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Grimoire

Soal 8

Round Robin

IP Hash

Least Connection

Top-left terminal (htop)

```
1 [||                    1.4%]   Tasks: 12, 0 thr; 1 running
2 [||                    2.0%]   Load average: 0.18 0.20 0.21
3 [|                     3.4%]   Uptime: 38 days, 03:19:21
4 [|                     2.0%]
Mem[||||||||||1.08G/7.57G]
Swp[||||||      549M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+
 7602 root       20   0  4932  3380  2752 R  0.0  0.0  0:00.74
 7213 root       20   0  188M  6528  3144 S  0.0  0.1  0:00.06
    1 root       20   0  4000  3140  2644 S  0.0  0.0  0:00.03
   60 root       20   0  2456     4     0 S  0.0  0.0  0:00.00
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice - F8Nice +
```

Top-right terminal (htop)

```
1 [                     0.0%]   Tasks: 12, 0 thr; 1 running
2 [|                    0.7%]   Load average: 0.18 0.20 0.21
3 [||                   1.4%]   Uptime: 38 days, 03:19:23
4 [|                    0.7%]
Mem[||||||||||1.08G/7.57G]
Swp[||||||      549M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+
 7294 root       20   0  4932  3264  2640 R  0.0  0.0  0:01.00
 7286 root       20   0  188M  6288  2912 S  0.0  0.1  0:00.12
 7254 www-data   20   0 62192  5424  3552 S  0.0  0.1  0:00.01
    1 root       20   0  3868  3192  2704 S  0.0  0.0  0:00.02
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice - F8Nice +
```

Middle-left terminal (Apache Benchmark)

```
HTML transferred:       123219 bytes
Requests per second:    2156.68 [#/sec] (mean)
Time per request:       4.637 [ms] (mean)
Time per request:       0.464 [ms] (mean, across all concurrent requests)
Transfer rate:          1724.62 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    1   0.4      1       3
Processing:     2    3   2.8      3      20
Waiting:        2    3   2.8      3      20
Total:          2    4   2.9      4      22

Percentage of the requests served within a certain time (ms)
  50%      4
  66%      4
  75%      5
  80%      5
```

Middle-right terminal (htop)

```
1 [||                   1.4%]   Tasks: 12, 0 thr; 1 running
2 [|                    0.7%]   Load average: 0.18 0.20 0.21
3 [|                    4.7%]   Uptime: 38 days, 03:19:22
4 [|                    2.0%]
Mem[||||||||||1.08G/7.57G]
Swp[||||||      549M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+
 7383 root       20   0  4928  3320  2752 R  0.0  0.0  0:00.69
 7292 root       20   0  188M  6528  3148 S  0.0  0.1  0:00.12
    1 root       20   0  4000  3188  2684 S  0.0  0.0  0:00.02
   66 root       20   0  2456     4     0 S  0.0  0.0  0:00.00
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice - F8Nice +
```
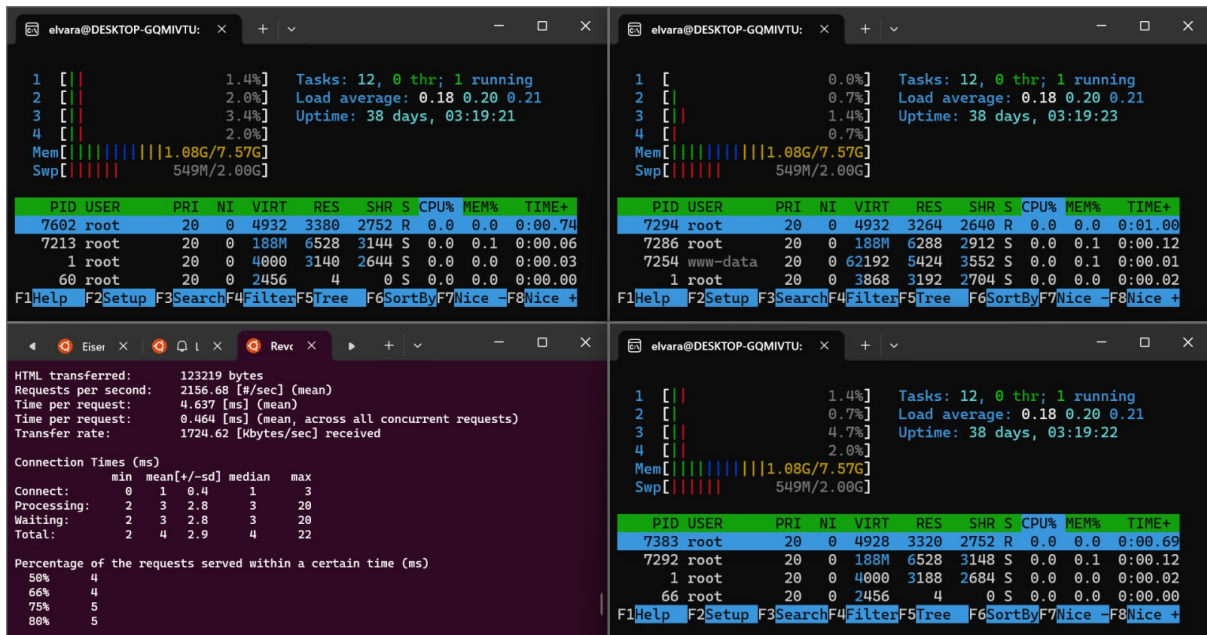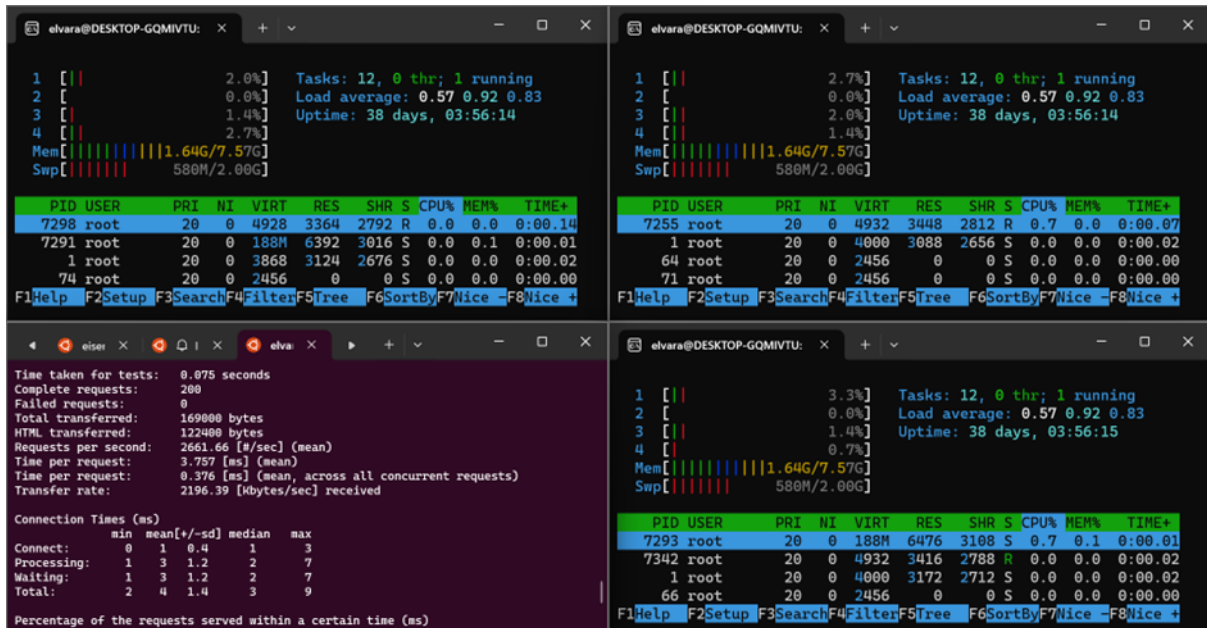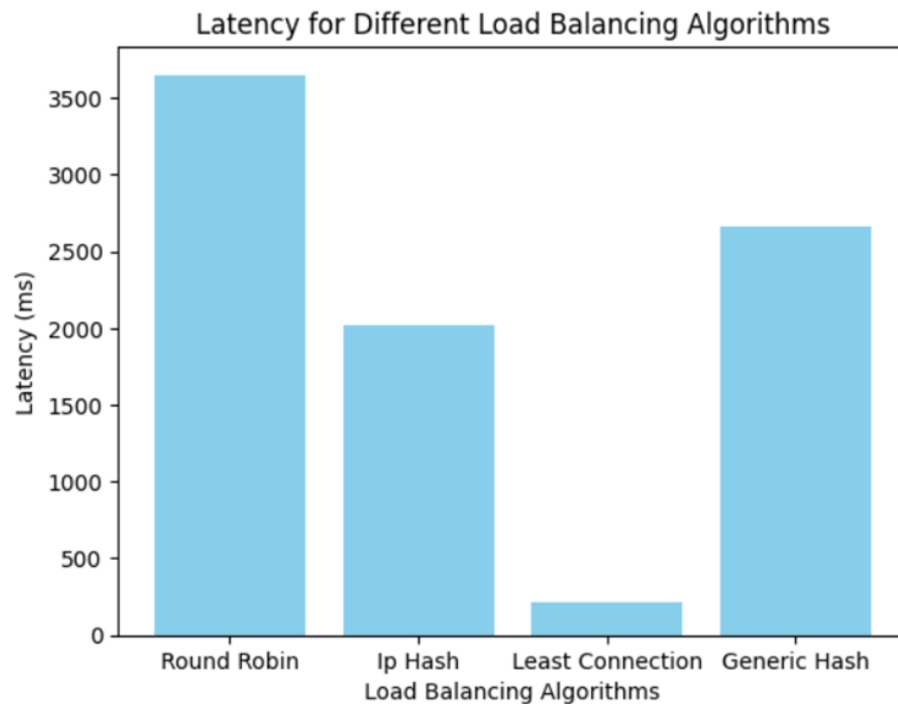
Generic Hash

Lower-left terminal (htop)

```
1 [||                   2.0%]   Tasks: 12, 0 thr; 1 running
2 [                     0.0%]   Load average: 0.57 0.92 0.83
3 [|                    1.4%]   Uptime: 38 days, 03:56:14
4 [|                    2.7%]
Mem[|||||||||||1.64G/7.57G]
Swp[||||||      580M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+
 7298 root       20   0  4928  3364  2792 R  0.0  0.0  0:00.14
 7291 root       20   0  188M  6392  3016 S  0.0  0.1  0:00.01
    1 root       20   0  3868  3124  2676 S  0.0  0.0  0:00.02
   74 root       20   0  2456     0     0 S  0.0  0.0  0:00.00
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice - F8Nice +
```

Lower-right terminal (htop)

```
1 [||                   2.7%]   Tasks: 12, 0 thr; 1 running
2 [                     0.0%]   Load average: 0.57 0.92 0.83
3 [||                   2.0%]   Uptime: 38 days, 03:56:14
4 [|                    1.4%]
Mem[|||||||||||1.64G/7.57G]
Swp[||||||      580M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+
 7255 root       20   0  4932  3448  2812 R  0.7  0.0  0:00.07
    1 root       20   0  4000  3088  2656 S  0.0  0.0  0:00.02
   64 root       20   0  2456     0     0 S  0.0  0.0  0:00.00
   71 root       20   0  2456     0     0 S  0.0  0.0  0:00.00
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice - F8Nice +
```

Bottom-left terminal (Apache Benchmark)

```
Time taken for tests:   0.075 seconds
Complete requests:      200
Failed requests:        0
Total transferred:      169000 bytes
HTML transferred:       122400 bytes
Requests per second:    2661.66 [#/sec] (mean)
Time per request:       3.757 [ms] (mean)
Time per request:       0.376 [ms] (mean, across all concurrent requests)
Transfer rate:          2196.39 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    1   0.4      1       3
Processing:     1    3   1.2      2       7
Waiting:        1    3   1.2      2       7
Total:          2    4   1.4      3       9

Percentage of the requests served within a certain time (ms)
```

Bottom-right terminal (htop)

```
1 [||                   3.3%]   Tasks: 12, 0 thr; 1 running
2 [                     0.0%]   Load average: 0.57 0.92 0.83
3 [||                   1.4%]   Uptime: 38 days, 03:56:15
4 [                     0.7%]
Mem[|||||||||||1.64G/7.57G]
Swp[||||||      580M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+
 7293 root       20   0  188M  6476  3108 S  0.7  0.1  0:00.01
 7342 root       20   0  4932  3416  2788 R  0.0  0.0  0:00.02
    1 root       20   0  4000  3172  2712 S  0.0  0.0  0:00.02
   66 root       20   0  2456     0     0 S  0.0  0.0  0:00.00
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice - F8Nice +
```

Hasil request per second

Latency for Different Load Balancing Algorithms
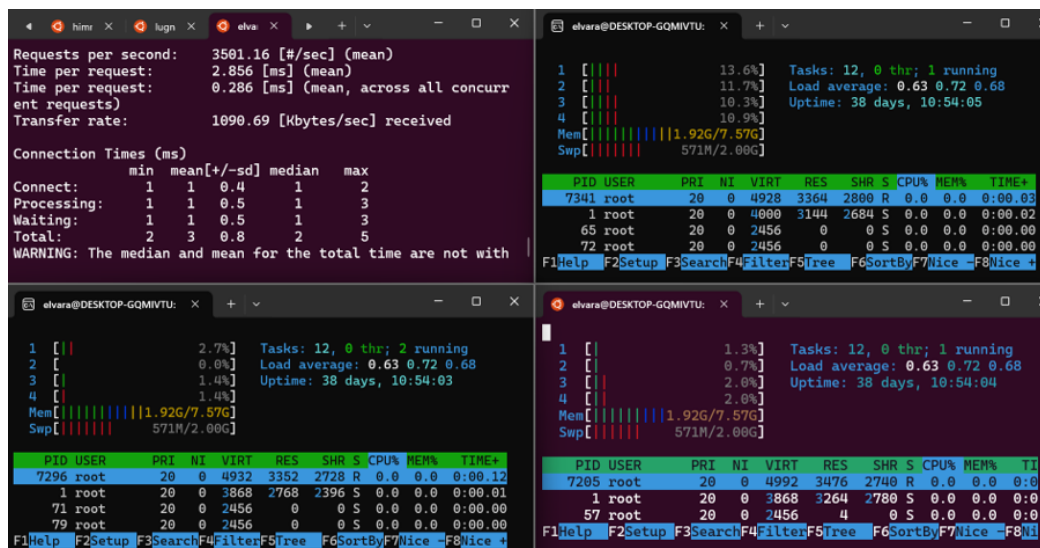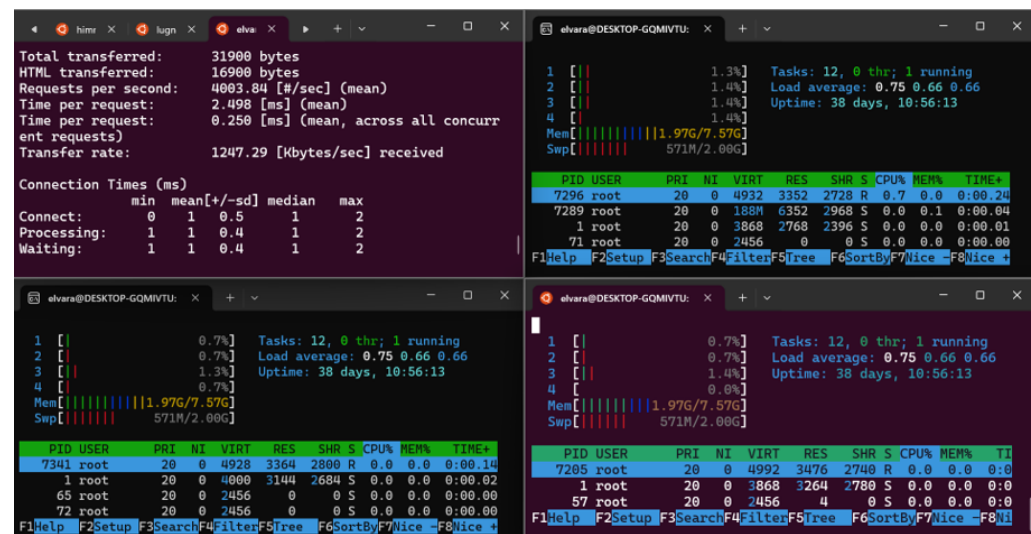
Dari hasil dihitung request per second 4 algoritma tersebut maka Round Robin mendapatkan nilai tertinggi dan Least Connection terendah
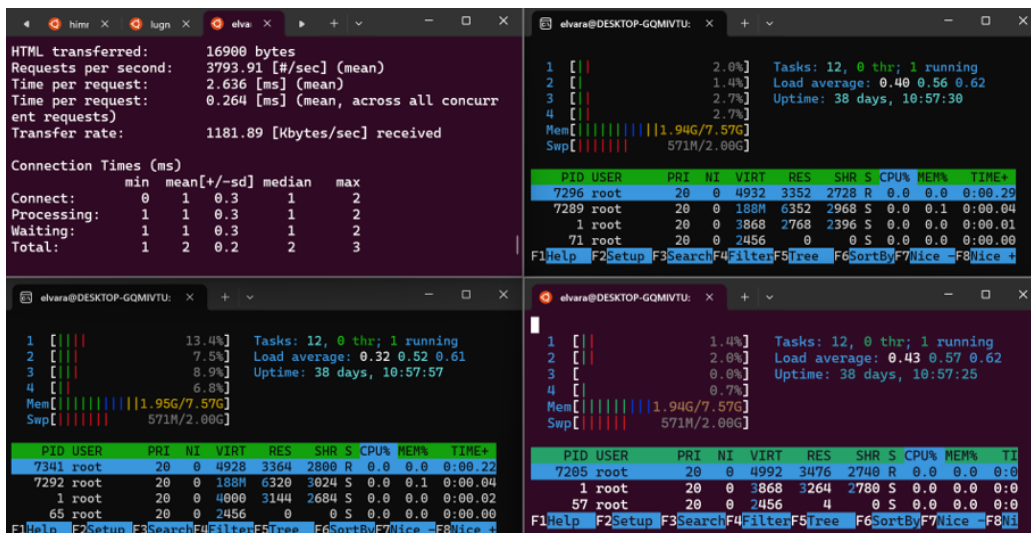
Soal 9

3 worker

2 worker

1 worker

Histogram of Worker Data

Dari hasil dihitung request per second penggunaan worker tersebut maka penggunaan 2 worker mendapatkan nilai tertinggi dan 1 worker terendah

Soal 15

Response

```
root@Revolte:/# cat register.json
{
   "username": "kelompokIT21",
   "password": "passwordIT21"
}
```

Testing

```
Server Software:        nginx/1.14.2
Server Hostname:        10.74.4.6
Server Port:            8001

Document Path:          /api/auth/register
Document Length:        467 bytes

Concurrency Level:      10
Time taken for tests:   209.199 seconds
Complete requests:      100
Failed requests:        99
   (Connect: 0, Receive: 0, Length: 99, Exceptions: 0)
Non-2xx responses:      99
Total transferred:      34910 bytes
Total body sent:        21600
HTML transferred:       5714 bytes
Requests per second:    0.48 [#/sec] (mean)
Time per request:       20919.933 [ms] (mean)
Time per request:       2091.993 [ms] (mean, across all concurrent requests)
Transfer rate:          0.16 [Kbytes/sec] received
                        0.10 kb/s sent
                        0.26 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        1    8  13.8      4      96
Processing: 10115 18962 2846.3  20342   22603
Waiting:    10114 18961 2846.6  20342   22602
Total:      10118 18969 2848.1  20356   22617

Percentage of the requests served within a certain time (ms)
  50%   20356
  66%   20421
  75%   20456
  80%   20510
  90%   20641
  95%   20753
  98%   21641
  99%   22617
 100%   22617 (longest request)
```

htop

Soal 16

Response

Testing

```
Server Software:        nginx/1.14.2
Server Hostname:        10.74.4.6
Server Port:            8001

Document Path:          /api/auth/login
Document Length:        335 bytes

Concurrency Level:      10
Time taken for tests:   5.705 seconds
Complete requests:      100
Failed requests:        39
   (Connect: 0, Receive: 0, Length: 39, Exceptions: 0)
Non-2xx responses:      39
Total transferred:      309320 bytes
Total body sent:        21200
HTML transferred:       278576 bytes
Requests per second:    17.53 [#/sec] (mean)
Time per request:       570.546 [ms] (mean)
Time per request:       57.055 [ms] (mean, across all concurrent requests)
Transfer rate:          52.94 [Kbytes/sec] received
                        3.63 kb/s sent
                        56.57 kb/s total

Connection Times (ms)
            min  mean[+/-sd] median   max
Connect:      0    0   0.4      0       2
Processing:  84  552 345.2    798    1109
Waiting:     80  548 349.4    797    1109
Total:       85  552 345.2    798    1110

Percentage of the requests served within a certain time (ms)
  50%    798
  66%    814
  75%    820
  80%    833
  90%    904
  95%    993
  98%   1082
  99%   1110
 100%   1110 (longest request)
```

htop

Soal 17

Response

```
root@Revolte:/# cat login_output.txt
{"token":"eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJpc3MiOiJodHRwOi8vMTAuNzQuNC42OjgwMDEvYXBpL2F1dGgvbG9naW4iLCJpYXQiOjE3MDAxNDEzNTAsImV4cCI6MTcwM
DE0NDk1MCwibmJmIjoxNzAwMTQxMzUwLCJqdGkiOiJ5clhlc01TWXhVT0NQeHo4Iiwic3ViIjoiMSIsInByaiI6IjIzYmQ1Yzg5NDlmNjYwYWRiMzllNzAxYzQroot@Revolte:/# ab -n
root@Revolte:/# ab -n 100 -c 10 -H "Authorization: Bearer $token" http://10.74.4.6:8001/api/me
```

Testing

```
Server Software:        nginx/1.14.2
Server Hostname:        10.74.4.6
Server Port:            8001

Document Path:          /api/me
Document Length:        6619 bytes

Concurrency Level:      10
Time taken for tests:   1.441 seconds
Complete requests:      100
Failed requests:        0
Non-2xx responses:      100
Total transferred:      696500 bytes
HTML transferred:       661900 bytes
Requests per second:    69.39 [#/sec] (mean)
Time per request:       144.104 [ms] (mean)
Time per request:       14.410 [ms] (mean, across all concurrent requests)
Transfer rate:          472.00 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    1   0.6      0       3
Processing:    47  136  25.3    138     227
Waiting:       29  130  26.1    131     225
Total:         49  137  25.0    138     227
WARNING: The median and mean for the initial connection time are not within a normal deviation
        These results are probably not that reliable.

Percentage of the requests served within a certain time (ms)
  50%    138
  66%    145
  75%    150
  80%    151
  90%    158
  95%    166
  98%    225
  99%    227
 100%    227 (longest request)
```

htop

Soal 19
Script Awal

```
root@Revolte:/# ab -n 100 -c 10 -p login.json -T application/json http://www.riegel.canyon.it21.com/api/auth/login
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking www.riegel.canyon.it21.com (be patient).....done


Server Software:        nginx/1.14.2
Server Hostname:        www.riegel.canyon.it21.com
Server Port:            80

Document Path:          /api/auth/login
Document Length:        324 bytes

Concurrency Level:      10
Time taken for tests:   6.998 seconds
Complete requests:      100
Failed requests:        66
   (Connect: 0, Receive: 0, Length: 66, Exceptions: 0)
Non-2xx responses:      66
Total transferred:      42088 bytes
Total body sent:        22500
HTML transferred:       22434 bytes
Requests per second:    14.29 [#/sec] (mean)
Time per request:       699.789 [ms] (mean)
Time per request:       69.979 [ms] (mean, across all concurrent requests)
Transfer rate:          5.87 [Kbytes/sec] received
                        3.14 kb/s sent
                        9.01 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        1    4   4.6      1      21
Processing:     3  568 818.4     20    2109
Waiting:        2  568 818.5     19    2108
Total:          7  572 817.9     25    2110

Percentage of the requests served within a certain time (ms)
  50%     25
  66%    474
  75%   1478
  80%   1751
  90%   1975
  95%   2056
  98%   2108
  99%   2110
 100%   2110 (longest request)
```

Script Percobaaan 1

```
root@Revolte:/# ab -n 100 -c 10 -p login.json -T application/json http://www.riegel.canyon.it21.com/api/auth/login
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking www.riegel.canyon.it21.com (be patient).....done


Server Software:        nginx/1.14.2
Server Hostname:        www.riegel.canyon.it21.com
Server Port:            80

Document Path:          /api/auth/login
Document Length:        173 bytes

Concurrency Level:      10
Time taken for tests:   8.090 seconds
Complete requests:      100
Failed requests:        33
   (Connect: 0, Receive: 0, Length: 33, Exceptions: 0)
Non-2xx responses:      67
Total transferred:      41806 bytes
Total body sent:        22500
HTML transferred:       22283 bytes
Requests per second:    12.36 [#/sec] (mean)
Time per request:       809.004 [ms] (mean)
Time per request:       80.900 [ms] (mean, across all concurrent requests)
Transfer rate:          5.05 [Kbytes/sec] received
                        2.72 kb/s sent
                        7.76 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        1    4   4.9      2      25
Processing:     5  769 1232.8    25    4929
Waiting:        3  768 1232.8    25    4928
Total:          6  773 1233.3    33    4933

Percentage of the requests served within a certain time (ms)
  50%     33
  66%     64
  75%   1699
  80%   1760
  90%   3534
  95%   3650
  98%   3720
  99%   4933
 100%   4933 (longest request)
```

Script Percobaaan 2

```
root@Revolte:/# ab -n 100 -c 10 -p login.json -T application/json http://www.riegel.canyon.it21.com/api/auth/login
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking www.riegel.canyon.it21.com (be patient).....done


Server Software:        nginx/1.14.2
Server Hostname:        www.riegel.canyon.it21.com
Server Port:            80

Document Path:          /api/auth/login
Document Length:        324 bytes

Concurrency Level:      10
Time taken for tests:   7.504 seconds
Complete requests:      100
Failed requests:        66
   (Connect: 0, Receive: 0, Length: 66, Exceptions: 0)
Non-2xx responses:      66
Total transferred:      42088 bytes
Total body sent:        22500
HTML transferred:       22434 bytes
Requests per second:    13.33 [#/sec] (mean)
Time per request:       750.441 [ms] (mean)
Time per request:       75.044 [ms] (mean, across all concurrent requests)
Transfer rate:          5.48 [Kbytes/sec] received
                        2.93 kb/s sent
                        8.40 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        1    5   5.0      4      21
Processing:     4  605 854.5     30    2174
Waiting:        3  604 854.5     29    2174
Total:          6  610 854.8     40    2175

Percentage of the requests served within a certain time (ms)
  50%     40
  66%    599
  75%   1677
  80%   1744
  90%   2052
  95%   2112
  98%   2153
  99%   2175
 100%   2175 (longest request)
```

Script Percobaaan 3

```
root@Revolte:/# ab -n 100 -c 10 -p login.json -T application/json http://www.riegel.canyon.it21.com/api/auth/login
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking www.riegel.canyon.it21.com (be patient).....done


Server Software:        nginx/1.14.2
Server Hostname:        www.riegel.canyon.it21.com
Server Port:            80

Document Path:          /api/auth/login
Document Length:        173 bytes

Concurrency Level:      10
Time taken for tests:   8.722 seconds
Complete requests:      100
Failed requests:        33
   (Connect: 0, Receive: 0, Length: 33, Exceptions: 0)
Non-2xx responses:      67
Total transferred:      41806 bytes
Total body sent:        22500
HTML transferred:       22283 bytes
Requests per second:    11.47 [#/sec] (mean)
Time per request:       872.202 [ms] (mean)
Time per request:       87.220 [ms] (mean, across all concurrent requests)
Transfer rate:          4.68 [Kbytes/sec] received
                        2.52 kb/s sent
                        7.20 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        1    7   6.3      6      28
Processing:     4  831 1370.4     34    4441
Waiting:        4  830 1370.1     34    4441
Total:          5  838 1371.0     46    4443

Percentage of the requests served within a certain time (ms)
  50%     46
  66%    101
  75%   1714
  80%   1755
  90%   4160
  95%   4393
  98%   4428
  99%   4443
 100%   4443 (longest request)
```

Kesimpulan

Dari ketiga percobaan di atas, perubahan signifikan terletak pada time taken for tests dimana di setiap percobaan memiliki penurunan time taken for tests yang artinya waktu yang dibutuhkan semakin sedikit di tiap percobaan. Namun, untuk total request yang berhasil diproses cenderung tidak terlalu berubah sehingga ketiga percobaan ini belum bisa menaikkan performa handling request-nya. Dengan demikian, dilakukan percobaan di soal 20 dengan menggunakan Least-Connection pada Load Balancer atau Eisen.