

Analisis Grimoire .

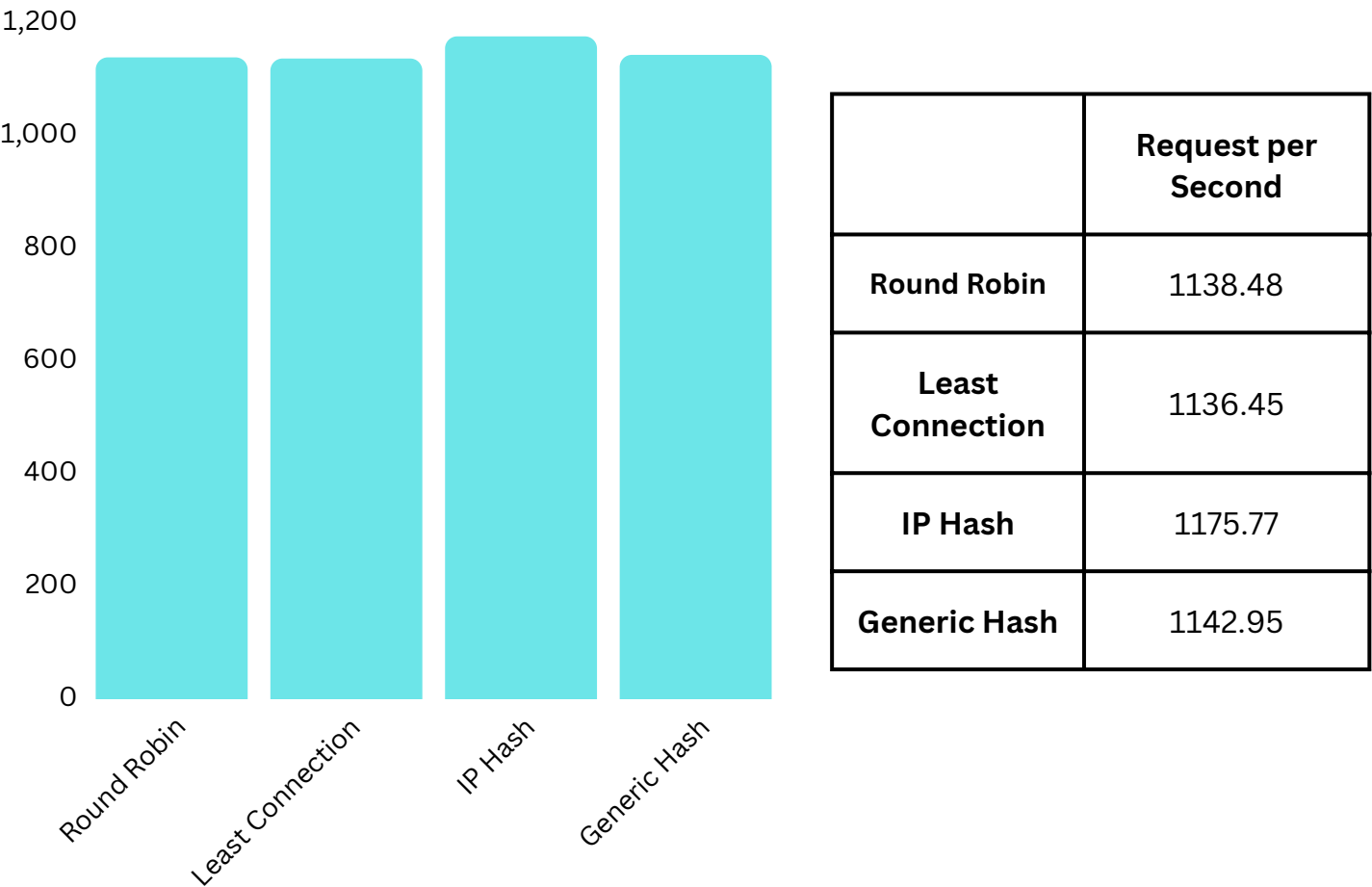
Andrian 5025211079

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Algoritma Load Balancing .

Analisa Jenis - Jenis Algoritma LB

Perbandingan Request per Second



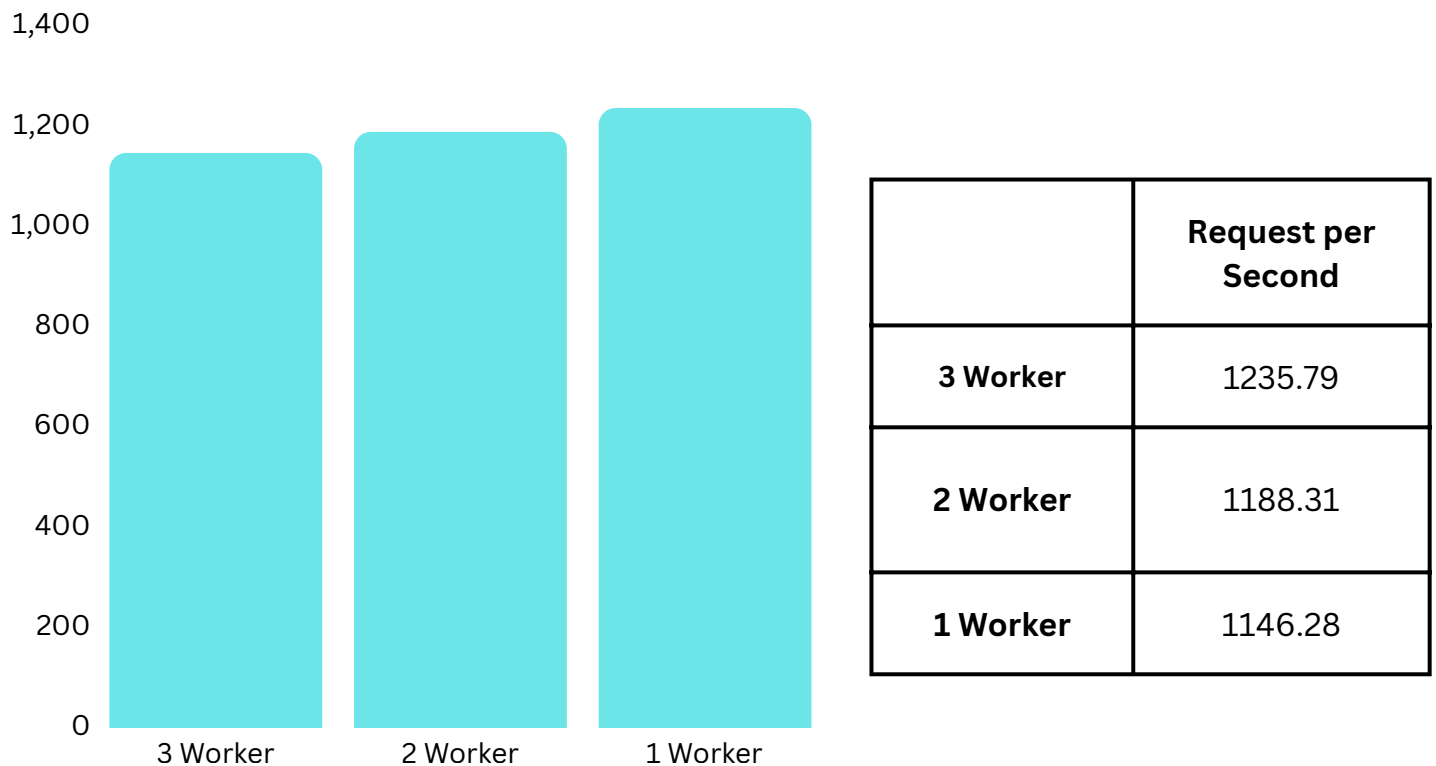
Setiap algoritma dilakukan testing dengan 200 request dan 10 request/second.

Hasil yang didapatkan dari setiap algoritma cenderung mirip, dimana secara rata-rata request per second dari hasil keempat algoritma memiliki nilai yang berdekatan. Untuk algoritma dengan request per second paling tinggi didapatkan oleh algoritma **IP Hash**. Sedangkan request per second paling rendah didapatkan oleh algoritma **Least Connection**.

Dengan skala 200 request, range dari kedua algoritma ini dapat digolongkan cukup besar, dengan perbedaan 39.32 request per second. Jika dibandingkan dengan total request, range dari kedua algoritma mencapai **19.66%**.

Adanya perbedaan dari nilai request per second disebabkan oleh beberapa hal seperti, karakteristik dari sebuah algoritma, kecepatan dalam server menanggapi request, jenis beban kerja, dll.

Perbandingan Request per Second



Dalam konteks algoritma load balancing round robin, peningkatan worker seharusnya meningkatkan kemampuan sistem dalam menangani lebih banyak request per detik. Oleh karena itu, hasil yang didapatkan bertentangan dengan harapan umum. Hal ini dapat terjadi dikarenakan beberapa hal, seperti overhead komunikasi antar worker, dimana **semakin banyak worker, semakin kompleks manajemen komunikasi antar worker**, Resources sharing, semakin sedikit worker, **setiap worker memiliki akses yang lebih baik terhadap sumber sistem**, Skalabilitas Horizontal yang terbatas, **sistem tidak dapat memanfaatkan secara efisien kinerja dari peningkatan worker**, Karakteristik Beban Kerja, terdapat kemungkinan juga bahwa **karakteristik beban kerja lebih cocok dengan penggunaan worker yang lebih sedikit**, dll.

**Hasil Testing
API Request
Pada Riegel Channel
Grimoire .**

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POST /auth/register

```

root@revolte:~# nano register_data2.json
root@revolte:~# ab -n 100 -c 10 -T 'application/json' -p register_data2.json http://192.177.4.1:8001/api/auth/register/
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
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Benchmarking 192.177.4.1 (be patient).....done

Server Software:      nginx/1.14.2
Server Hostname:      192.177.4.1
Server Port:          8001

Document Path:        /api/auth/register/
Document Length:      468 bytes

Concurrency Level:    10
Time taken for tests:  0.934 seconds
Complete requests:    100
Failed requests:       99
   (Connect: 0, Receive: 0, Length: 99, Exceptions: 0)
Non-2xx responses:    99
Total transferred:    299700 bytes
Total body sent:      21300
HTML transferred:     268355 bytes
Requests per second:  107.07 [#/sec] (mean)
Time per request:     93.393 [ms] (mean)
Time per request:     9.339 [ms] (mean, across all concurrent requests)
Transfer rate:        313.38 [Kbytes/sec] received
                      22.27 kb/s sent
                      335.65 kb/s total

Connection Times (ms)
              min    mean[+/-sd] median   max
Connect:        0      0   0.3      0      1
Processing:     17    81  19.6     89    116
Waiting:        17    77  22.2     89    113
Total:          18    81  19.5     89    116

Percentage of the requests served within a certain time (ms)
 50%    89
 66%    93
 75%    95
 80%    97
 90%   101
 95%   106
 98%   116
 99%   116
100%   116 (longest request)

```

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POST /auth/login

```

root@revolte:~# ab -n 100 -c 10 -T 'application/json' -p login_data.json -g login_results.data http://192.177.4.2:8002/api/auth/login
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
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Benchmarking 192.177.4.2 (be patient).....done

Server Software:      nginx/1.14.2
Server Hostname:      192.177.4.2
Server Port:          8002

Document Path:        /api/auth/login
Document Length:      337 bytes

Concurrency Level:    10
Time taken for tests:  3.786 seconds
Complete requests:    100
Failed requests:       40
   (Connect: 0, Receive: 0, Length: 40, Exceptions: 0)
Non-2xx responses:    40
Total transferred:    315789 bytes
Total body sent:      20800
HTML transferred:     284980 bytes
Requests per second:  26.41 [#/sec] (mean)
Time per request:     378.641 [ms] (mean)
Time per request:     37.864 [ms] (mean, across all concurrent requests)
Transfer rate:        81.45 [Kbytes/sec] received
                      5.36 kb/s sent
                      86.81 kb/s total

Connection Times (ms)
              min    mean[+/-sd] median   max
Connect:        0      0   0.3      0      2
Processing:     47   367 245.1    465   777
Waiting:        35   360 252.8    465   777
Total:          47   367 245.1    465   778

Percentage of the requests served within a certain time (ms)
 50%    465
 66%    567
 75%    571
 80%    577
 90%    637
 95%    674
 98%    739
 99%    778
100%    778 (longest request)

```

17 GET /me

```
root@Revolte:~# token=$(cat token.txt); ab -n 1000 -c 10 -H "Authorization: Bearer $token" http://192.177.4.3:8003/api/me
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
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Benchmarking 192.177.4.3 (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Completed 600 requests
Completed 700 requests
Completed 800 requests
Completed 900 requests
Completed 1000 requests
Finished 1000 requests

Server Software:      nginx/1.14.2
Server Hostname:      192.177.4.3
Server Port:          8003

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

Concurrency Level:    10
Time taken for tests:  6.709 seconds
Complete requests:    1000
Failed requests:       875
  (Connect: 0, Receive: 0, Length: 875, Exceptions: 0)
Non-2xx responses:    1000
Total transferred:    6133784 bytes
HTML transferred:     5795250 bytes
Requests per second:  149.05 [#/sec] (mean)
Time per request:     67.090 [ms] (mean)
Time per request:     6.709 [ms] (mean, across all concurrent requests)
Transfer rate:        892.84 [Kbytes/sec] received

Connection Times (ms)
      min   mean[+/-sd] median   max
Connect:    0      0   0.5      0      6
Processing: 15     66   8.2     65    116
Waiting:    15     52  12.0     51    106
Total:      17     67   8.2     65    116

Percentage of the requests served within a certain time (ms)
 50%    65
 66%    67
 75%    69
 80%    71
 90%    75
 95%    81
 98%    93
 99%    98
100%   116 (longest request)
```

Hasil Testing Implementasi PHP-FPM .

Screenshot Hasil .

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```
root@Revolte:~# ab -n 100 -c 10 -T 'application/json' -p register_data2.json
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.al7.com (be patient).....done

Server Software:      nginx/1.14.2
Server Hostname:      riegel.canyon.al7.com
Server Port:          80

Document Path:        /api/auth/register
Document Length:      986424 bytes

Concurrency Level:    10
Time taken for tests:  5.357 seconds
Complete requests:    100
Failed requests:      66
   (Connect: 0, Receive: 0, Length: 66, Exceptions: 0)
Non-2xx responses:    100
Total transferred:    33568700 bytes
Total body sent:      21700
HTML transferred:     33541914 bytes
Requests per second:  18.67 [#/sec] (mean)
Time per request:     535.654 [ms] (mean)
Time per request:     53.565 [ms] (mean, across all concurrent requests)
Transfer rate:        6119.99 [Kbytes/sec] received
                      3.96 kb/s sent
                      6123.94 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:        0    7   6.8      6    27
Processing:    15  491 488.9    282  2265
Waiting:       15  373 423.7    188  2136
Total:         16  498 490.0    292  2277

Percentage of the requests served within a certain time (ms)
 50%    292
 66%    534
 75%    769
 80%   1070
 90%   1248
 95%   1284
 98%   2161
 99%   2277
100%   2277 (longest request)
```

Percobaan
Default.

```
root@Revolte:~# ab -n 100 -c 10 -T 'application/json' -p register_data2.json
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.al7.com (be patient).....done

Server Software:      nginx/1.14.2
Server Hostname:      riegel.canyon.al7.com
Server Port:          80

Document Path:        /api/auth/register
Document Length:      986424 bytes

Concurrency Level:    10
Time taken for tests:  5.357 seconds
Complete requests:    100
Failed requests:      66
   (Connect: 0, Receive: 0, Length: 66, Exceptions: 0)
Non-2xx responses:    100
Total transferred:    33568700 bytes
Total body sent:      21700
HTML transferred:     33541914 bytes
Requests per second:  18.67 [#/sec] (mean)
Time per request:     535.654 [ms] (mean)
Time per request:     53.565 [ms] (mean, across all concurrent requests)
Transfer rate:        6119.99 [Kbytes/sec] received
                      3.96 kb/s sent
                      6123.94 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:        0    7   6.8      6    27
Processing:    15  491 488.9    282  2265
Waiting:       15  373 423.7    188  2136
Total:         16  498 490.0    292  2277

Percentage of the requests served within a certain time (ms)
 50%    292
 66%    534
 75%    769
 80%   1070
 90%   1248
 95%   1284
 98%   2161
 99%   2277
100%   2277 (longest request)
```

Percobaan
Template 1.

```
root@Revolte:~# ab -n 100 -c 10 -T 'application/json' -p register_data2.json
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.al7.com (be patient).....done

Server Software:      nginx/1.14.2
Server Hostname:      riegel.canyon.al7.com
Server Port:          80

Document Path:        /api/auth/register
Document Length:      53 bytes

Concurrency Level:    10
Time taken for tests:  5.520 seconds
Complete requests:    100
Failed requests:      33
   (Connect: 0, Receive: 0, Length: 33, Exceptions: 0)
Non-2xx responses:    100
Total transferred:    32582400 bytes
Total body sent:      21700
HTML transferred:     3255543 bytes
Requests per second:  18.12 [#/sec] (mean)
Time per request:     552.011 [ms] (mean)
Time per request:     55.201 [ms] (mean, across all concurrent requests)
Transfer rate:        5764.15 [Kbytes/sec] received
                      3.84 kb/s sent
                      5767.99 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:        0   13 102.4      0   1026
Processing:    15  444 541.7    132  2312
Waiting:       15  269 354.0    115  2312
Total:         15  458 585.6    140  3338

Percentage of the requests served within a certain time (ms)
 50%    140
 66%    507
 75%    856
 80%    932
 90%   1189
 95%   1638
 98%   1979
 99%   3338
100%   3338 (longest request)
```

Percobaan
Template 2.

```
root@Revolte:~# ab -n 100 -c 10 -T 'application/json' -p register_data2.json
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.al7.com (be patient).....done

Server Software:      nginx/1.14.2
Server Hostname:      riegel.canyon.al7.com
Server Port:          80

Document Path:        /api/auth/register
Document Length:      53 bytes

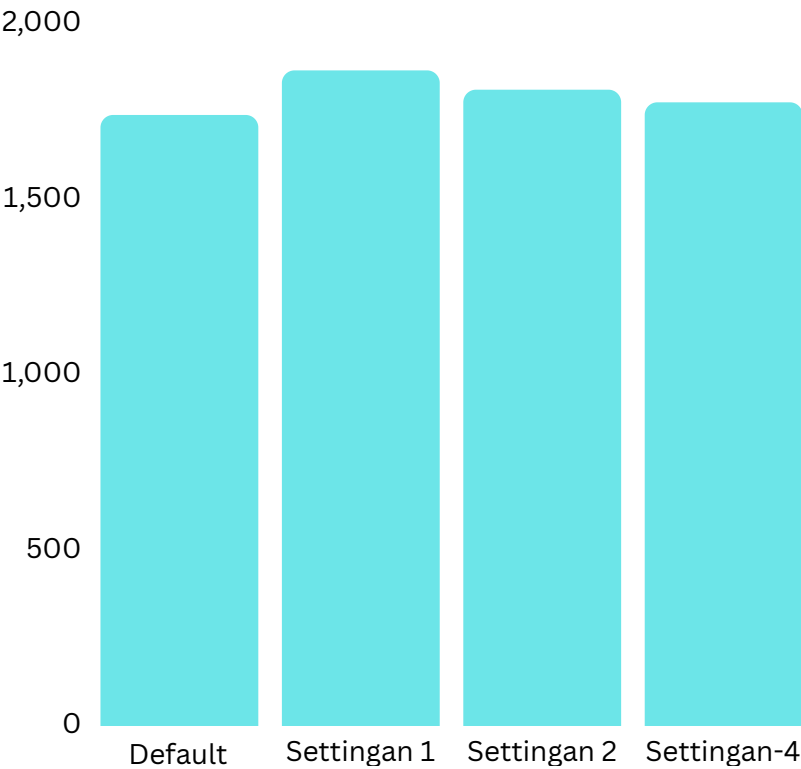
Concurrency Level:    10
Time taken for tests:  5.631 seconds
Complete requests:    100
Failed requests:      33
   (Connect: 0, Receive: 0, Length: 33, Exceptions: 0)
Non-2xx responses:    100
Total transferred:    32582400 bytes
Total body sent:      21700
HTML transferred:     3255543 bytes
Requests per second:  17.76 [#/sec] (mean)
Time per request:     563.099 [ms] (mean)
Time per request:     56.310 [ms] (mean, across all concurrent requests)
Transfer rate:        5650.65 [Kbytes/sec] received
                      3.76 kb/s sent
                      5654.42 kb/s total

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:        0   25 145.8      0   1050
Processing:    13  454 526.3    132  2080
Waiting:       13  264 270.8    119  1173
Total:         13  479 540.6    134  2081

Percentage of the requests served within a certain time (ms)
 50%    134
 66%    550
 75%    971
 80%   1088
 90%   1298
 95%   1559
 98%   1806
 99%   2081
100%   2081 (longest request)
```

Percobaan
Template 3.

Perbandingan Request per Second



	Request per Second
Default	17,40
Settingan 1	18,67
Settingan 2	18,12
Settingan 3	17,76

	Default	Settingan 1	Settingan 2	Settingan 3
max_children	5	20	25	35
start_servers	2	5	20	25
min_spare_servers	1	5	10	15
max_spare_servers	3	10	15	20

Untuk melakukan analisis terhadap implementasi PHP-FM serta perubahan terhadap Request per second, kita dapat melakukan hyperparameter tuning pada konfigurasi PHP-FM untuk mencapai konfigurasi yang paling optimal. Setelah melakukan hyperparameter tuning, pada settingan 1 menghasilkan request per second yang paling tinggi. Sedangkan untuk request per second yang paling rendah terdapat pada settingan default.

Namun berdasarkan modifikasi yang dilakukan kepada konfigurasi sistem, didapatkan bahwa terdapat perbedaan yang tidak signifikan dari konfigurasi sebelumnya. Hal ini dapat diakibatkan oleh beberapa hal, seperti workload yang didapatkan, batasan sumber daya, efek tuning yang terbatas, dll.

Hasil Screenshot

https://drive.google.com/drive/folders/1Oc-0wqFRN2mNxDQeLsGcgkPVPYvFx6f2?usp=drive_link

SEKIAN TERIMA GAJI