Grimoire
Praktikum Jaringan Komputer Modul 3
Kelompok B18

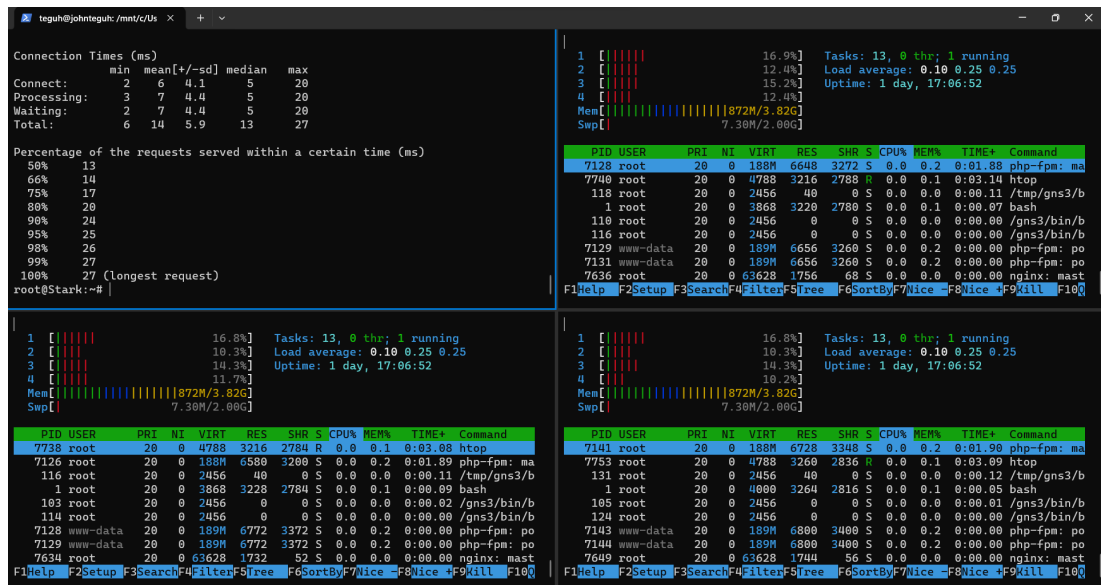**Anggota:**
1. Shazia Ingeyla Naveeda (5025211203)
2. Aryan Shafa Wardana (5025211031)

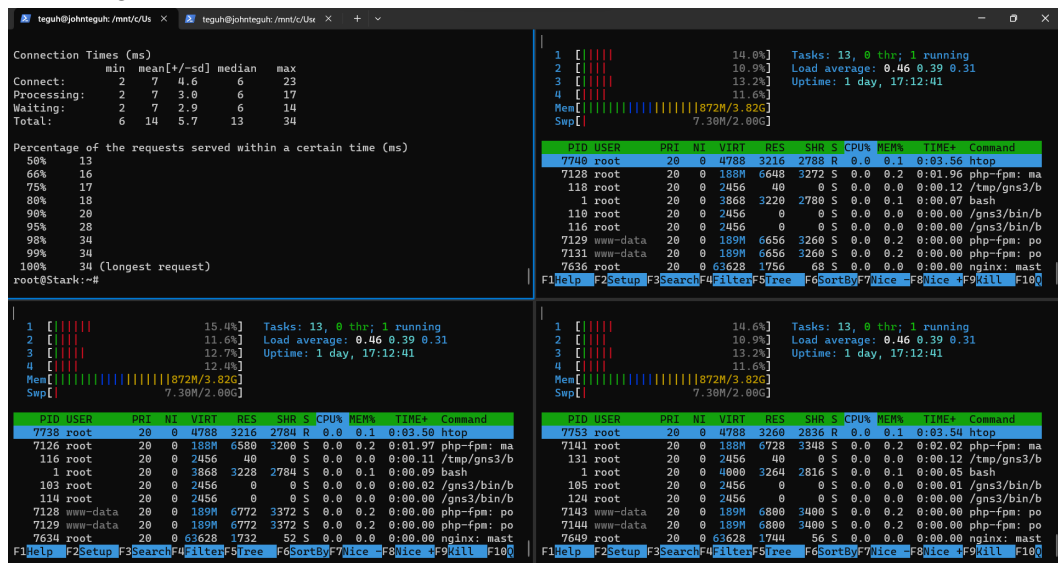I. Hasil Testing
   Nomor 8
   A. Algo Round Robin (691.12 [#/sec] (mean))

   B. Algo Least Connection (635.47 [#/sec] (mean))

C. Algo IP Hash (684.04 [#/sec] (mean))

```
Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        2     6   3.2      5     18
Processing:     2     7   3.4      7     20
Waiting:        2     7   3.3      7     20
Total:          6    13   4.4     13     32

Percentage of the requests served within a certain time (ms)
  50%     13
  66%     14
  75%     16
  80%     17
  90%     19
  95%     21
  98%     23
  99%     23
 100%     32 (longest request)
root@Stark:~#
```

```
  1 [||||                        11.4%]   Tasks: 13, 0 thr; 1 running
  2 [|||||                       15.0%]   Load average: 0.47 0.40 0.32
  3 [||||                        13.6%]   Uptime: 1 day, 17:16:18
  4 [||||                        11.8%]
  Mem[|||||||||||||||||877M/3.82G]
  Swp[                         7.30M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+  Command
 7740 root       20   0  4788  3216  2788 R  0.0  0.1  0:03.80 htop
 7128 root       20   0  188M  6648  3272 S  0.0  0.2  0:02.91 php-fpm: ma
  118 root       20   0  2456    40     0 S  0.0  0.0  0:00.12 /tmp/gns3/b
    1 root       20   0  3868  3220  2780 S  0.0  0.1  0:00.07 bash
  110 root       20   0  2456     0     0 S  0.0  0.0  0:00.00 /gns3/bin/b
  116 root       20   0  2456     0     0 S  0.0  0.0  0:00.00 /gns3/bin/b
 7129 www-data   20   0  189M  6656  3260 S  0.0  0.2  0:00.00 php-fpm: po
 7131 www-data   20   0  189M  6656  3260 S  0.0  0.2  0:00.00 php-fpm: po
 7636 root       20   0 63628  1756    68 S  0.0  0.0  0:00.00 nginx: mast
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice -F8Nice +F9Kill  F10Q
```

```
  1 [|||||                       12.0%]   Tasks: 13, 0 thr; 1 running
  2 [|||||                       14.9%]   Load average: 0.47 0.40 0.32
  3 [||||                        13.0%]   Uptime: 1 day, 17:16:18
  4 [||||                        11.7%]
  Mem[|||||||||||||||||877M/3.82G]
  Swp[                         7.30M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+  Command
 7126 root       20   0  188M  6580  3200 S  0.8  0.2  0:02.04 php-fpm:
 7738 root       20   0  4788  3216  2784 R  0.0  0.1  0:03.81 htop
  116 root       20   0  2456    40     0 S  0.0  0.0  0:00.12 /tmp/gns3/
    1 root       20   0  3868  3228  2784 S  0.0  0.1  0:00.09 bash
  103 root       20   0  2456     0     0 S  0.0  0.0  0:00.02 /gns3/bin/b
  114 root       20   0  2456     0     0 S  0.0  0.0  0:00.00 /gns3/bin/b
 7128 www-data   20   0  189M  6772  3372 S  0.0  0.2  0:00.00 php-fpm: po
 7129 www-data   20   0  189M  6772  3372 S  0.0  0.2  0:00.00 php-fpm: po
 7634 root       20   0 63628  1732    52 S  0.0  0.0  0:00.00 nginx: mast
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice -F8Nice +F9Kill  F10Q
```

```
  1 [||||                        11.4%]   Tasks: 13, 0 thr; 1 running
  2 [|||||                       15.0%]   Load average: 0.47 0.40 0.32
  3 [|||||                       13.6%]   Uptime: 1 day, 17:16:18
  4 [||||                        11.7%]
  Mem[|||||||||||||||||877M/3.82G]
  Swp[                         7.30M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+  Command
 7141 root       20   0  188M  6728  3348 S  0.8  0.2  0:02.10 php-fpm:
 7753 root       20   0  4788  3260  2836 R  0.0  0.1  0:03.78 htop
  131 root       20   0  2456    40     0 S  0.0  0.0  0:00.12 /tmp/gns3/b
    1 root       20   0  4000  3264  2816 S  0.0  0.1  0:00.05 bash
  105 root       20   0  2456     0     0 S  0.0  0.0  0:00.01 /gns3/bin/b
  124 root       20   0  2456     0     0 S  0.0  0.0  0:00.00 /gns3/bin/b
 7143 www-data   20   0  189M  6800  3400 S  0.0  0.2  0:00.00 php-fpm: po
 7144 www-data   20   0  189M  6800  3400 S  0.0  0.2  0:00.00 php-fpm: po
 7649 root       20   0 63628  1744    56 S  0.0  0.0  0:00.00 nginx: mast
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice -F8Nice +F9Kill  F10Q
```

D. Algo Generic Hash (638.46 [#/sec] (mean))

```
Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        1     7   3.6      5     18
Processing:     2     8   3.6      7     16
Waiting:        2     7   3.6      6     15
Total:          5    14   5.2     14     29

Percentage of the requests served within a certain time (ms)
  50%     14
  66%     17
  75%     18
  80%     19
  90%     21
  95%     24
  98%     26
  99%     29
 100%     29 (longest request)
root@Stark:~#
```

```
  1 [||||||                      16.2%]   Tasks: 13, 0 thr; 1 running
  2 [||||                        12.1%]   Load average: 0.32 0.37 0.32
  3 [|||                         10.0%]   Uptime: 1 day, 17:17:24
  4 [|||||                       17.3%]
  Mem[|||||||||||||||||878M/3.82G]
  Swp[                         7.30M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+  Command
 7740 root       20   0  4788  3216  2788 R  0.0  0.1  0:03.88 htop
 7128 root       20   0  188M  6648  3272 S  0.0  0.2  0:02.04 php-fpm: ma
  118 root       20   0  2456    40     0 S  0.0  0.0  0:00.12 /tmp/gns3/b
    1 root       20   0  3868  3220  2780 S  0.0  0.1  0:00.07 bash
  110 root       20   0  2456     0     0 S  0.0  0.0  0:00.00 /gns3/bin/b
  116 root       20   0  2456     0     0 S  0.0  0.0  0:00.00 /gns3/bin/b
 7129 www-data   20   0  189M  6656  3260 S  0.0  0.2  0:00.00 php-fpm: po
 7131 www-data   20   0  189M  6656  3260 S  0.0  0.2  0:00.00 php-fpm: po
 7636 root       20   0 63628  1756    68 S  0.0  0.0  0:00.00 nginx: mast
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice -F8Nice +F9Kill  F10Q
```

```
  1 [||||||                      16.9%]   Tasks: 13, 0 thr; 1 running
  2 [||||                        12.9%]   Load average: 0.32 0.37 0.32
  3 [|||                         10.8%]   Uptime: 1 day, 17:17:24
  4 [|||||                       17.3%]
  Mem[|||||||||||||||||878M/3.82G]
  Swp[                         7.30M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+  Command
 7738 root       20   0  4788  3216  2784 R  0.0  0.1  0:03.91 htop
 7126 root       20   0  188M  6580  3200 S  0.0  0.2  0:02.04 php-fpm: ma
  116 root       20   0  2456    40     0 S  0.0  0.0  0:00.12 /tmp/gns3/b
    1 root       20   0  3868  3228  2784 S  0.0  0.1  0:00.09 bash
  103 root       20   0  2456     0     0 S  0.0  0.0  0:00.02 /gns3/bin/b
  114 root       20   0  2456     0     0 S  0.0  0.0  0:00.00 /gns3/bin/b
 7128 www-data   20   0  189M  6772  3372 S  0.0  0.2  0:00.00 php-fpm: po
 7129 www-data   20   0  189M  6772  3372 S  0.0  0.2  0:00.00 php-fpm: po
 7634 root       20   0 63628  1732    52 S  0.0  0.0  0:00.00 nginx: mast
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice -F8Nice +F9Kill  F10Q
```
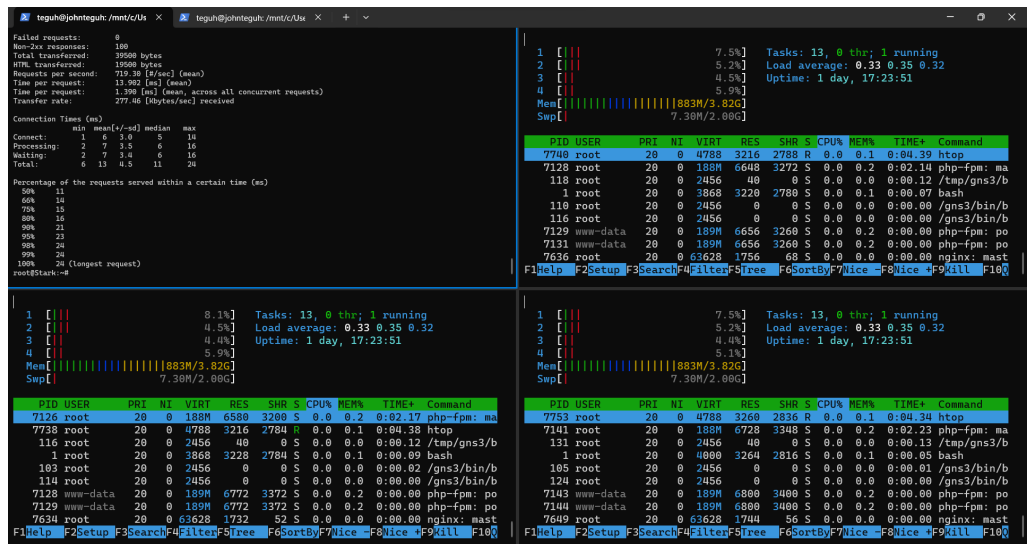
```
  1 [||||||                      17.1%]   Tasks: 13, 0 thr; 1 running
  2 [||||                        13.0%]   Load average: 0.32 0.37 0.32
  3 [|||                         10.9%]   Uptime: 1 day, 17:17:24
  4 [|||||                       17.3%]
  Mem[|||||||||||||||||878M/3.82G]
  Swp[                         7.30M/2.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+  Command
 7141 root       20   0  188M  6728  3348 S  0.0  0.2  0:02.11 php-fpm: ma
 7753 root       20   0  4788  3260  2836 R  0.0  0.1  0:03.86 htop
  131 root       20   0  2456    40     0 S  0.0  0.0  0:00.12 /tmp/gns3/b
    1 root       20   0  4000  3264  2816 S  0.0  0.1  0:00.05 bash
  105 root       20   0  2456     0     0 S  0.0  0.0  0:00.01 /gns3/bin/b
  124 root       20   0  2456     0     0 S  0.0  0.0  0:00.00 /gns3/bin/b
 7143 www-data   20   0  189M  6800  3400 S  0.0  0.2  0:00.00 php-fpm: po
 7144 www-data   20   0  189M  6800  3400 S  0.0  0.2  0:00.00 php-fpm: po
 7649 root       20   0 63628  1744    56 S  0.0  0.0  0:00.00 nginx: mast
F1Help  F2Setup F3Search F4Filter F5Tree  F6SortBy F7Nice -F8Nice +F9Kill  F10Q
```

Nomor 9

A. Algo Round Robin 3 Worker
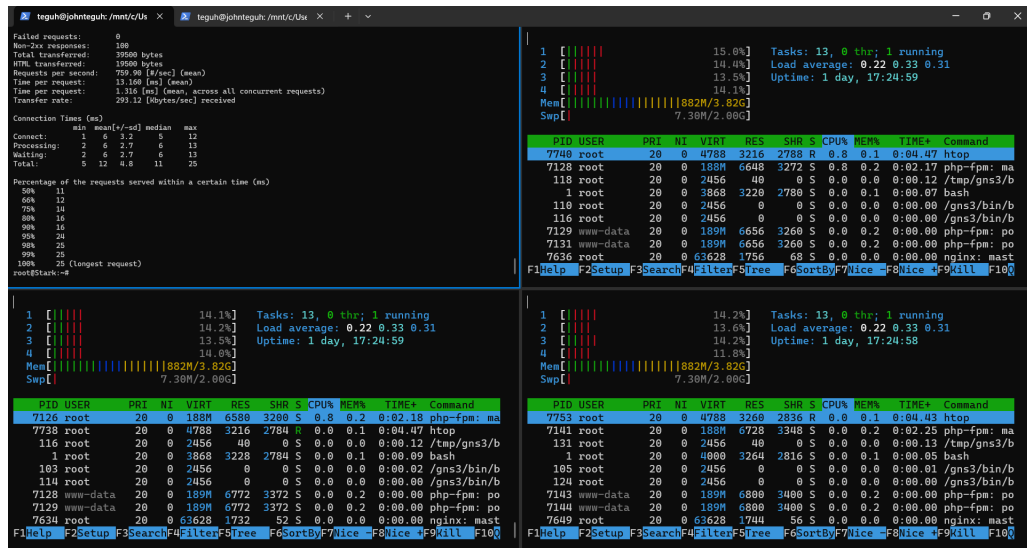
B. Algo Round Robin 2 Worker
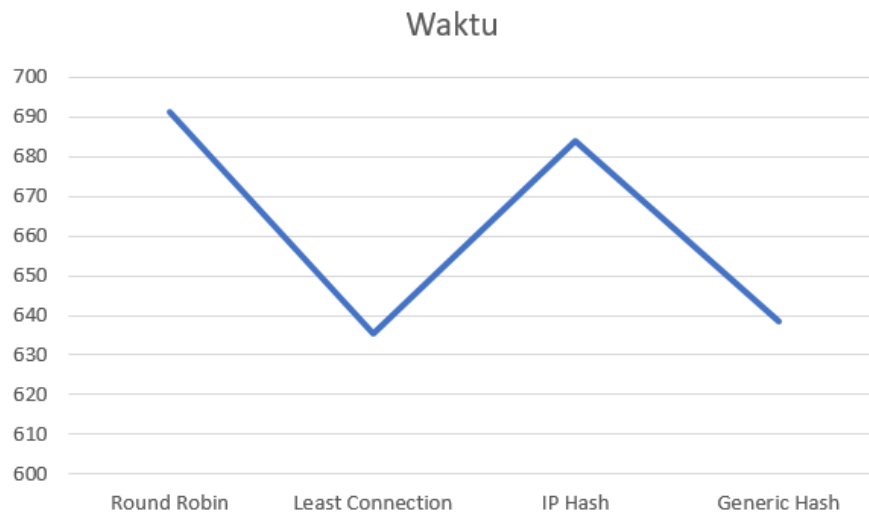

C. Algo Round Robin 1 Worker
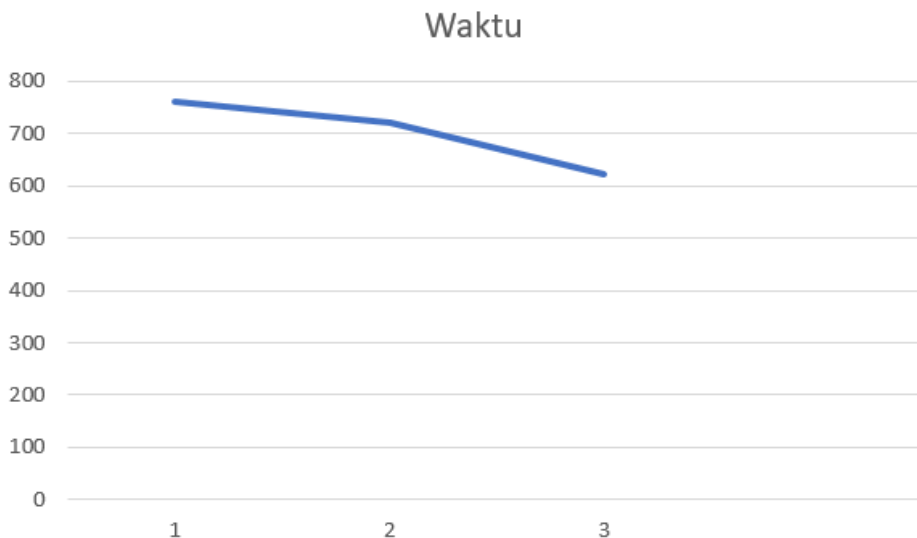
II. Grafik
    A. Nomor 8

Waktu

    B. Nomor 9

Waktu
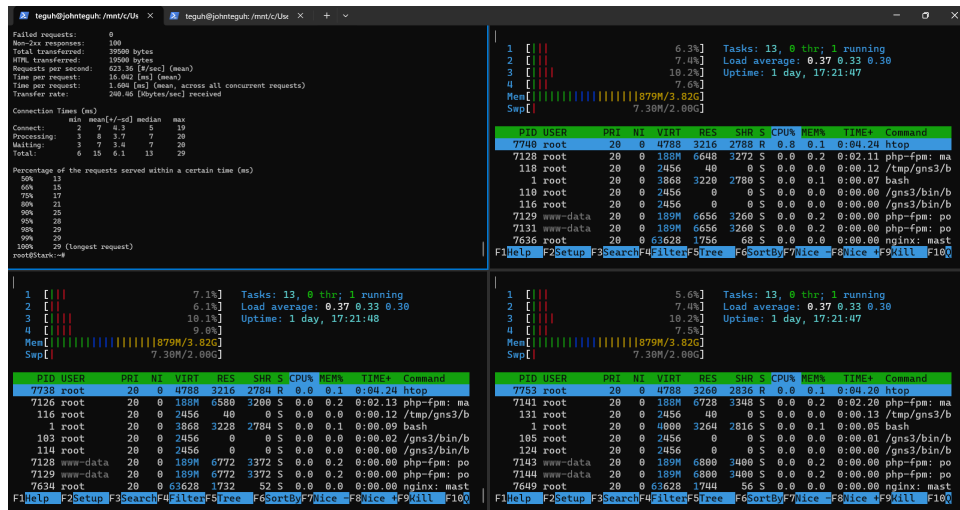
III.   Analisa
Round Robin:
Rata-rata request per second: 691.12 req/s.
Dengan Algoritma ini server akan menerima request secara bergantian. Dengan beban yang dianggap sama.

Least Connection:
Rata-rata request per second: 635.47 req/s.
Server yang memiliki koneksi terendah akan menjadi tujuan untuk request baru karena algoritma ini akan memilih server dengan jumlah koneksi yang paling rendah.

IP Hash:
Rata-rata request per second: 684.04 req/s.
Algoritma IP Hash akan melakukan distribusi request dengan IP. Dimana akan digunakan informasi alamat IP yang diinginkan klien untuk menentukan tujuan dari request tersebut

Generic Hash:
Rata-rata request per second: 638.46 req/s.
Algoritma ini menggunakan fungsi hash untuk menentukan server yang akan menerima permintaan, yang dapat memberikan seimbang beban dengan baik.

Bisa ditarik kesimpulannya bahwa algoritma yang dipakai bisa saja berbeda tingkat efisiensinya. Tergantung dengan kebutuhan karena apakah aplikasi yang dibutuhkan dinamis dan sebagainya. Maka dari itu pemilihan algoritma load balincing harus dipertimbangakan. Namun tingkat efisiensi bisa saja dipengaruhi oleh rata-rata req/sec. Semakin kecil maka akan semakin efisien.

Nomor 15
Apache Benchmark menggunakan api POST /auth/register

```
 POST /auth/register        ×     +   ∨

Benchmarking 192.187.2.2 (be patient).....done


Server Software:        nginx/1.14.2
Server Hostname:        192.187.2.2
Server Port:            81

Document Path:          /api/auth/register
Document Length:        6619 bytes

Concurrency Level:      10
Time taken for tests:   0.953 seconds
Complete requests:      100
Failed requests:        0
Non-2xx responses:      100
Total transferred:      696500 bytes
Total body sent:        20600
HTML transferred:       661900 bytes
Requests per second:    104.90 [#/sec] (mean)
Time per request:       95.330 [ms] (mean)
Time per request:       9.533 [ms] (mean, across all concurrent requests)
Transfer rate:          713.50 [Kbytes/sec] received
                        21.10 kb/s sent
                        734.60 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median    max
Connect:        0    1    2.4      0      10
Processing:    17   92   40.7     93     223
Waiting:       14   57   34.5     46     154
Total:         17   93   40.9     93     224

Percentage of the requests served within a certain time (ms)
  50%     93
  66%    106
  75%    114
  80%    130
  90%    148
  95%    159
  98%    199
  99%    224
 100%    224 (longest request)
```

Nomor 16
Apache Benchmark menggunakan api POST /auth/login

```
Benchmarking 192.187.2.2 (be patient).....done


Server Software:        nginx/1.14.2
Server Hostname:        192.187.2.2
Server Port:            81

Document Path:          /api/auth/login
Document Length:        6619 bytes

Concurrency Level:      10
Time taken for tests:   0.986 seconds
Complete requests:      100
Failed requests:        0
Non-2xx responses:      100
Total transferred:      696500 bytes
Total body sent:        20300
HTML transferred:       661900 bytes
Requests per second:    101.45 [#/sec] (mean)
Time per request:       98.571 [ms] (mean)
Time per request:       9.857 [ms] (mean, across all concurrent requests)
Transfer rate:          690.04 [Kbytes/sec] received
                        20.11 kb/s sent
                        710.15 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    1   2.0      0       10
Processing:    12   96  57.5     95      305
Waiting:        9   61  42.5     50      188
Total:         12   96  57.7     96      305

Percentage of the requests served within a certain time (ms)
  50%     96
  66%    112
  75%    138
  80%    157
  90%    172
  95%    187
  98%    219
  99%    305
 100%    305 (longest request)
```

Nomor 17

Apache Benchmark menggunakan api GET /me

```
Benchmarking 192.187.2.2 (be patient).....done


Server Software:        nginx/1.14.2
Server Hostname:        192.187.2.2
Server Port:            81

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

Concurrency Level:      10
Time taken for tests:   1.043 seconds
Complete requests:      100
Failed requests:        0
Non-2xx responses:      100
Total transferred:      696500 bytes
HTML transferred:       661900 bytes
Requests per second:    95.84 [#/sec] (mean)
Time per request:       104.338 [ms] (mean)
Time per request:       10.434 [ms] (mean, across all concurrent requests)
Transfer rate:          651.90 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median    max
Connect:        0    1    2.0      0       12
Processing:    14  101   54.1    104      222
Waiting:       10   57   43.6     39      208
Total:         14  102   54.2    104      222

Percentage of the requests served within a certain time (ms)
  50%    104
  66%    124
  75%    140
  80%    150
  90%    172
  95%    204
  98%    220
  99%    222
 100%    222 (longest request)
```

Nomor 19

Percobaan menggunakan api POST /auth/register

    a. Percobaan 1

```
[percobaan]

user = percobaan
group = percobaan

listen = /run/php/php8.0-fpm.sock

listen.owner = www-data
listen.group = www-data

pm = dynamic

pm.max_children = 5
pm.start_servers = 2
pm.min_spare_servers = 1
pm.max_spare_servers = 3
```

```
POST /auth/register        ×    +   ∨
Benchmarking 192.187.2.2 (be patient).....done


Server Software:        nginx/1.14.2
Server Hostname:        192.187.2.2
Server Port:            81

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

Concurrency Level:      10
Time taken for tests:   0.655 seconds
Complete requests:      100
Failed requests:        67
   (Connect: 0, Receive: 0, Length: 67, Exceptions: 0)
Non-2xx responses:      100
Total transferred:      477380 bytes
Total body sent:        20600
HTML transferred:       449182 bytes
Requests per second:    152.67 [#/sec] (mean)
Time per request:       65.502 [ms] (mean)
Time per request:       6.550 [ms] (mean, across all concurrent requests)
Transfer rate:          711.72 [Kbytes/sec] received
                        30.71 kb/s sent
                        742.43 kb/s total


Connection Times (ms)
            min  mean[+/-sd] median   max
Connect:      0    0   0.8     0        6
Processing:   1   62  46.5    77      161
Waiting:      0   42  34.7    48      155
Total:        1   62  46.5    77      161

Percentage of the requests served within a certain time (ms)
  50%     77
  66%     92
  75%    101
  80%    104
  90%    111
  95%    130
  98%    134
  99%    161
 100%    161 (longest request)
```

b. Percobaan 2

```
[percobaan]

user = percobaan
group = percobaan

listen = /run/php/php8.0-fpm.sock

listen.owner = www-data
listen.group = www-data

pm = dynamic

pm.max_children = 100
pm.start_servers = 40
pm.min_spare_servers = 20
pm.max_spare_servers = 60
```

```
POST /auth/register          ×    + ∨

Benchmarking 192.187.2.2 (be patient).....done


Server Software:        nginx/1.14.2
Server Hostname:        192.187.2.2
Server Port:            81

Document Path:          /api/auth/register
Document Length:        463 bytes

Concurrency Level:      10
Time taken for tests:   1.265 seconds
Complete requests:      100
Failed requests:        99
   (Connect: 0, Receive: 0, Length: 99, Exceptions: 0)
Non-2xx responses:      99
Total transferred:      34246 bytes
Total body sent:        20600
HTML transferred:       9670 bytes
Requests per second:    79.04 [#/sec] (mean)
Time per request:       126.516 [ms] (mean)
Time per request:       12.652 [ms] (mean, across all concurrent requests)
Transfer rate:          26.43 [Kbytes/sec] received
                        15.90 kb/s sent
                        42.33 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    1   1.6      0       7
Processing:     1  101 128.4     25     485
Waiting:        0  101 128.3     25     485
Total:          1  102 128.7     25     485

Percentage of the requests served within a certain time (ms)
  50%     25
  66%    124
  75%    207
  80%    227
  90%    341
  95%    381
  98%    434
  99%    485
 100%    485 (longest request)
```

c. Percobaan 3

```
[percobaan]
```

```
user = percobaan
group = percobaan

listen = /run/php/php8.0-fpm.sock

listen.owner = www-data
listen.group = www-data

pm = dynamic

pm.max_children = 500
pm.start_servers = 200
pm.min_spare_servers = 100
pm.max_spare_servers = 300
```

POST /auth/register   ×   + ∨

cheBench, 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 192.187.2.2 (be patient).....done

Server Software: nginx/1.14.2
Server Hostname: 192.187.2.2
Server Port: 81

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

Concurrency Level: 10
Time taken for tests: 1.062 seconds
Complete requests: 100
Failed requests: 66
   (Connect: 0, Receive: 0, Length: 66, Exceptions: 0)
Non-2xx responses: 100
Total transferred: 33820 bytes
Total body sent: 20600
HTML transferred: 9380 bytes
Requests per second: 94.17 [#/sec] (mean)
Time per request: 106.188 [ms] (mean)
Time per request: 10.619 [ms] (mean, across all concurrent requests)
Transfer rate: 31.10 [Kbytes/sec] received
                        18.94 kb/s sent
                        50.05 kb/s total

Connection Times (ms)
              min mean[+/-sd] median   max
Connect: 0   0   1.1   0   8
Processing: 1 102 128.9   26   432
Waiting: 0 102 129.0   25   432
Total: 1 102 129.1   26   433

Percentage of the requests served within a certain time (ms)
  50%   26
  66%   122
  75%   220
  80%   228
  90%   344
  95%   398
  98%   426
  99%   433
 100%   433 (longest request)
```

**Analisis:**
Setelah dimodifikasi konfigurasi PHP-FM dengan 3 percobaan, diperoleh bahwa Percobaan 1 memiliki requests per seconds paling besar. Sedangkan, Percobaan 2 memiliki requests per seconds paling kecil. Namun, dapat dilihat bahwa semakin besar hyperparameter maka semakin banyak request yang failed atau gagal.

**Nomor 20**
Apache Benchmark menggunakan api POST /auth/register