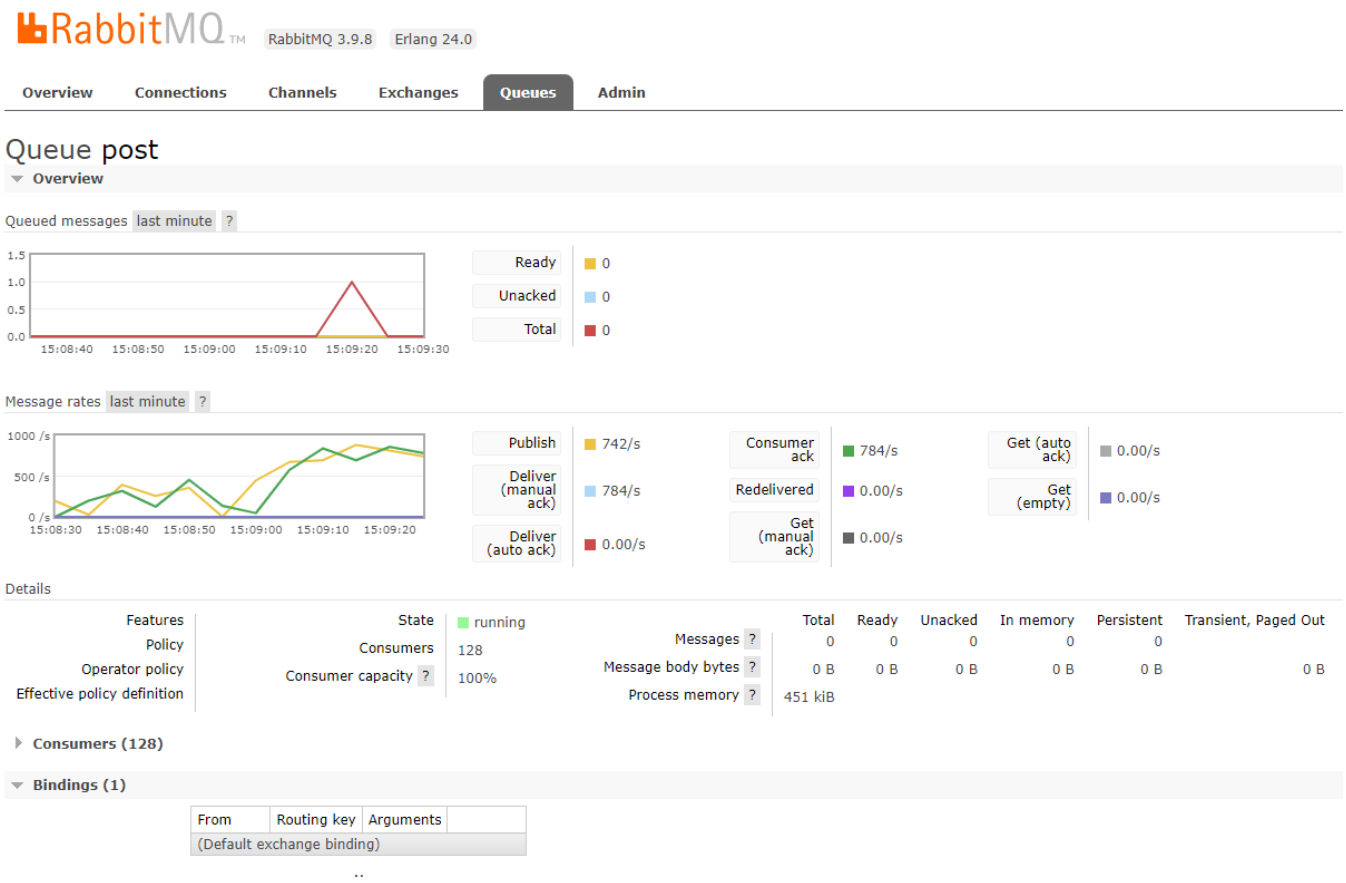

RabbitMQ™ RabbitMQ 3.9.8 Erlang 24.0
Overview Connections Channels Exchanges Queues Admin
Queue post
Overview
Queued messages last minute ?
5.0 4.0 3.0 2.0 1.0 0.0
14:28:20 14:28:30 14:28:40 14:28:50 14:29:00 14:29:10
Ready 0
Unacked 0
Total 0
Message rates last minute ?
600 /s 400 /s 200 /s 0 /s
14:28:10 14:28:20 14:28:30 14:28:40 14:28:50 14:29:00
Publish 325/s
Deliver (manual ack) 322/s
Deliver (auto ack) 0.00/s
Consumer ack 322/s
Redelivered 0.00/s
Get (manual ack) 0.00/s
Get (auto ack) 0.00/s
Get (empty) 0.00/s
Details
Features
Policy
Operator policy
Effective policy definition
State running
Consumers 128
Consumer capacity ? 100%
Messages ? Total 0 Ready 0 Unacked 0 In memory 0 Persistent 0 Transient, Paged Out
Message body bytes ? 0 B 0 B 0 B 0 B 0 B 0 B
Process memory ? 708 kiB
Consumers (128)
Bindings (1)
From Routing key Arguments
(Default exchange binding)
⇓
This queue

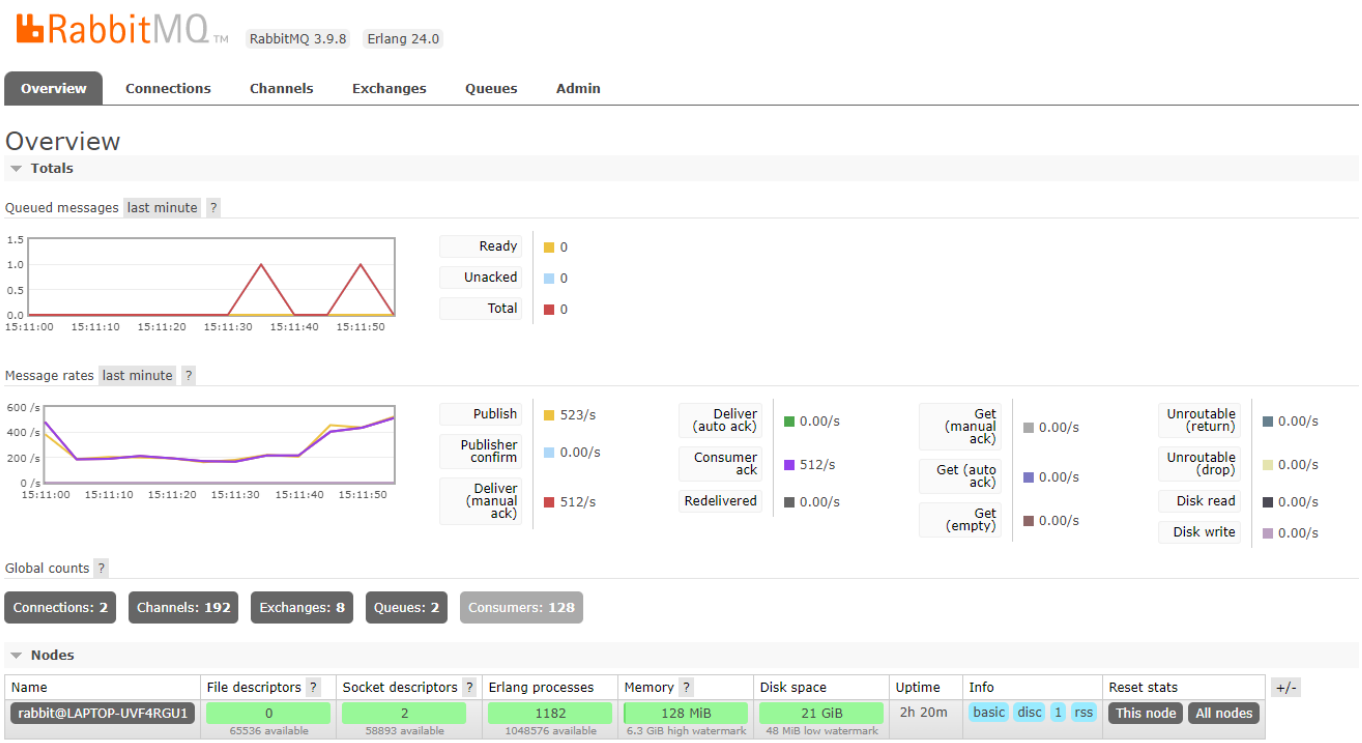

RabbitMQ™ RabbitMQ 3.9.8 Erlang 24.0
Overview Connections Channels Exchanges Queues Admin
Queue post
Overview
Queued messages last minute ?
1.5 1.0 0.5 0.0
14:29:20 14:29:30 14:29:40 14:29:50 14:30:00 14:30:10
Ready 0
Unacked 0
Total 0
Message rates last minute ?
400 /s 300 /s 200 /s 100 /s 0 /s
14:29:10 14:29:20 14:29:30 14:29:40 14:29:50 14:30:00
Publish 4.4/s
Deliver (manual ack) 4.4/s
Deliver (auto ack) 0.00/s
Consumer ack 4.4/s
Redelivered 0.00/s
Get (manual ack) 0.00/s
Get (auto ack) 0.00/s
Get (empty) 0.00/s
Details
Features
Policy
Operator policy
Effective policy definition
State running
Consumers 128
Consumer capacity ? 100%
Messages ? Total 0 Ready 0 Unacked 0 In memory 0 Persistent 0 Transient, Paged Out
Message body bytes ? 0 B 0 B 0 B 0 B 0 B 0 B
Process memory ? 451 kiB
Consumers (128)
Bindings (1)
From Routing key Arguments
(Default exchange binding)
⇓
This queue

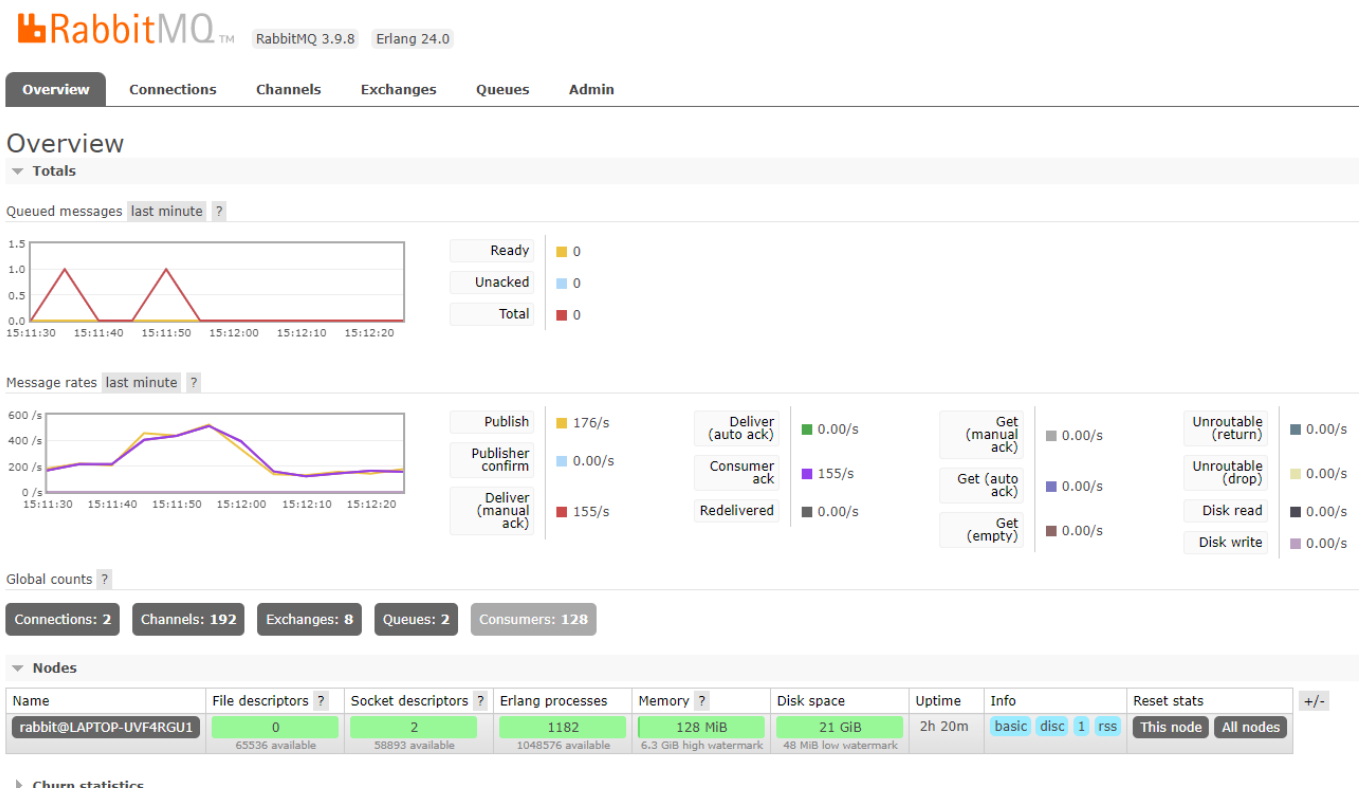
```
response:Success: /4/seasons/2021/days/100/skiers/89426723 LiftRide@69c21147
response:Success: /6/seasons/2021/days/100/skiers/89437250 LiftRide@1d315cb5
response:Success: /9/seasons/2021/days/100/skiers/89439987 LiftRide@18f83558
response:Success: /8/seasons/2021/days/100/skiers/89444011 LiftRide@30532ff1
response:Success: /1/seasons/2021/days/100/skiers/89451124 LiftRide@71a63da3
response:Success: /5/seasons/2021/days/100/skiers/89456763 LiftRide@11162dbe
response:Success: /8/seasons/2021/days/100/skiers/89463103 LiftRide@47ef124c
response:Success: /6/seasons/2021/days/100/skiers/89473786 LiftRide@2f2d7d7f
response:Success: /2/seasons/2021/days/100/skiers/89481050 LiftRide@7b39ff94
response:Success: /0/seasons/2021/days/100/skiers/89482605 LiftRide@2b57978e
response:Success: /2/seasons/2021/days/100/skiers/89491991 LiftRide@1b0615d3
response:Success: /9/seasons/2021/days/100/skiers/89493876 LiftRide@ee60c29
Number requests: 99126
Number of success: 99126
Number of failure: 0
Throughput in requests per second: Mean response time (milliseconds): 3
Wall time (second): 368
```

3.2 128-Threads in client

- number of Tomcat servers: 1
- number of channels in each Tomcat server: 64
- number of threads in the consumer: 128
- basicQos for each channel in consumer: 10



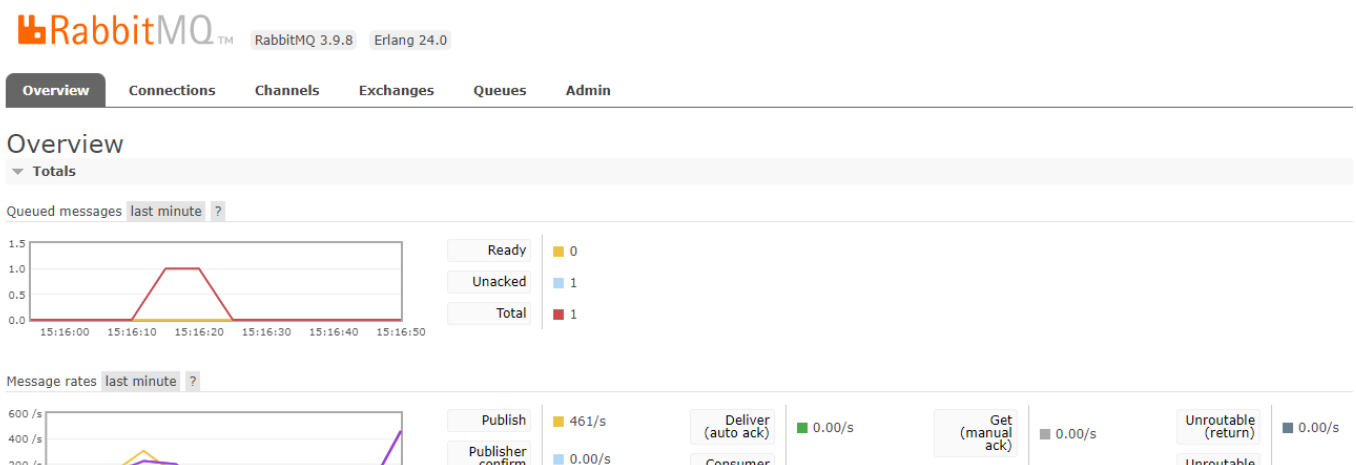


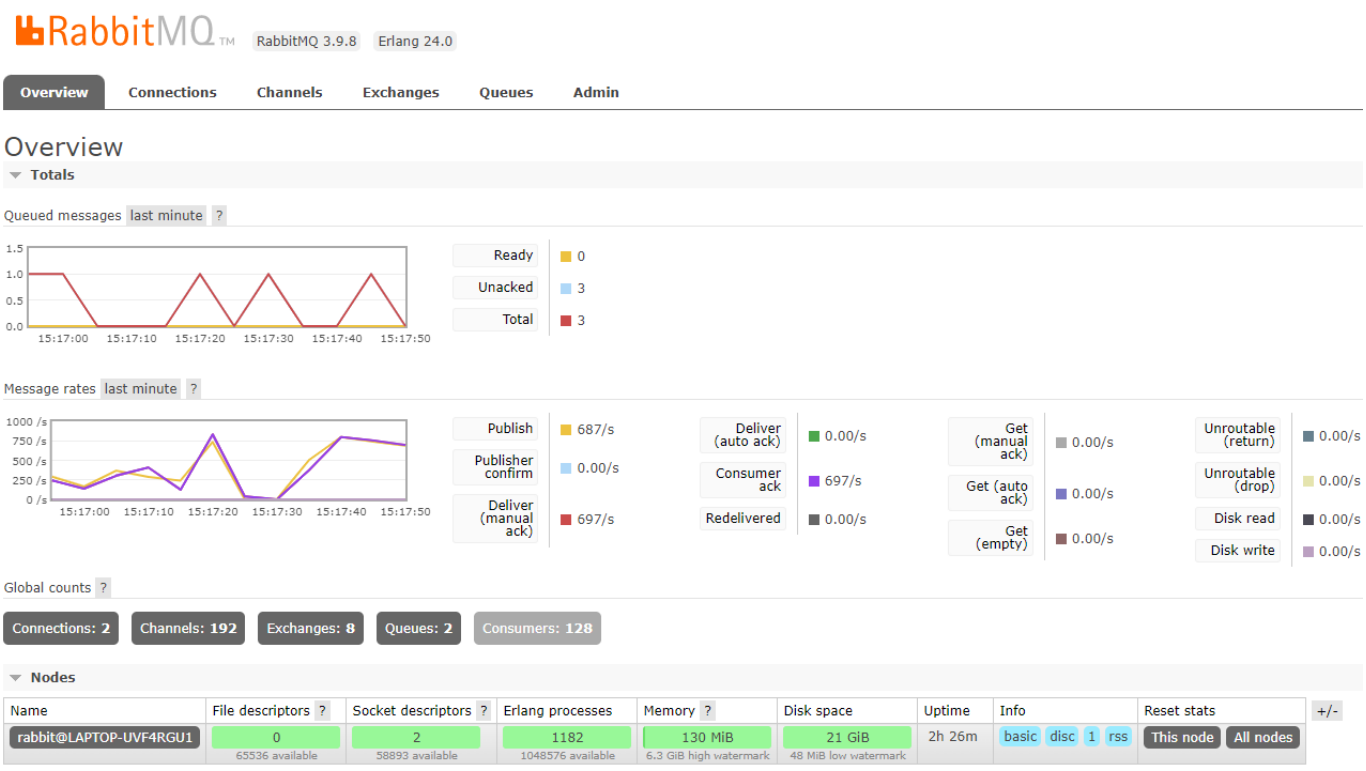


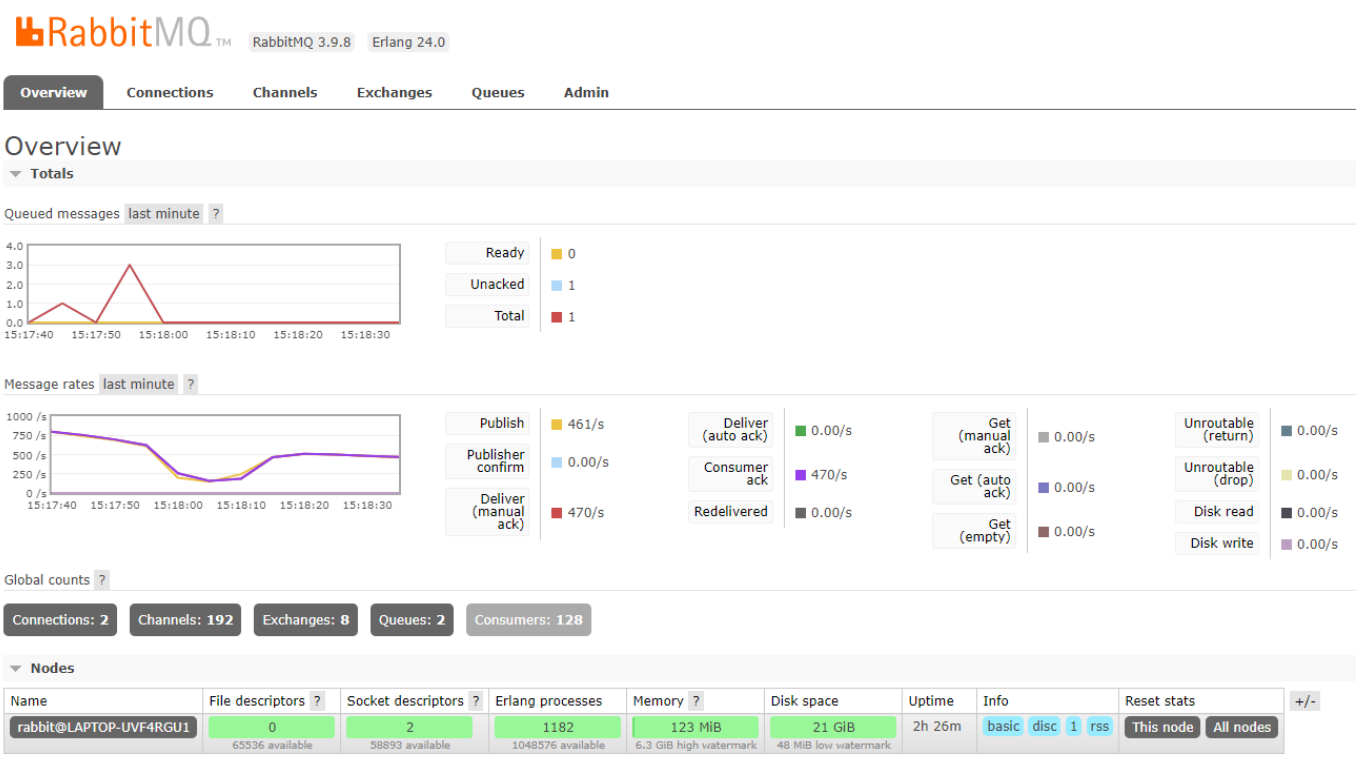
128-threads-result

3.3 256-Threads in client

- number of Tomcat servers: 1
- number of channels in each Tomcat server: 64
- number of threads in the consumer: 128
- basicQos for each channel in consumer: 10


RabbitMQ™ RabbitMQ 3.9.8 Erlang 24.0
Overview Connections Channels Exchanges Queues Admin
Overview
Totals
Queued messages last minute ?
1.5 1.0 0.5 0.0
15:16:00 15:16:10 15:16:20 15:16:30 15:16:40 15:16:50
Ready 0
Unacked 1
Total 1
Message rates last minute ?
600 /s 400 /s 200 /s 0 /s
15:16:00 15:16:10 15:16:20 15:16:30 15:16:40 15:16:50
Publish 461/s
Publisher confirm 0.00/s
Deliver (manual ack) 461/s
Deliver (auto ack) 0.00/s
Consumer ack 461/s
Redelivered 0.00/s
Get (manual ack) 0.00/s
Get (auto ack) 0.00/s
Get (empty) 0.00/s
Unroutable (return) 0.00/s
Unroutable (drop) 0.00/s
Disk read 0.00/s
Disk write 0.00/s
Global counts ?
Connections: 2 Channels: 192 Exchanges: 8 Queues: 2 Consumers: 128
Nodes
Name File descriptors ? Socket descriptors ? Erlang processes Memory ? Disk space Uptime Info Reset stats +/-
rabbit@LAPTOP-UVF4RGU1 0 65536 available 2 58893 available 1182 1048576 available 124 MiB 6.3 GiB high watermark 21 GiB 48 MiB low watermark 2h 25m basic disc 1 rss This node All nodes


RabbitMQ™ RabbitMQ 3.9.8 Erlang 24.0
Overview Connections Channels Exchanges Queues Admin
Overview
Totals
Queued messages last minute ?
1.5 1.0 0.5 0.0
15:17:00 15:17:10 15:17:20 15:17:30 15:17:40 15:17:50
Ready 0
Unacked 3
Total 3
Message rates last minute ?
1000 /s 750 /s 500 /s 250 /s 0 /s
15:17:00 15:17:10 15:17:20 15:17:30 15:17:40 15:17:50
Publish 687/s
Publisher confirm 0.00/s
Deliver (manual ack) 697/s
Deliver (auto ack) 0.00/s
Consumer ack 697/s
Redelivered 0.00/s
Get (manual ack) 0.00/s
Get (auto ack) 0.00/s
Get (empty) 0.00/s
Unroutable (return) 0.00/s
Unroutable (drop) 0.00/s
Disk read 0.00/s
Disk write 0.00/s
Global counts ?
Connections: 2 Channels: 192 Exchanges: 8 Queues: 2 Consumers: 128
Nodes
Name File descriptors ? Socket descriptors ? Erlang processes Memory ? Disk space Uptime Info Reset stats +/-
rabbit@LAPTOP-UVF4RGU1 0 65536 available 2 58893 available 1182 1048576 available 130 MiB 6.3 GiB high watermark 21 GiB 48 MiB low watermark 2h 26m basic disc 1 rss This node All nodes

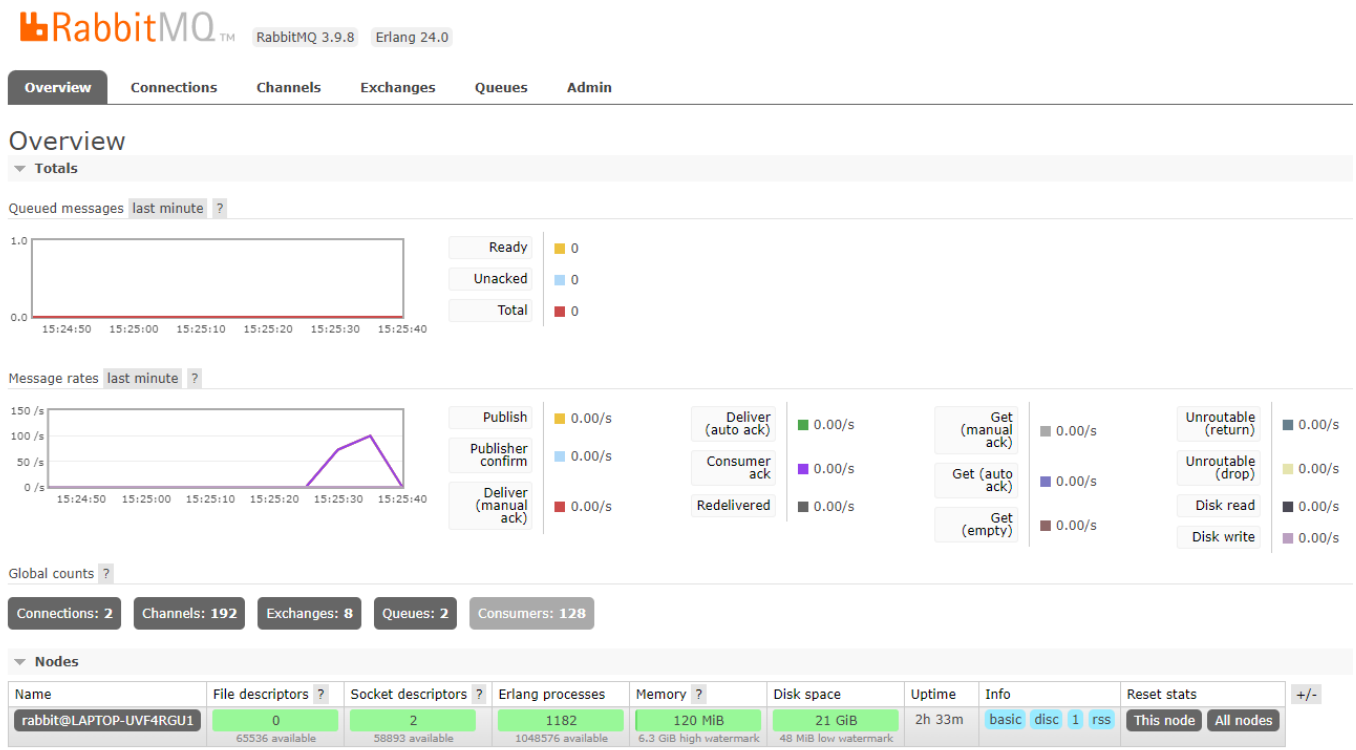


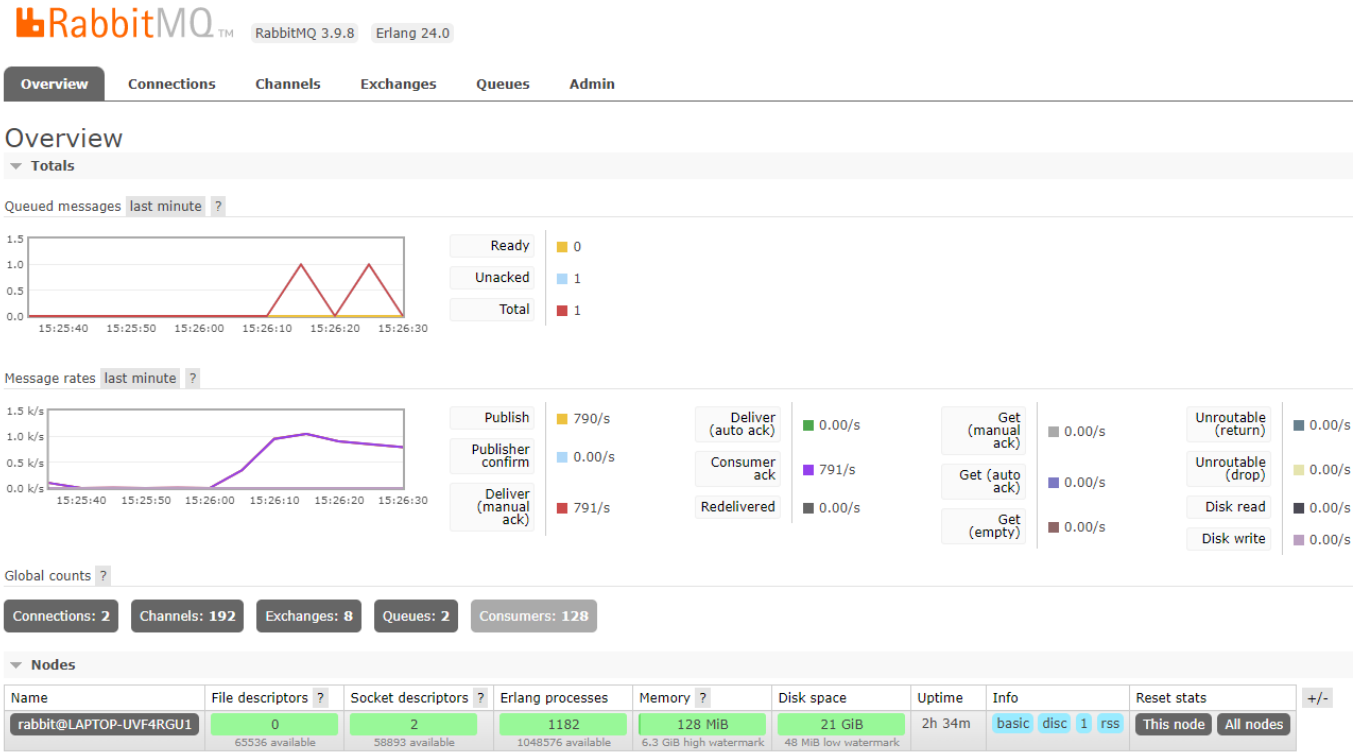

```
response:Success: /2/seasons/2021/days/100/skiers/22350693 LiftRide@65e7608c
response:Success: /0/seasons/2021/days/100/skiers/22352818 LiftRide@285e806e
response:Success: /9/seasons/2021/days/100/skiers/22354041 LiftRide@7d89940f
response:Success: /1/seasons/2021/days/100/skiers/22355727 LiftRide@1ded8398
response:Success: /9/seasons/2021/days/100/skiers/22358003 LiftRide@1e9187a4
response:Success: /8/seasons/2021/days/100/skiers/22359148 LiftRide@3c3705f5
response:Success: /7/seasons/2021/days/100/skiers/22361211 LiftRide@316d4434
response:Success: /5/seasons/2021/days/100/skiers/22361778 LiftRide@69718b57
response:Success: /5/seasons/2021/days/100/skiers/22363438 LiftRide@744da7ac
response:Success: /0/seasons/2021/days/100/skiers/22365096 LiftRide@578a7eb8
response:Success: /2/seasons/2021/days/100/skiers/22366784 LiftRide@3dfbba79
Number requests: 96939
Number of success: 96939
Number of failure: 0
Throughput in requests per second: Mean response time (milliseconds): 3
Wall time (second): 348
```

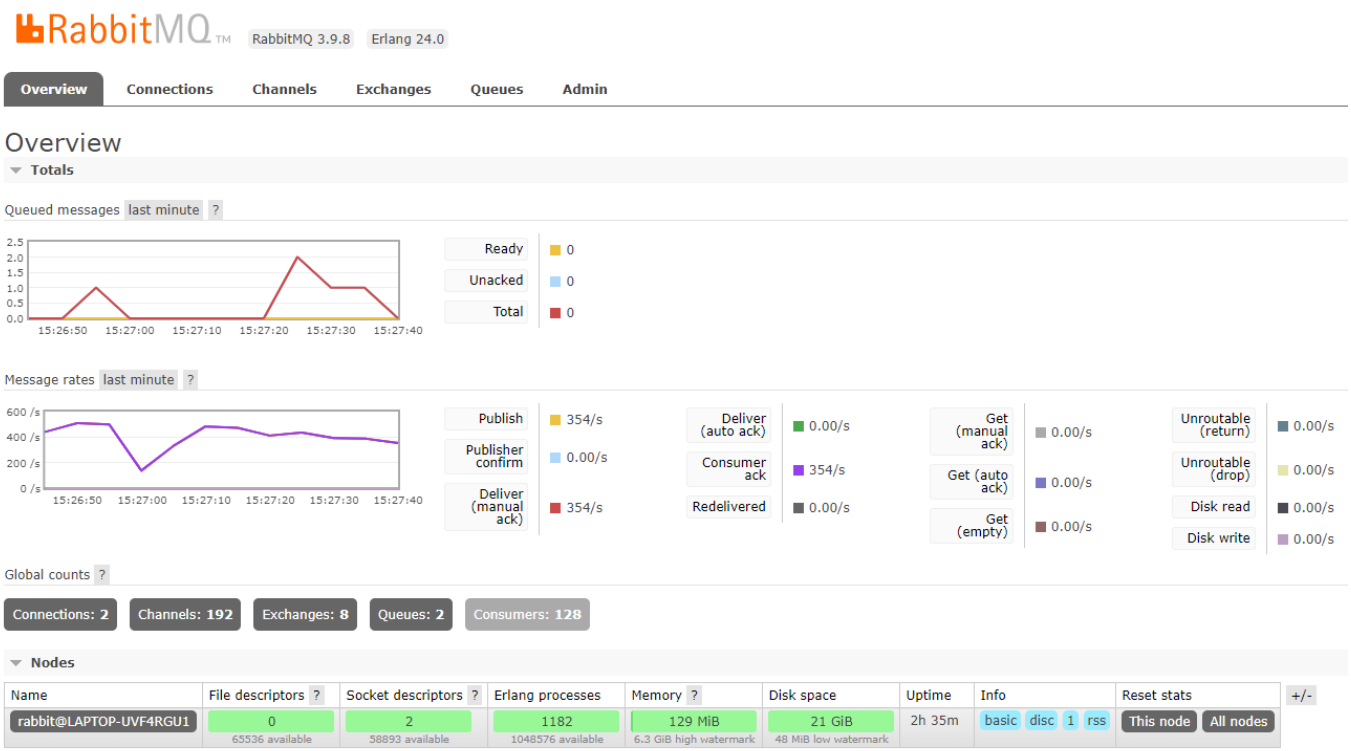
4. Bonus Points

4.1 512-threads in client test run

- number of Tomcat servers: 1
- number of channels in each Tomcat server: 64
- number of threads in the consumer: 256
- basicQos for each channel in consumer: 10


RabbitMQ
RabbitMQ 3.9.8
Erlang 24.0
Overview
Connections
Channels
Exchanges
Queues
Admin
Overview
Totals
Queued messages last minute ?
1.0
0.0
15:24:50 15:25:00 15:25:10 15:25:20 15:25:30 15:25:40
Ready 0
Unacked 0
Total 0
Message rates last minute ?
150 /s
100 /s
50 /s
0 /s
15:24:50 15:25:00 15:25:10 15:25:20 15:25:30 15:25:40
Publish 0.00/s
Publisher confirm 0.00/s
Deliver (manual ack) 0.00/s
Deliver (auto ack) 0.00/s
Consumer ack 0.00/s
Redelivered 0.00/s
Get (manual ack) 0.00/s
Get (auto ack) 0.00/s
Get (empty) 0.00/s
Unroutable (return) 0.00/s
Unroutable (drop) 0.00/s
Disk read 0.00/s
Disk write 0.00/s
Global counts ?
Connections: 2
Channels: 192
Exchanges: 8
Queues: 2
Consumers: 128
Nodes
Name
File descriptors ?
Socket descriptors ?
Erlang processes
Memory ?
Disk space
Uptime
Info
Reset stats
+/-
rabbit@LAPTOP-UVF4RGU1
0
65536 available
2
58893 available
1182
1048576 available
120 MiB
6.3 GiB high watermark
21 GiB
48 MiB low watermark
2h 33m
basic disc 1 rss
This node
All nodes


RabbitMQ
RabbitMQ 3.9.8
Erlang 24.0
Overview
Connections
Channels
Exchanges
Queues
Admin
Overview
Totals
Queued messages last minute ?
1.5
1.0
0.5
0.0
15:25:40 15:25:50 15:26:00 15:26:10 15:26:20 15:26:30
Ready 0
Unacked 1
Total 1
Message rates last minute ?
1.5 k/s
1.0 k/s
0.5 k/s
0.0 k/s
15:25:40 15:25:50 15:26:00 15:26:10 15:26:20 15:26:30
Publish 790/s
Publisher confirm 0.00/s
Deliver (manual ack) 791/s
Deliver (auto ack) 0.00/s
Consumer ack 791/s
Redelivered 0.00/s
Get (manual ack) 0.00/s
Get (auto ack) 0.00/s
Get (empty) 0.00/s
Unroutable (return) 0.00/s
Unroutable (drop) 0.00/s
Disk read 0.00/s
Disk write 0.00/s
Global counts ?
Connections: 2
Channels: 192
Exchanges: 8
Queues: 2
Consumers: 128
Nodes
Name
File descriptors ?
Socket descriptors ?
Erlang processes
Memory ?
Disk space
Uptime
Info
Reset stats
+/-
rabbit@LAPTOP-UVF4RGU1
0
65536 available
2
58893 available
1182
1048576 available
128 MiB
6.3 GiB high watermark
21 GiB
48 MiB low watermark
2h 34m
basic disc 1 rss
This node
All nodes




```
response:Success: /8/seasons/2021/days/100/skiers/22351570 LiftRide@5db4f2ee
response:Success: /2/seasons/2021/days/100/skiers/22353268 LiftRide@4e440fa8
response:Success: /3/seasons/2021/days/100/skiers/22353920 LiftRide@7f7c7a98
response:Success: /9/seasons/2021/days/100/skiers/22356378 LiftRide@644e1f34
response:Success: /8/seasons/2021/days/100/skiers/22358285 LiftRide@2938e73a
response:Success: /8/seasons/2021/days/100/skiers/22358550 LiftRide@278d8b05
response:Success: /3/seasons/2021/days/100/skiers/22361320 LiftRide@18f6b154
response:Success: /6/seasons/2021/days/100/skiers/22361625 LiftRide@33c458b9
response:Success: /1/seasons/2021/days/100/skiers/22364070 LiftRide@3da51be1
response:Success: /3/seasons/2021/days/100/skiers/22365320 LiftRide@4946adc2
response:Success: /8/seasons/2021/days/100/skiers/22367080 LiftRide@4a8c92da
Number requests: 99576
Number of success: 99576
Number of failure: 0
Throughput in requests per second: Mean response time (milliseconds): 3
Wall time (second): 301
```