Kelompok IT17	PETA - Report Hasil Analisis Benchmarking dan Grafik Praktikum Jaringan Komputer Modul 3
Mutiara Nurhaliza - 5027221010	
Aqila Aqsa - 5027211032	

No 8 analisis hasil testing dengan 500 request dan 50 request/second masing-masing algoritma Load Balancer

1. Hasil testing pada Apache Benchmark

- Round Robin

```
Server Software:        nginx/1.14.2
Server Hostname:        harkonen.IT17.com
Server Port:            80

Document Path:          /
Document Length:        195 bytes

Concurrency Level:      50
Time taken for tests:   0.902 seconds
Complete requests:      500
Failed requests:        0
Non-2xx responses:      500
Total transferred:      200000 bytes
HTML transferred:       97500 bytes
Requests per second:    554.44 [#/sec] (mean)
Time per request:       90.181 [ms] (mean)
Time per request:       1.804 [ms] (mean, across all concurrent requests)
Transfer rate:          216.58 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    42  16.5     45      77
Processing:     2    46  12.3     45      77
Waiting:        0    46  12.2     44      77
Total:          2    88  26.0     93     134

Percentage of the requests served within a certain time (ms)
  50%     93
  66%     99
  75%    101
  80%    109
  90%    120
  95%    127
  98%    128
  99%    129
 100%    134 (longest request)
```

Requests per second: 554.44 [#/sec] (mean)

- Generic hash

```
root@Vladimir:/# ab -n 500 -c 50 http://harkonen.IT17.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 harkonen.IT17.com (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Finished 500 requests


Server Software:        nginx/1.14.2
Server Hostname:        harkonen.IT17.com
Server Port:            80

Document Path:          /
Document Length:        195 bytes

Concurrency Level:      50
Time taken for tests:   0.950 seconds
Complete requests:      500
Failed requests:        0
Non-2xx responses:      500
Total transferred:      200000 bytes
HTML transferred:       97500 bytes
Requests per second:    526.34 [#/sec] (mean)
Time per request:       94.995 [ms] (mean)
Time per request:       1.900 [ms] (mean, across all concurrent requests)
Transfer rate:          205.60 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median    max
Connect:        1   43  14.5     44       73
Processing:     6   48  10.5     49       72
Waiting:        0   48  10.5     48       72
Total:          6   92  18.1     97      112

Percentage of the requests served within a certain time (ms)
  50%     97
  66%    101
  75%    102
  80%    103
  90%    106
  95%    107
  98%    108
  99%    109
 100%    112 (longest request)
```

Requests per second: 526.34 [#/sec] (mean)

- Least connection

```
root@Vladimir:/# ab -n 500 -c 50 http://harkonen.IT17.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 harkonen.IT17.com (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Finished 500 requests


Server Software:        nginx/1.14.2
Server Hostname:        harkonen.IT17.com
Server Port:            80

Document Path:          /
Document Length:        195 bytes

Concurrency Level:      50
Time taken for tests:   0.895 seconds
Complete requests:      500
Failed requests:        0
Non-2xx responses:      500
Total transferred:      200000 bytes
HTML transferred:       97500 bytes
Requests per second:    558.52 [#/sec] (mean)
Time per request:       89.522 [ms] (mean)
Time per request:       1.790 [ms] (mean, across all concurrent requests)
Transfer rate:          218.17 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        1    42   14.2     45      75
Processing:     6    45   10.8     43      76
Waiting:        0    45   10.8     43      75
Total:          7    87   19.2     90     115

Percentage of the requests served within a certain time (ms)
  50%     90
  66%     94
  75%     99
  80%    102
  90%    108
  95%    110
  98%    112
  99%    114
 100%    115 (longest request)
```

Requests per second: 558.52 [#/sec] (mean)

- IP Hash

```
root@Vladimir:/# ab -n 500 -c 50 http://harkonen.IT17.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 harkonen.IT17.com (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Finished 500 requests


Server Software:        nginx/1.14.2
Server Hostname:        harkonen.IT17.com
Server Port:            80

Document Path:          /
Document Length:        195 bytes

Concurrency Level:      50
Time taken for tests:   0.909 seconds
Complete requests:      500
Failed requests:        0
Non-2xx responses:      500
Total transferred:      200000 bytes
HTML transferred:       97500 bytes
Requests per second:    549.98 [#/sec] (mean)
Time per request:       90.913 [ms] (mean)
Time per request:       1.818 [ms] (mean, across all concurrent requests)
Transfer rate:          214.84 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    38  15.1     37      72
Processing:     2    50  15.8     50      85
Waiting:        1    49  15.8     49      85
Total:          2    88  24.6     86     139

Percentage of the requests served within a certain time (ms)
  50%     86
  66%     96
  75%    110
  80%    114
  90%    119
  95%    132
  98%    136
  99%    138
 100%    139 (longest request)
```
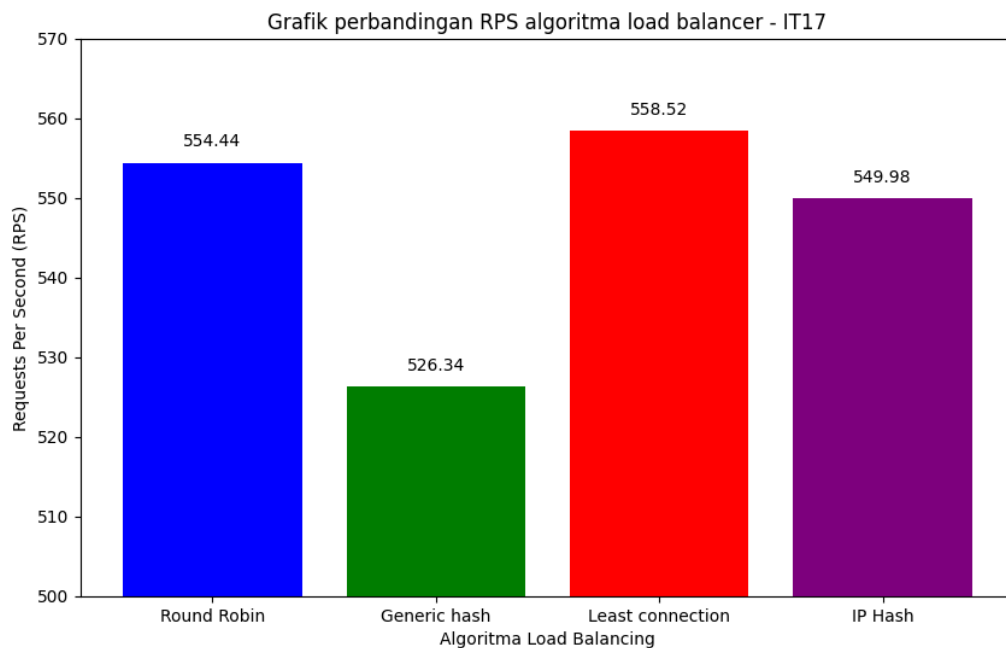
Requests per second: 549.98 [#/sec] (mean)

2. Grafik request per second untuk masing masing algoritma.

Grafik perbandingan RPS algoritma load balancer - IT17

3. Analisis
1. Round Robin:
   a. RPS: 554.44
   b. Kelebihan: Sederhana, mendistribusikan beban secara merata.
   c. Kekurangan: Tidak mempertimbangkan beban server saat ini.
2. Generic Hash:
   a. RPS: 526.34
   b. Kelebihan: Konsistensi cache untuk permintaan serupa.
   c. Kekurangan: Performa terendah, potensi ketidakseimbangan beban.
3. Least Connection:
   a. RPS: 558.52
   b. Kelebihan: Performa terbaik, distribusi beban efektif.
   c. Kekurangan: Memerlukan pemantauan koneksi aktif.
4. IP Hash:
   a. RPS: 549.98
   b. Kelebihan: Konsistensi sesi, baik untuk cache.
   c. Kekurangan: Potensi ketidakseimbangan jika distribusi IP tidak merata.

Kesimpulan

1. Least Connection: Terbaik dalam performa, cocok untuk beban yang bervariasi.
2. Round Robin: Baik untuk beban seragam, sederhana dalam implementasi.
3. IP Hash: Baik untuk konsistensi sesi, performa cukup baik.
4. Generic Hash: Performa terendah, cocok untuk skenario khusus.

No 9 Analisis testing dengan menggunakan 3 worker, 2 worker, dan 1 worker sebanyak 1000 request dengan 10 request/second

1. Hasil testing pada Apache Benchmark
- 3 worker

```
root@Vladimir:/# ab -n 500 -c 50 http://harkonen.IT17.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 harkonen.IT17.com (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Finished 500 requests


Server Software:        nginx/1.14.2
Server Hostname:        harkonen.IT17.com
Server Port:            80

Document Path:          /
Document Length:        195 bytes

Concurrency Level:      50
Time taken for tests:   0.894 seconds
Complete requests:      500
Failed requests:        0
Non-2xx responses:      500
Total transferred:      200000 bytes
HTML transferred:       97500 bytes
Requests per second:    559.36 [#/sec] (mean)
Time per request:       89.388 [ms] (mean)
Time per request:       1.788 [ms] (mean, across all concurrent requests)
Transfer rate:          218.50 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        1   41  12.2     43      72
Processing:     5   46  10.2     44      74
Waiting:        0   46  10.2     43      74
Total:          6   87  14.1     90     118

Percentage of the requests served within a certain time (ms)
  50%     90
  66%     94
  75%     97
  80%     99
  90%    101
  95%    104
  98%    111
  99%    112
 100%    118 (longest request)
```

Requests per second: 559.36 [#/sec] (mean)

- 2 worker

```
root@Vladimir:/# ab -n 500 -c 50 http://harkonen.IT17.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 harkonen.IT17.com (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Finished 500 requests


Server Software:        nginx/1.14.2
Server Hostname:        harkonen.IT17.com
Server Port:            80

Document Path:          /
Document Length:        195 bytes

Concurrency Level:      50
Time taken for tests:   0.948 seconds
Complete requests:      500
Failed requests:        0
Non-2xx responses:      500
Total transferred:      200000 bytes
HTML transferred:       97500 bytes
Requests per second:    527.63 [#/sec] (mean)
Time per request:       94.763 [ms] (mean)
Time per request:       1.895 [ms] (mean, across all concurrent requests)
Transfer rate:          206.11 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        1   46  14.8     47      80
Processing:     2   46  12.4     45      80
Waiting:        1   45  12.4     45      79
Total:          3   91  18.6     94     120

Percentage of the requests served within a certain time (ms)
  50%     94
  66%     98
  75%    100
  80%    102
  90%    110
  95%    114
  98%    118
  99%    120
 100%    120 (longest request)
```

Requests per second: 527.63 [#/sec] (mean)

- 1 worker

```
root@Vladimir:/# ab -n 500 -c 50 http://harkonen.IT17.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 harkonen.IT17.com (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Finished 500 requests


Server Software:        nginx/1.14.2
Server Hostname:        harkonen.IT17.com
Server Port:            80

Document Path:          /
Document Length:        195 bytes

Concurrency Level:      50
Time taken for tests:   0.974 seconds
Complete requests:      500
Failed requests:        0
Non-2xx responses:      500
Total transferred:      200000 bytes
HTML transferred:       97500 bytes
Requests per second:    513.20 [#/sec] (mean)
Time per request:       97.427 [ms] (mean)
Time per request:       1.949 [ms] (mean, across all concurrent requests)
Transfer rate:          200.47 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median     max
Connect:        1    46   15.5     49      73
Processing:     5    48   12.1     49      74
Waiting:        0    47   12.1     49      74
Total:          7    94   23.1    100     115

Percentage of the requests served within a certain time (ms)
  50%    100
  66%    103
  75%    106
  80%    108
  90%    110
  95%    111
  98%    113
  99%    115
 100%    115 (longest request)
```
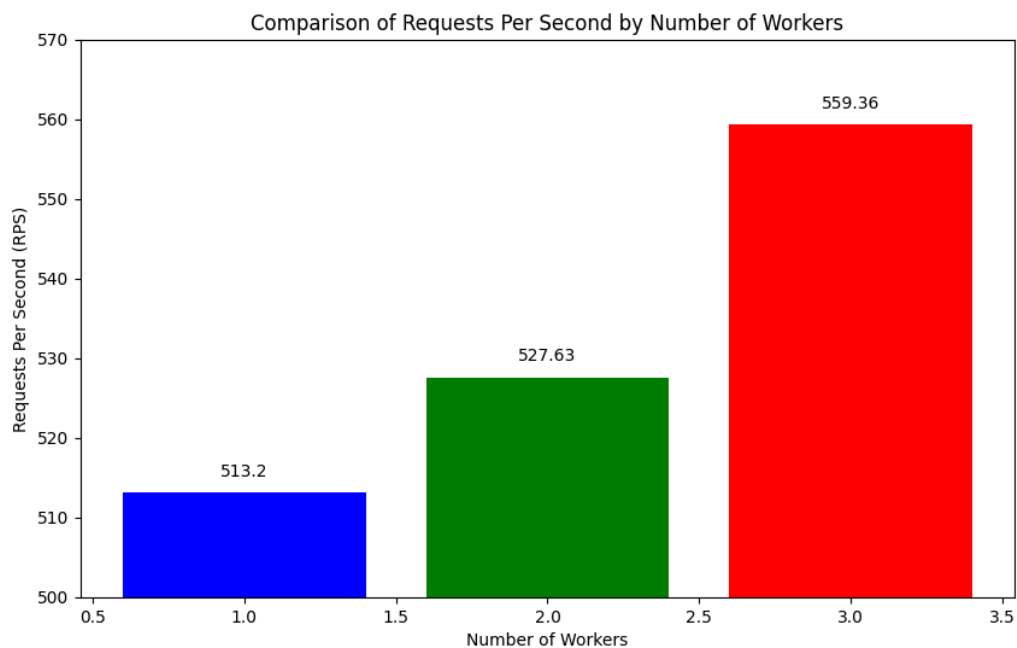
Requests per second: 513.20 [#/sec] (mean)

2. Grafik request per second untuk masing masing algoritma.

Comparison of Requests Per Second by Number of Workers

3. Analisis
1. 1 Worker:
   - RPS: 513.20
   - Keterangan: Performa terendah, server terbatas dalam menangani beban.
2. 2 Worker:
   - RPS: 527.63
   - Keterangan: Peningkatan performa dengan distribusi beban lebih efisien.
3. 3 Worker:
   - RPS: 559.36
   - Keterangan: Performa terbaik, distribusi beban optimal.

Kesimpulan

- Jumlah worker lebih banyak meningkatkan performa server.
- 3 worker memberikan performa terbaik dalam pengujian ini.

Atreides Channel memiliki beberapa endpoint yang harus ditesting sebanyak 100 request dengan 10 request/second. Tambahkan response dan hasil testing pada peta.

     a. POST /auth/register **(15)**

     b. POST /auth/login **(16)**

     c. GET /me **(17)**

- Untuk soal-soal di atas, testing dilakukan di worker Leto (10.72.2.1:8001).

1. A. POST /auth/register (15)

```
Server Software:        nginx/1.14.2
Server Hostname:        10.72.2.1
Server Port:            8001

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

Concurrency Level:      10
Time taken for tests:   0.645 seconds
Complete requests:      100
Failed requests:        99
   (Connect: 0, Receive: 0, Length: 99, Exceptions: 0)
Non-2xx responses:      99
Total transferred:      246732 bytes
Total body sent:        21600
HTML transferred:       215826 bytes
Requests per second:    155.10 [#/sec] (mean)
Time per request:       64.473 [ms] (mean)
Time per request:       6.447 [ms] (mean, across all concurrent requests)
Transfer rate:          373.72 [Kbytes/sec] received
                        32.72 kb/s sent
                        406.44 kb/s total

Connection Times (ms)
            min  mean[+/-sd] median   max
Connect:      0    0   0.2      0       1
Processing:  14   50  15.2     56     136
Waiting:     14   49  15.2     56     136
Total:       14   50  15.2     56     137

Percentage of the requests served within a certain time (ms)
  50%     56
  66%     57
  75%     58
  80%     58
  90%     61
  95%     63
  98%     67
  99%    137
 100%    137 (longest request)
root@Paul:~#
```

- Hasil testing di atas menunjukkan ada 99 failed requests. Hal ini terjadi karena username yang digunakan untuk login hanya satu, yaitu kelompokIT17. Jika banyak request yang mencoba menggunakan username yang sama secara bersamaan, hanya satu yang berhasil dan sisanya gagal karena kemungkinan terjadinya konflik di server.

```
echo '
{
  "username": "kelompokIT17",
  "password": "passwordIT17"
}' > login.json
```

- **Request per Second:** Server menangani 155,10 permintaan per detik, yang merupakan tingkat cukup tinggi mengingat tingkat concurrency sebesar 10, mengindikasikan bahwa server mampu menangani beban sedang dengan efisien.

- **Time per Request:** Rata-rata waktu per permintaan saat mempertimbangkan penanganan bersamaan adalah sekitar 6,447 ms yang sangat baik.

2. **B. POST /auth/login (16)**

```
Server Software:        nginx/1.14.2
Server Hostname:        10.72.2.1
Server Port:            8001

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

Concurrency Level:      10
Time taken for tests:   1.363 seconds
Complete requests:      100
Failed requests:        38
   (Connect: 0, Receive: 0, Length: 38, Exceptions: 0)
Non-2xx responses:      38
Total transferred:      302974 bytes
Total body sent:        21300
HTML transferred:       272292 bytes
Requests per second:    73.39 [#/sec] (mean)
Time per request:       136.253 [ms] (mean)
Time per request:       13.625 [ms] (mean, across all concurrent requests)
Transfer rate:          217.15 [Kbytes/sec] received
                        15.27 kb/s sent
                        232.42 kb/s total

Connection Times (ms)
            min  mean[+/-sd] median   max
Connect:      0    0   0.2      0       1
Processing:  13  127  88.1    146     288
Waiting:     13  127  88.2    146     288
Total:       13  128  88.2    147     289

Percentage of the requests served within a certain time (ms)
  50%    147
  66%    207
  75%    210
  80%    211
  90%    215
  95%    272
  98%    278
  99%    289
 100%    289 (longest request)
root@Paul:~#
```

- Server menunjukkan adanya 38 permintaan gagal dari total testing sebanyak 100. mengindikasikan bahwa server mungkin tidak mengirimkan jumlah data yang diharapkan atau terdapat ketidaksesuaian antara data yang diharapkan dengan yang diterima atau permasalahan kapasitas yang tidak memadai.

- **Request per Second:** Permintaan per detik secara signifikan lebih rendah yaitu 73,39 dibandingkan dengan endpoint sebelumnya. Pengurangan ini semakin mendukung anggapan bahwa endpoint login lebih memakan sumber daya.

- **Waktu Respons:** Rata-rata waktu per permintaan yang mencapai 136,253 ms menunjukkan bahwa proses login memakan lebih banyak sumber daya atau kurang dioptimalkan dibandingkan dengan endpoint /api/auth/register.

3. **C. GET /me (17)**

```
Server Software:        nginx/1.14.2
Server Hostname:        10.72.2.1
Server Port:            8001

Document Path:          /api/me
Document Length:        120 bytes

Concurrency Level:      10
Time taken for tests:   0.452 seconds
Complete requests:      100
Failed requests:        39
   (Connect: 0, Receive: 0, Length: 39, Exceptions: 0)
Non-2xx responses:      39
Total transferred:      296207 bytes
HTML transferred:       265461 bytes
Requests per second:    221.23 [#/sec] (mean)
Time per request:       45.202 [ms] (mean)
Time per request:       4.520 [ms] (mean, across all concurrent requests)
Transfer rate:          639.94 [Kbytes/sec] received

Connection Times (ms)
            min  mean[+/-sd] median   max
Connect:      0    0   0.5      0       3
Processing:  18   41   9.3     39      65
Waiting:     18   40   9.4     39      65
Total:       18   41   9.4     39      68

Percentage of the requests served within a certain time (ms)
  50%     39
  66%     45
  75%     48
  80%     50
  90%     55
  95%     56
  98%     64
  99%     68
 100%     68 (longest request)
root@Paul:~#
```

- Terdapat 39 permintaan gagal dari total 100 permintaan yang diuji. Hal ini mengindikasikan bahwa server mungkin tidak mengirimkan jumlah data yang diharapkan, atau terdapat ketidaksesuaian antara data yang diharapkan dengan yang diterima. Ini juga bisa menunjukkan permasalahan kapasitas server yang tidak memadai atau masalah dalam pengolahan permintaan di server.

- **Request per Second:** Tingkat permintaan per detik adalah 221,23, yang menunjukkan tingkat throughput yang cukup tinggi. Ini menandakan bahwa meskipun ada kegagalan, server masih mampu menangani sejumlah besar permintaan dalam waktu yang singkat.

- **Waktu per Permintaan:** Rata-rata waktu per permintaan adalah 45,202 ms untuk semua permintaan yang berjalan bersamaan. Ini menunjukkan bahwa server secara umum dapat menangani permintaan dengan cepat, meskipun terdapat variasi waktu respons karena beberapa permintaan gagal.

Untuk meningkatkan performa dari Worker, coba implementasikan PHP-FPM pada Leto, Duncan, dan Jessica. Untuk testing kinerja naikkan:

- pm.max_children

- pm.start_servers

- pm.min_spare_servers

- pm.max_spare_servers

sebanyak tiga percobaan dan lakukan testing sebanyak 100 request dengan 10 request/second kemudian berikan hasil analisisnya pada PDF.**(19)**

- pm.max_children:
  - Deskripsi: Menentukan jumlah maksimum child processes yang dapat dibuat.
  - Pengaruh: Parameter ini menentukan berapa banyak permintaan yang dapat ditangani secara bersamaan. Semakin besar nilainya, semakin banyak permintaan yang dapat diproses pada saat yang sama, tetapi ini juga membutuhkan lebih banyak sumber daya (CPU dan RAM).

- pm.start_servers:
  - Deskripsi: Menentukan jumlah proses yang akan dimulai ketika PHP-FPM diaktifkan.
  - Pengaruh: Pengaturan ini membantu mengurangi waktu respon awal dengan memastikan bahwa ada cukup banyak proses siap untuk menangani permintaan segera setelah server diaktifkan. Jika nilai terlalu kecil, permintaan pertama mungkin lambat karena proses baru perlu dibuat.

- pm.min_spare_servers:
  - Deskripsi: Menentukan jumlah minimum child processes yang menganggur (tidak aktif) yang akan dipertahankan.
  - Pengaruh: Memastikan ada sejumlah minimum proses menganggur yang siap menangani permintaan baru tanpa perlu membuat proses baru, yang dapat meningkatkan waktu respon. Jika nilainya terlalu kecil, server mungkin harus sering membuat proses baru.

- pm.max_spare_servers:
  - Deskripsi: Menentukan jumlah maksimum child processes yang menganggur (tidak aktif) yang akan dipertahankan.
  - Pengaruh: Membatasi jumlah proses menganggur untuk menghemat sumber daya. Jika terlalu banyak proses menganggur, sumber daya server bisa terbuang sia-sia. Jika nilainya terlalu kecil, server mungkin harus sering menghentikan proses yang tidak perlu.

1. **Testing #1**

```
pm.max_children = 10
pm.start_servers = 5
pm.min_spare_servers = 2
pm.max_spare_servers = 6
```

Hasil:

```
Server Software:        nginx/1.14.2
Server Hostname:        atreides.IT17.com
Server Port:            80

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

Concurrency Level:      10
Time taken for tests:   1.606 seconds
Complete requests:      100
Failed requests:        0
Total transferred:      61800 bytes
Total body sent:        21600
HTML transferred:       33500 bytes
Requests per second:    62.26 [#/sec] (mean)
Time per request:       160.621 [ms] (mean)
Time per request:       16.062 [ms] (mean, across all concurrent requests)
Transfer rate:          37.57 [Kbytes/sec] received
                        13.13 kb/s sent
                        50.71 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    0   0.3      0       2
Processing:    75  129  68.3    108     370
Waiting:       75  129  68.3    108     370
Total:         75  129  68.5    108     371

Percentage of the requests served within a certain time (ms)
  50%    108
  66%    125
  75%    132
  80%    135
  90%    170
  95%    336
  98%    369
  99%    371
 100%    371 (longest request)
```

- Pengaturan PHP-FPM menunjukkan kapasitas yang cukup untuk menangani permintaan dengan efisiensi tinggi. Tidak ada permintaan gagal yang dilaporkan, yang mengindikasikan stabilitas dan efektivitas load balancer serta konfigurasi PHP-FPM dalam mengelola beban kerja.

- **Request per Second:** sebanyak 62.26, menunjukkan performa yang cukup baik, dan tidak ada kegagalan yang terjadi dan kompleksitas yang mungkin terlibat dalam proses autentikasi login.

2. **Testing #2**

```
pm.max_children = 20
pm.start_servers = 10
pm.min_spare_servers = 4
pm.max_spare_servers = 12
```

Hasil:

```
Server Software:        nginx/1.14.2
Server Hostname:        atreides.IT17.com
Server Port:            80

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

Concurrency Level:      10
Time taken for tests:   1.624 seconds
Complete requests:      100
Failed requests:        0
Total transferred:      61800 bytes
Total body sent:        21600
HTML transferred:       33500 bytes
Requests per second:    61.56 [#/sec] (mean)
Time per request:       162.448 [ms] (mean)
Time per request:       16.245 [ms] (mean, across all concurrent requests)
Transfer rate:          37.15 [Kbytes/sec] received
                        12.98 kb/s sent
                        50.14 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    0   0.4      0       2
Processing:    78  131  66.6    108     363
Waiting:       78  131  66.6    108     363
Total:         78  132  66.9    108     364

Percentage of the requests served within a certain time (ms)
  50%    108
  66%    131
  75%    143
  80%    153
  90%    174
  95%    333
  98%    354
  99%    364
 100%    364 (longest request)
```

- Pengaturan PHP-FPM yang lebih tinggi menunjukkan kapasitas yang memadai untuk menangani permintaan, dengan tidak adanya kegagalan permintaan yang dilaporkan, mengindikasikan stabilitas sistem yang baik.

- **Request per Second :** sedikit lebih rendah (61.56 permintaan per detik) dibandingkan dengan pengujian sebelumnya, meskipun sangat sedikit.

3. Testing #3

```
pm.max_children = 40

pm.start_servers = 20

pm.min_spare_servers = 8

pm.max_spare_servers = 24
```

Hasil:

```
Server Software:        nginx/1.14.2
Server Hostname:        atreides.IT17.com
Server Port:            80

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

Concurrency Level:      10
Time taken for tests:   1.807 seconds
Complete requests:      100
Failed requests:        0
Total transferred:      61800 bytes
Total body sent:        21600
HTML transferred:       33500 bytes
Requests per second:    55.34 [#/sec] (mean)
Time per request:       180.709 [ms] (mean)
Time per request:       18.071 [ms] (mean, across all concurrent requests)
Transfer rate:          33.40 [Kbytes/sec] received
                        11.67 kb/s sent
                        45.07 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    1   2.0      0       9
Processing:    77  148  69.9    132     378
Waiting:       77  148  69.6    132     378
Total:         77  148  70.9    132     387

Percentage of the requests served within a certain time (ms)
  50%    132
  66%    152
  75%    161
  80%    168
  90%    223
  95%    357
  98%    377
  99%    387
 100%    387 (longest request)
```

- **Kapasitas dan Efisiensi:** Meskipun konfigurasi PHP-FPM ditingkatkan, terjadi penurunan dalam throughput menjadi 55.34 permintaan per detik dan peningkatan rata-rata waktu per permintaan menjadi 180.709 ms. Hal ini dapat menunjukkan bahwa ada overhead tambahan dalam manajemen proses yang lebih besar atau bahwa worker lebih sering menunggu ketersediaan sumber daya.

Nampaknya hanya menggunakan PHP-FPM tidak cukup untuk meningkatkan performa dari worker maka implementasikan Least-Conn pada Stilgar. Untuk testing kinerja dari worker tersebut dilakukan sebanyak 100 request dengan 10 request/second. **(20)**

```
Server Software:        nginx/1.14.2
Server Hostname:        atreides.IT17.com
Server Port:            80

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

Concurrency Level:      10
Time taken for tests:   1.178 seconds
Complete requests:      100
Failed requests:        0
Total transferred:      61800 bytes
Total body sent:        21600
HTML transferred:       33500 bytes
Requests per second:    84.90 [#/sec] (mean)
Time per request:       117.783 [ms] (mean)
Time per request:       11.778 [ms] (mean, across all concurrent requests)
Transfer rate:          51.24 [Kbytes/sec] received
                        17.91 kb/s sent
                        69.15 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    0   0.3      0       2
Processing:    74  105  27.6     98     214
Waiting:       74  105  27.6     98     214
Total:         74  105  27.7     99     216

Percentage of the requests served within a certain time (ms)
  50%      99
  66%     107
  75%     117
  80%     127
  90%     145
  95%     161
  98%     189
  99%     216
 100%     216 (longest request)
root@Paul:~#
```

- Algoritma least connections meningkatkan efisiensi distribusi beban di antara worker, yang tercermin dari peningkatan RPS menjadi 84.90 permintaan per detik dan penurunan TPR menjadi 117.783 ms.