

### Soal 8

Karena diminta untuk menuliskan grimoire, buatlah analisis hasil testing dengan 200 request dan 10 request/second masing-masing algoritma Load Balancer dengan ketentuan sebagai berikut:

- Nama Algoritma Load Balancer
- Report hasil testing pada Apache Benchmark
- Grafik request per second untuk masing masing algoritma.
- Analisis (8)

Jawaban :

I. Hasil Testing

a. Weighted Round Robin

```
zien@LAPTOP-GM254HKI: /m × + v
root@Stark:/# ab -n 200 -c 10 http://granz.channel.a11.com/
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 granz.channel.a11.com (be patient)
Completed 100 requests
Completed 200 requests
Finished 200 requests

Server Software:      nginx/1.14.2
Server Hostname:      granz.channel.a11.com
Server Port:          80

Document Path:        /
Document Length:      625 bytes

Concurrency Level:    10
Time taken for tests:  0.109 seconds
Complete requests:    200
Failed requests:       0
Total transferred:    152400 bytes
HTML transferred:     125000 bytes
Requests per second:  1827.94 [#/sec] (mean)
Time per request:      5.471 [ms] (mean)
Time per request:      0.547 [ms] (mean, across all concurrent requests)
Transfer rate:         1360.24 [Kbytes/sec] received

Connection Times (ms)
      min   mean[+/-sd] median   max
Connect:    0     2   1.1      2     7
Processing:  1     3   1.2      3     7
Waiting:    1     3   1.2      3     7
Total:      1     5   1.4      5     9

Percentage of the requests served within a certain time (ms)
 50%    5
 66%    6
 75%    6
 80%    6
 90%    7
 95%    9
 98%    9
 99%    9
100%    9 (longest request)
```

The image displays four terminal windows from a Linux system, showing system status and connection analysis.

**Top Left Terminal:** Shows system status with CPU at 7.8%, Memory at 613M/1.92G, and Swap at 7.81M/2.08G. The load average is 0.06, 0.22, 0.29. The uptime is 22:11:39. A table of running processes is shown, including htop, php-fpm, bash, and nginx.

**Top Right Terminal:** Shows system status with CPU at 6.2%, Memory at 613M/1.92G, and Swap at 7.81M/2.08G. The load average is 0.06, 0.22, 0.29. The uptime is 22:11:40. A table of running processes is shown, including htop, php-fpm, bash, and nginx.

**Bottom Left Terminal:** Shows connection times in milliseconds. The table below summarizes the data:

Connection Times (ms)	min	mean[+/-sd]	median	max
Connect:	0	3 1.5	2	7
Processing:	2	3 0.9	3	8
Waiting:	1	3 0.9	3	7
Total:	4	6 1.5	6	11

Below the table, it shows the percentage of requests served within a certain time (ms):

Percentage of the requests served within a certain time (ms)	ms
50%	6
66%	6
75%	7
80%	7
90%	8
95%	10
98%	10
99%	10
100%	11 (longest request)

**Bottom Right Terminal:** Shows system status with CPU at 7.7%, Memory at 613M/1.92G, and Swap at 7.81M/2.08G. The load average is 0.06, 0.22, 0.29. The uptime is 22:11:40. A table of running processes is shown, including htop, php-fpm, bash, and nginx.

## b. Least Connection

The terminal shows the output of the ApacheBench (ab) command, benchmarking granz.channel.a11.com. The results are as follows:

Benchmarking granz.channel.a11.com (be patient)  
 Completed 100 requests  
 Completed 200 requests  
 Finished 200 requests

Server Software: nginx/1.14.2  
 Server Hostname: granz.channel.a11.com  
 Server Port: 80

Document Path: /  
 Document Length: 625 bytes

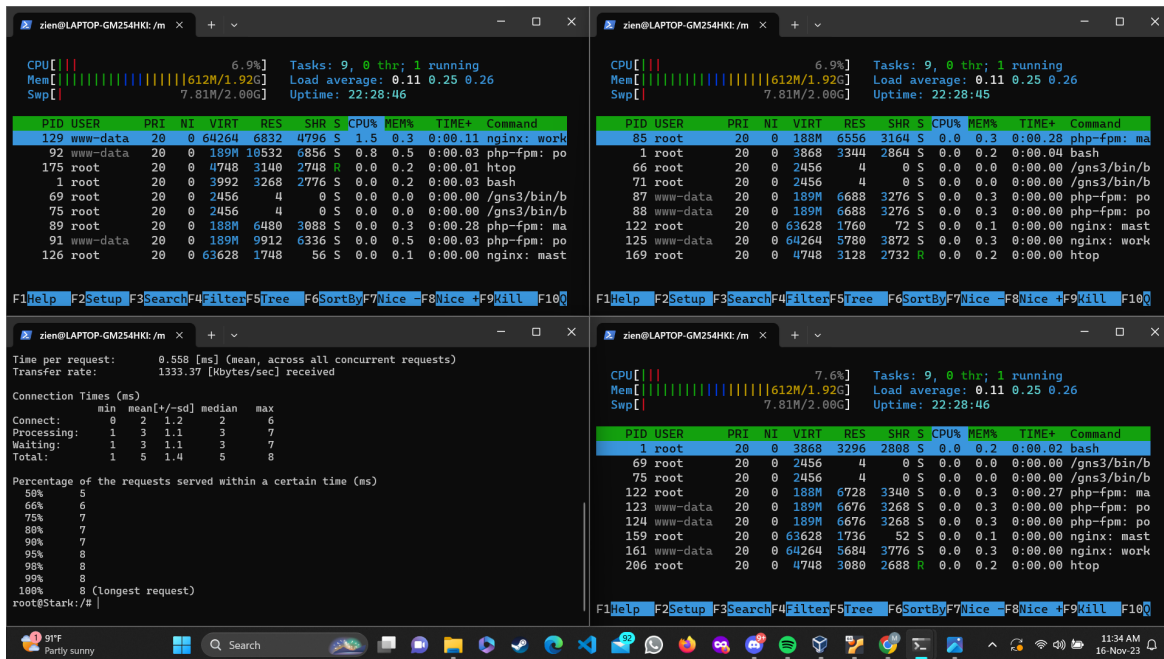
Concurrency Level: 10  
 Time taken for tests: 0.112 seconds  
 Complete requests: 200  
 Failed requests: 0  
 Total transferred: 152400 bytes  
 HTML transferred: 125000 bytes  
 Requests per second: 1791.83 [#/sec] (mean)  
 Time per request: 5.581 [ms] (mean)  
 Time per request: 0.558 [ms] (mean, across all concurrent requests)  
 Transfer rate: 1333.37 [Kbytes/sec] received

Connection Times (ms)

	min	mean[+/-sd]	median	max
Connect:	0	2 1.2	2	6
Processing:	1	3 1.1	3	7
Waiting:	1	3 1.1	3	7
Total:	1	5 1.4	5	8

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

Percentage of the requests served within a certain time (ms)	ms
50%	5
66%	6
75%	7
80%	7
90%	7
95%	8
98%	8
99%	8
100%	8 (longest request)



### c. IP Hash

```
zien@LAPTOP-GM254HKI:/m × + v
root@Stark:/# ab -n 200 -c 10 http://granz.channel.a11.com/
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 granz.channel.a11.com (be patient)
Completed 100 requests
Completed 200 requests
Finished 200 requests

Server Software:      nginx/1.14.2
Server Hostname:      granz.channel.a11.com
Server Port:          80

Document Path:        /
Document Length:       625 bytes

Concurrency Level:     10
Time taken for tests:   0.117 seconds
Complete requests:      200
Failed requests:         0
Total transferred:      152400 bytes
HTML transferred:       125000 bytes
Requests per second:    1703.62 [#/sec] (mean)
Time per request:       5.870 [ms] (mean)
Time per request:       0.587 [ms] (mean, across all concurrent requests)
Transfer rate:          1267.73 [Kbytes/sec] received

Connection Times (ms)
  min  mean[+/-sd] median  max
Connect:    1    2  0.9      2    5
Processing:  1    3  0.9      3    6
Waiting:    1    3  0.9      3    6
Total:      4    6  1.2      5    9

Percentage of the requests served within a certain time (ms)
 50%    5
 66%    6
 75%    6
 80%    7
 90%    7
 95%    8
 98%    9
 99%    9
100%    9 (longest request)
root@Stark:/# |
```

The image displays four terminal windows from a Linux system, likely a laptop named 'LAPTOP-GM254HK1'. The windows show various system metrics and process lists.

**Top Left Window:** Shows system status (CPU: 7.6%, Mem: 612M/1.92G, Swap: 7.81M/2.00G) and a process list. The process list includes users like 'www-data', 'root', and 'nginx' with their respective PIDs, PRI, NI, VIRT, RES, SHR, S, CPU%, MEM%, TIME+, and Command.

**Top Right Window:** Shows system status (CPU: 1.5%, Mem: 612M/1.92G, Swap: 7.81M/2.00G) and a process list. The process list includes users like 'root', 'www-data', and 'nginx' with their respective PIDs, PRI, NI, VIRT, RES, SHR, S, CPU%, MEM%, TIME+, and Command.

**Bottom Left Window:** Shows performance metrics for a request, including 'Time per request: 0.587 [ms]' and 'Transfer rate: 1267.73 [Kbytes/sec]'. It also displays 'Connection Times (ms)' and 'Percentage of the requests served within a certain time (ms)'.

**Bottom Right Window:** Shows system status (CPU: 6.9%, Mem: 612M/1.92G, Swap: 7.81M/2.00G) and a process list. The process list includes users like 'root', 'www-data', and 'nginx' with their respective PIDs, PRI, NI, VIRT, RES, SHR, S, CPU%, MEM%, TIME+, and Command.

#### d. Generic Hash

The image shows a terminal window with the output of the 'ab' (ApacheBench) command. The output includes the command used, the server being benchmarked, and various performance metrics.

```

root@Stark:/# ab -n 200 -c 10 http://granz.channel.a11.com/
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 granz.channel.a11.com (be patient)
Completed 100 requests
Completed 200 requests
Finished 200 requests

Server Software:      nginx/1.14.2
Server Hostname:      granz.channel.a11.com
Server Port:          80

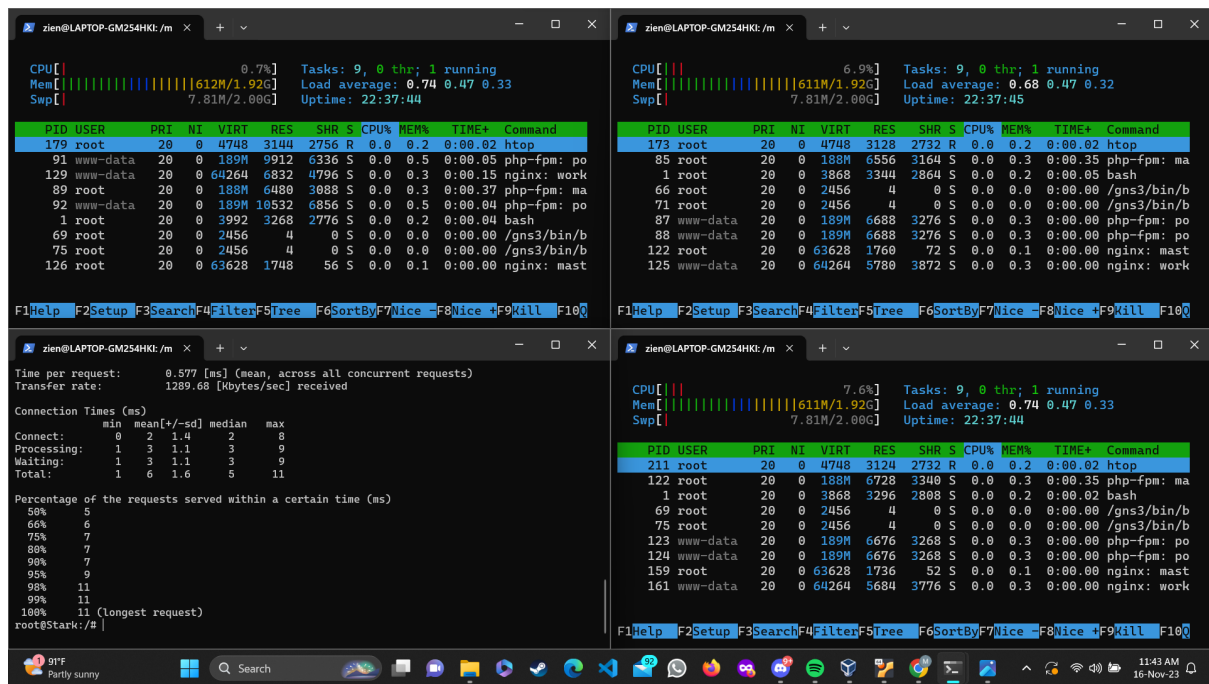
Document Path:        /
Document Length:      625 bytes

Concurrency Level:    10
Time taken for tests:  0.115 seconds
Complete requests:    200
Failed requests:       0
Total transferred:    152400 bytes
HTML transferred:     125000 bytes
Requests per second:  1733.12 [#/sec] (mean)
Time per request:     5.770 [ms] (mean)
Time per request:     0.577 [ms] (mean, across all concurrent requests)
Transfer rate:        1289.68 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0        2   1.4      2      8
Processing:      1        3   1.1      3      9
Waiting:        1        3   1.1      3      9
Total:          1        6   1.6      5     11

Percentage of the requests served within a certain time (ms)
 50%    5
 66%    6
 75%    7
 80%    7
 90%    7
 95%    9
 98%   11
 99%   11
100%   11 (longest request)

```

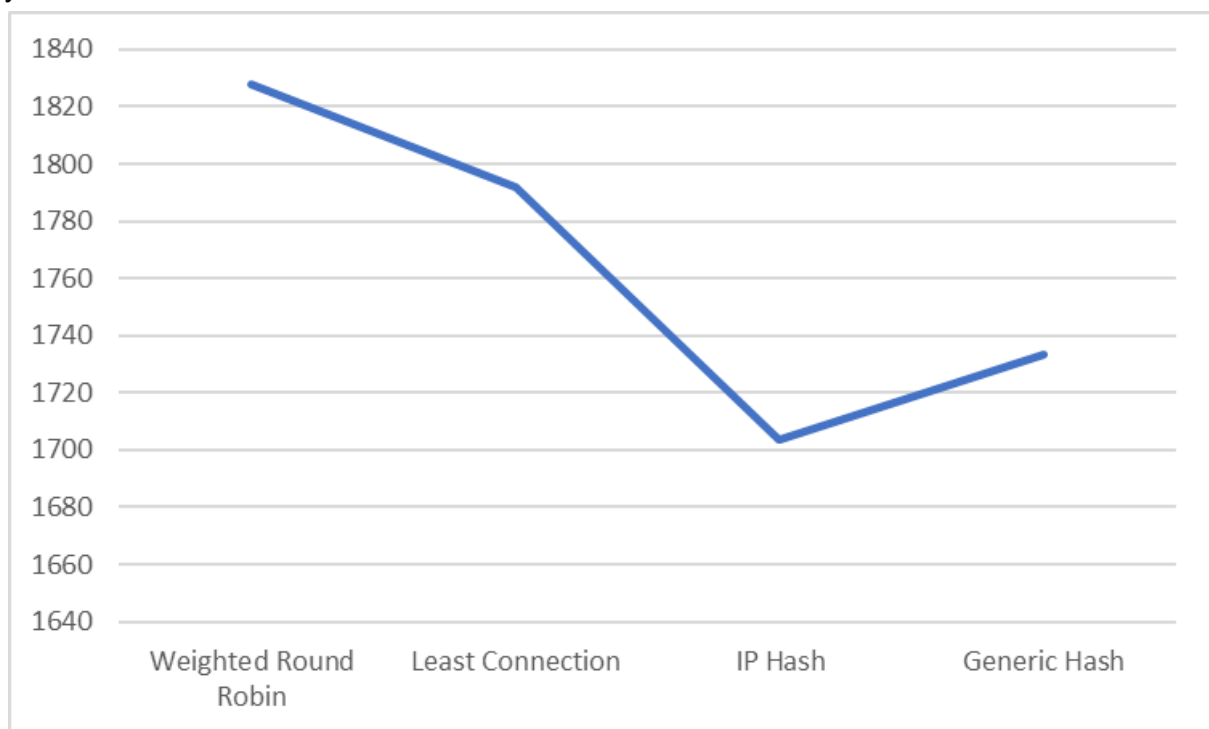


## II. Grafik

Request per second untuk tiap Algo

x= nama algo

y= waktu



## III. Analisis

Dari data dan grafik yang telah disajikan, terlihat bahwa algoritma Weighted Round Robin unggul dengan nilai request per second tertinggi dibandingkan dengan algoritma load balancing lainnya. Hal ini menandakan keefektifan algoritma tersebut dalam menanggapi permintaan atau beban kerja yang diberikan. Untuk memaksimalkan kinerja algoritma ini,

dapat dilakukan dengan menerima permintaan secara bergantian dan mengalokasikannya ke server dengan bobot (weight) yang lebih tinggi.

Pada posisi kedua, terdapat algoritma Least Connection dengan perbedaan nilai yang cukup kecil. Meskipun tidak seoptimal Weighted Round Robin, algoritma ini tetap memberikan respons yang baik dalam distribusi beban kerja. Sementara itu, algoritma generic hash menunjukkan nilai request per second terendah, mengindikasikan bahwa algoritma tersebut mungkin tidak optimal dalam mendistribusikan beban dalam konteks pengujian tertentu.

Perlu diingat bahwa perbedaan nilai ini dapat dipengaruhi oleh berbagai faktor seperti konfigurasi server, jaringan, load balancer, dan faktor-faktor lainnya yang perlu diperhatikan.

### **Soal 9**

Dengan menggunakan algoritma Round Robin, lakukan testing dengan menggunakan 3 worker, 2 worker, dan 1 worker sebanyak 100 request dengan 10 request/second, kemudian tambahkan grafiknya pada grimoire.

Jawaban :

a. 3 Worker

```
zien@LAPTOP-GM254HKI: /m  × + ∨

root@Stark:/# ab -n 100 -c 10 http://granz.channel.a11.com/
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 granz.channel.a11.com (be patient).....done


Server Software:      nginx/1.14.2
Server Hostname:      granz.channel.a11.com
Server Port:          80

Document Path:        /
Document Length:      625 bytes

Concurrency Level:    10
Time taken for tests:  0.148 seconds
Complete requests:    100
Failed requests:       0
Total transferred:    76200 bytes
HTML transferred:     62500 bytes
Requests per second:  677.70 [#/sec] (mean)
Time per request:     14.756 [ms] (mean)
Time per request:     1.476 [ms] (mean, across all concurrent requests)
Transfer rate:        504.30 [Kbytes/sec] received


Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:      1   6   3.7      5    15
Processing:   1   8   3.2      8    15
Waiting:      1   8   2.8      7    15
Total:        2  14   4.6     15    23


Percentage of the requests served within a certain time (ms)
 50%    15
 66%    16
 75%    17
 80%    18
 90%    20
 95%    22
 98%    23
 99%    23
100%    23 (longest request)
```

b. 2 Worker

```
zien@LAPTOP-GM254HKI: /m × + v
root@Stark:/# ab -n 100 -c 10 http://granz.channel.a11.com/
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 granz.channel.a11.com (be patient).....done


Server Software:      nginx/1.14.2
Server Hostname:      granz.channel.a11.com
Server Port:          80

Document Path:        /
Document Length:       625 bytes

Concurrency Level:     10
Time taken for tests:   0.165 seconds
Complete requests:     100
Failed requests:        0
Total transferred:     76200 bytes
HTML transferred:      62500 bytes
Requests per second:   604.32 [#/sec] (mean)
Time per request:      16.548 [ms] (mean)
Time per request:      1.655 [ms] (mean, across all concurrent requests)
Transfer rate:         449.70 [Kbytes/sec] received


Connection Times (ms)
              min    mean[+/-sd] median    max
Connect:        1      6   4.1      5     14
Processing:      1     10   4.1      9     21
Waiting:         1      9   4.0      9     21
Total:           2     16   6.3     14     32


Percentage of the requests served within a certain time (ms)
 50%      14
 66%      19
 75%      19
 80%      20
 90%      26
 95%      30
 98%      32
 99%      32
100%      32 (longest request)
```



c. 1 Worker

```
root@Stark:/# ab -n 100 -c 10 http://granz.channel.a11.com/
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 granz.channel.a11.com (be patient).....done


Server Software:      nginx/1.14.2
Server Hostname:      granz.channel.a11.com
Server Port:          80

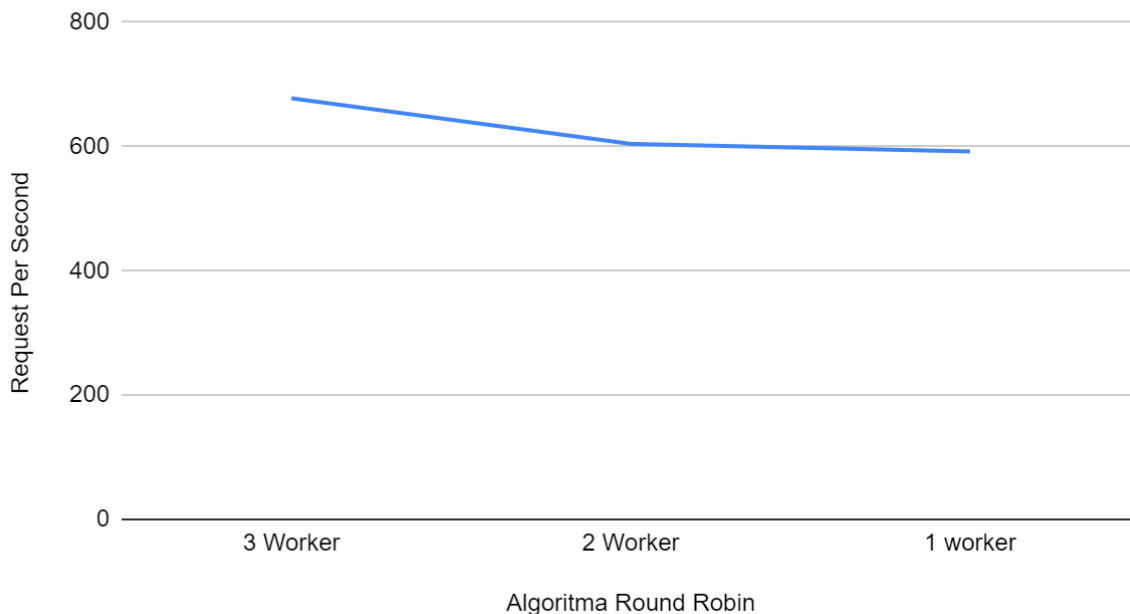
Document Path:        /
Document Length:      625 bytes

Concurrency Level:    10
Time taken for tests:  0.169 seconds
Complete requests:    100
Failed requests:      0
Total transferred:    76200 bytes
HTML transferred:    62500 bytes
Requests per second:  592.10 [#/sec] (mean)
Time per request:     16.889 [ms] (mean)
Time per request:     1.689 [ms] (mean, across all concurrent requests)
Transfer rate:        440.60 [Kbytes/sec] received


Connection Times (ms)
              min    mean[+/-sd] median    max
Connect:        0      7   3.7      7     26
Processing:      1      9   4.3      8     27
Waiting:         1      8   4.3      8     27
Total:           1     16   5.5     14     32


Percentage of the requests served within a certain time (ms)
 50%      14
 66%      17
 75%      18
 80%      21
 90%      23
 95%      27
 98%      32
 99%      32
100%      32 (longest request)
root@Stark:/# |
```

## II. Grafik



## Analisis

Dengan meningkatnya jumlah worker, waktu yang diperlukan untuk memproses permintaan akan semakin singkat. Ini terjadi karena dengan peningkatan jumlah worker, pembagian beban kerja pada setiap worker menjadi lebih ringan. Sebagai akibatnya, setiap worker dapat menangani jumlah permintaan yang lebih sedikit, mempercepat proses pemrosesan secara keseluruhan. Pendekatan ini memberikan efisiensi optimal dalam penanganan permintaan, menciptakan lingkungan yang responsif dan efisien.

## 15. POST /auth/register

```
root@Stark:~# curl -X POST riegel.canyon.all.com/api/auth/register -H 'Content-Type: application/json' -d '{"username": "username", "password": "password"}'
```

```
zien@LAPTOP-GM254HKI: /m × + ▾

root@Stark:~# ab -n 100 -c 10 reigel.canyon.a11.com/api/auth/register
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 reigel.canyon.a11.com (be patient).....done


Server Software:      BigIP
Server Hostname:      reigel.canyon.a11.com
Server Port:          80


Document Path:        /api/auth/register
Document Length:      0 bytes


Concurrency Level:    10
Time taken for tests:  3.792 seconds
Complete requests:    100
Failed requests:      0
Non-2xx responses:    100
Total transferred:    11200 bytes
HTML transferred:     0 bytes
Requests per second:  26.37 [#./sec] (mean)
Time per request:     379.154 [ms] (mean)
Time per request:     37.915 [ms] (mean, across all concurrent requests)
Transfer rate:        2.88 [Kbytes/sec] received


Connection Times (ms)
      min   mean[+/-sd] median   max
Connect:    47   153  79.9   147   408
Processing:  98   186  89.5   155   409
Waiting:    97   186  89.5   155   409
Total:     161   340  97.0   313   624


Percentage of the requests served within a certain time (ms)
 50%    313
 66%    357
 75%    409
 80%    411
 90%    512
 95%    517
 98%    524
 99%    624
100%    624 (longest request)
```

## 16. POST /auth/login

```
zien@LAPTOP-GM254HKI: /m × + ▾

root@Stark:~# curl -X POST reigel.canyon.a11.com/api/auth/login -H 'Content-Type: application/json' -d '{"username": "username", "password": "password"}'
{"token": "eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJpc3MiOiJodHRwOi8vcmlLL2ZsLmNhbnlvbi5hMTEuY29tL2FwaS9hdXRoL2xvZ2luIiwiaWF0IjoxNzAwMTQwMDMwLCJleHAiOiE3MDAxNjM2MzAsIm5iZiI6MTcwMDE0MDAzMCwianRpIjoizUQybFR0Z3ppNkhWenk1YiIsInN1YiI6IjEiLCJwcnYiOiIyM2JkNW40OTQ5ZjYwMGFkYjN5ZTcwMWM0MDA4NzJkYjdhNTk3NmY3In0._w76uL38W8BD7ZNB0GZ4kHiqu-kVych7c2c7vNqMps"}root@Stark:~#
```

```
zieren@LAPTOP-GM254HKI: /m  ×  +  v

root@Stark:~# ab -n 100 -c 10 reigel.canyon.a11.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 reigel.canyon.a11.com (be patient).....done


Server Software:      BigIP
Server Hostname:      reigel.canyon.a11.com
Server Port:          80

Document Path:        /api/auth/login
Document Length:      0 bytes

Concurrency Level:    10
Time taken for tests:  5.069 seconds
Complete requests:    100
Failed requests:       0
Non-2xx responses:    100
Total transferred:    11200 bytes
HTML transferred:     0 bytes
Requests per second:  19.73 [#/sec] (mean)
Time per request:     506.868 [ms] (mean)
Time per request:     50.687 [ms] (mean, across all concurrent requests)
Transfer rate:        2.16 [Kbytes/sec] received


Connection Times (ms)
      min  mean[+/-sd] median   max
Connect:    52   213 114.3    205   502
Processing:  95   256 119.2    244   508
Waiting:    95   256 119.2    244   507
Total:      203   469 201.1    453   968


Percentage of the requests served within a certain time (ms)
 50%    453
 66%    555
 75%    616
 80%    623
 90%    719
 95%    875
 98%    968
 99%    968
100%    968 (longest request)
```

17. GET /me

```
zhen@LAPTOP-GM254HKI:/m X + v
root@Stark:~# ab -n 100 -c 10 -H "Authorization: Bearer eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJpc3MiOiJodHRwOi8vbGFiYXZlbC9hcGkvYXV8aC9sb2dpbiIsImVhdC9MTcwMDEzNzc5NCwiZXhwIjoxNzAwMTQxMzk0LCJyYmYiOiJlE3M0aXNzc307QsImp0eSI6IjVKSzVld1VhTVM3dUJkVlg1LCJzdWIiOiJlIiwicHJ2Ijo1MjNiZDVjODk8OWY2MDhZGZiZOWU3MDFJNDAwODcyZGI3YTU5NzZmNyJ9.QYDZt03LcQ6idKqXmPHFXdVli9ndc63V4F1GXNe-37U" -r -k "http://riegel.canyon.a11.com/api/me"
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 riegel.canyon.a11.com (be patient).....done


Server Software:      nginx/1.14.2
Server Hostname:      riegel.canyon.a11.com
Server Port:          80

Document Path:        /api/me
Document Length:      29 bytes

Concurrency Level:    10
Time taken for tests:  2.139 seconds
Complete requests:    100
Failed requests:      39
   (Connect: 0, Receive: 0, Length: 39, Exceptions: 0)
Non-2xx responses:    100
Keep-Alive requests:  0
Total transferred:    291206 bytes
HTML transferred:     259910 bytes
Requests per second:  46.75 [#/sec] (mean)
Time per request:     213.900 [ms] (mean)
Time per request:     21.390 [ms] (mean, across all concurrent requests)
Transfer rate:        132.95 [Kbytes/sec] received


Connection Times (ms)
   min   mean[+/-sd] median   max
Connect:    0       1  2.2      0     18
Processing: 65    205  59.1    204    410
Waiting:    13    187  66.3     193    398
Total:      65    205  59.5    204    410


Percentage of the requests served within a certain time (ms)
 50%    204
 66%    220
 75%    235
 80%    244
 90%    295
 95%    316
 98%    337
 99%    410
100%    410 (longest request)
```

## 19. PHP-FPM

### percobaan 1

pm.max\_children = 75

pm.start\_servers = 10

pm.min\_spare\_servers = 5

pm.max\_spare\_servers = 20

```
root@Stark:~# ab -n 100 -c 10 http://riegel.canyon.a11.com/
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 riegel.canyon.a11.com (be patient).....done


Server Software:      nginx/1.14.2
Server Hostname:      riegel.canyon.a11.com
Server Port:          80

Document Path:        /
Document Length:      18887 bytes

Concurrency Level:    10
Time taken for tests:  3.963 seconds
Complete requests:    100
Failed requests:       0
Total transferred:    1999500 bytes
HTML transferred:     1888700 bytes
Requests per second:  25.23 [#/sec] (mean)
Time per request:     396.333 [ms] (mean)
Time per request:     39.633 [ms] (mean, across all concurrent requests)
Transfer rate:        492.68 [Kbytes/sec] received


Connection Times (ms)
              min    mean[+/-sd] median    max
Connect:        0      0   0.4      0      2
Processing:    147    308 120.6    285   1014
Waiting:       145    305 115.4    282    919
Total:         147    308 120.8    285   1015


Percentage of the requests served within a certain time (ms)
 50%    285
 66%    318
 75%    333
 80%    369
 90%    445
 95%    548
 98%    641
 99%   1015
100%   1015 (longest request)
```

## Percobaan 2

pm.max\_children = 40

pm.start\_servers = 10

pm.min\_spare\_servers = 3

pm.max\_spare\_servers = 20

```
zien@LAPTOP-GM254HKI: /m ×  zien@LAPTOP-GM254HKI: /mr ×  zien@LAPTOP-GM254HKI: /m ×

root@Stark:~# ab -n 100 -c 10 http://riegel.canyon.a11.com/
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 riegel.canyon.a11.com (be patient).....done


Server Software:      nginx/1.14.2
Server Hostname:      riegel.canyon.a11.com
Server Port:          80

Document Path:        /
Document Length:      18887 bytes

Concurrency Level:    10
Time taken for tests:  2.361 seconds
Complete requests:    100
Failed requests:       0
Total transferred:    1999500 bytes
HTML transferred:     1888700 bytes
Requests per second:  42.36 [#/sec] (mean)
Time per request:     236.093 [ms] (mean)
Time per request:     23.609 [ms] (mean, across all concurrent requests)
Transfer rate:        827.06 [Kbytes/sec] received


Connection Times (ms)
      min      mean[+/-sd] median    max
Connect:    0       3   7.4      0     31
Processing: 64     227  57.3    225    436
Waiting:    34     224  59.3    224    435
Total:      65     230  57.9    228    436


Percentage of the requests served within a certain time (ms)
 50%      228
 66%      249
 75%      265
 80%      273
 90%      288
 95%      304
 98%      421
 99%      436
100%     436 (longest request)
```

### Percobaan 3

```
pm.max_children = 40
pm.start_servers = 30
pm.min_spare_servers = 3
pm.max_spare_servers = 30
```

```
zien@LAPTOP-GM254HKI: /m  ×  zien@LAPTOP-GM254HKI: /mr  ×  zien@LAPTOP-GM254HKI: /m

root@Stark:~# ab -n 100 -c 10 http://riegel.canyon.a11.com/
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 riegel.canyon.a11.com (be patient).....done


Server Software:      nginx/1.14.2
Server Hostname:      riegel.canyon.a11.com
Server Port:         80

Document Path:        /
Document Length:      18887 bytes

Concurrency Level:    10
Time taken for tests:  3.216 seconds
Complete requests:    100
Failed requests:       0
Total transferred:    1999500 bytes
HTML transferred:     1888700 bytes
Requests per second:  31.09 [#/sec] (mean)
Time per request:     321.621 [ms] (mean)
Time per request:     32.162 [ms] (mean, across all concurrent requests)
Transfer rate:        607.12 [Kbytes/sec] received


Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0     0   0.4      0     2
Processing:    87   277  89.7    251   557
Waiting:       86   275  87.2    250   504
Total:         87   277  89.8    251   558


Percentage of the requests served within a certain time (ms)
 50%    251
 66%    303
 75%    337
 80%    366
 90%    421
 95%    433
 98%    507
 99%    558
100%    558 (longest request)
```

### 20. PHP-FPM dan Least-Conn

```
pm.max_children = 75
pm.start_servers = 10
```



```
pm.min_spare_servers = 5
pm.max_spare_servers = 20
```

```
root@Stark:~# ab -n 100 -c 10 http://riegel.canyon.a11.com/
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 riegel.canyon.a11.com (be patient).....done


Server Software:      nginx/1.14.2
Server Hostname:      riegel.canyon.a11.com
Server Port:          80

Document Path:        /
Document Length:      18887 bytes

Concurrency Level:    10
Time taken for tests:  2.072 seconds
Complete requests:    100
Failed requests:       0
Total transferred:    1999500 bytes
HTML transferred:    1888700 bytes
Requests per second:  48.27 [#/sec] (mean)
Time per request:     207.157 [ms] (mean)
Time per request:     20.716 [ms] (mean, across all concurrent requests)
Transfer rate:        942.59 [Kbytes/sec] received


Connection Times (ms)
              min    mean[+/-sd] median    max
Connect:        0      0   0.3      0      2
Processing:    84    201  43.4    202    354
Waiting:       45    199  45.6    199    353
Total:         84    201  43.5    203    354


Percentage of the requests served within a certain time (ms)
 50%    203
 66%    218
 75%    230
 80%    238
 90%    252
 95%    270
 98%    281
 99%    354
100%    354 (longest request)
```

## Analisis

- Dengan menaikkan jumlah nilai pm.start\_servers dan pm.max\_spare\_servers berpengaruh untuk meningkatkan waktu yang dibutuhkan untuk memproses sebuah request.
- Dengan menurunkan jumlah nilai pm.max\_children dan pm.min\_spare\_servers berpengaruh untuk mengurangi waktu yang dibutuhkan untuk memproses sebuah request.
- Penggunaan metode Least Connection bersama dengan PHP-FPM dapat menghasilkan kinerja yang lebih optimal dibandingkan dengan penggunaan metode Round Robin. Hal ini dapat dijelaskan dengan hipotesis bahwa tidak semua permintaan (request) memerlukan waktu pemrosesan yang sama. Dalam skenario penggunaan metode Round Robin, setiap permintaan

akan diberikan kepada server berikutnya dalam antrian tanpa memperhitungkan tingkat kompleksitas atau waktu eksekusi yang dibutuhkan oleh masing-masing permintaan.

Sebaliknya, metode Least Connection mempertimbangkan jumlah koneksi yang sedang aktif pada masing-masing server. Dengan demikian, metode ini memberikan prioritas kepada server dengan jumlah koneksi yang lebih sedikit, mengoptimalkan alokasi sumber daya dan memastikan bahwa server yang lebih efisien secara aktif terlibat dalam pemrosesan permintaan. Pendekatan ini memungkinkan untuk penanganan permintaan yang lebih adaptif dan efisien, meminimalkan waktu tunggu dan meningkatkan kinerja secara keseluruhan.