

PEMROGRAMAN JARINGAN
TUGAS 10 : PERFORMANCE TEST



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TAHUN PELAJARAN 2019/2020

TUGAS 10

1. Pull update terbaru
2. Jalankan `async_server.py` pada port 9002, 9003, 9004, 9005 (lihat pada BackendList)
3. Jalankan file `lb.py`, jalankan di port 44444
4. Jalankan browser, akseslah <http://localhost:44444/page.html>
5. Lihatlah di log program, bahwa setiap request akan dilayani oleh backend yang bergantian
6. Lakukan performance test seperti pada tugas 9, bandingkan penggunaan load balancer dengan `async_server` dengan `server_thread_http` pada folder `progjar5`
7. Buatlah tabel hasilnya

Jawaban:

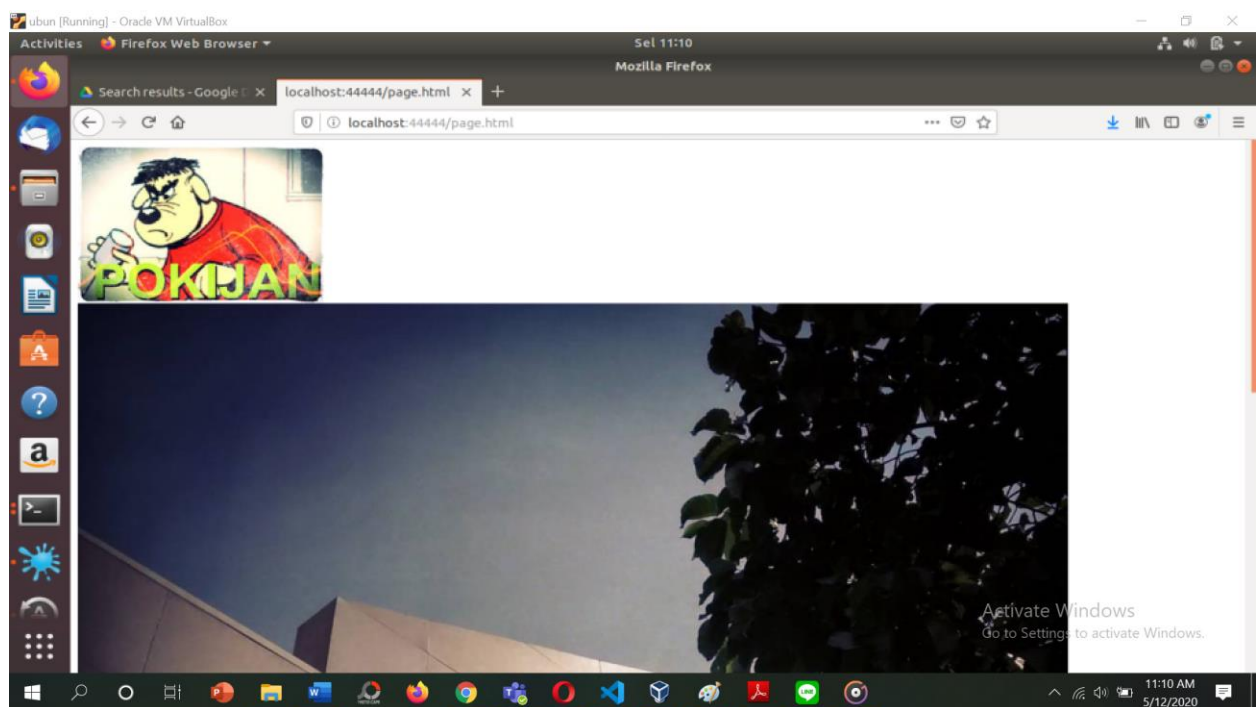
1. Jalankan `async_server.py` pada port 9002,9003,9004, dan 9005 dengan menjalankan file `runserver.sh` dengan command “`bash runserver.sh`”

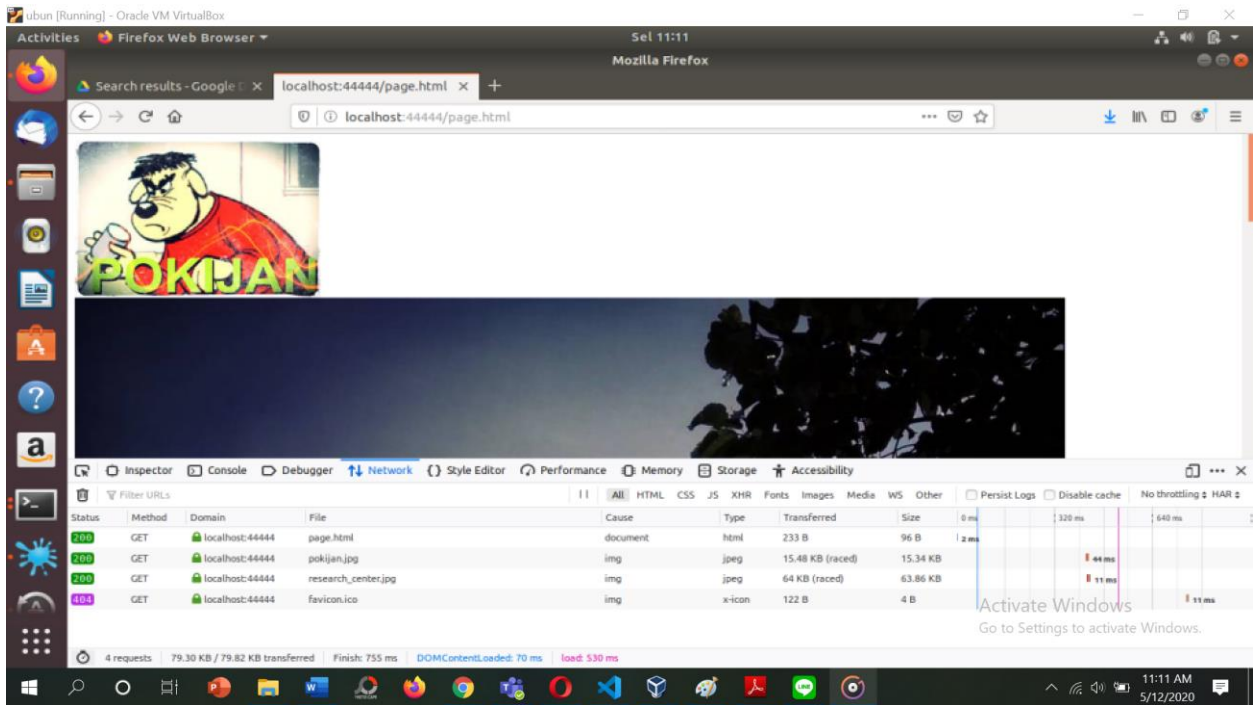
```
celliachintara@celliachintara-VirtualBox:~/Documents/tugas10$ WARNING:root:running on port 9005
WARNING:root:running on port 9003
WARNING:root:running on port 9004
WARNING:root:running on port 9002
```

2. Jalankan file `lb.py` pada port 44444

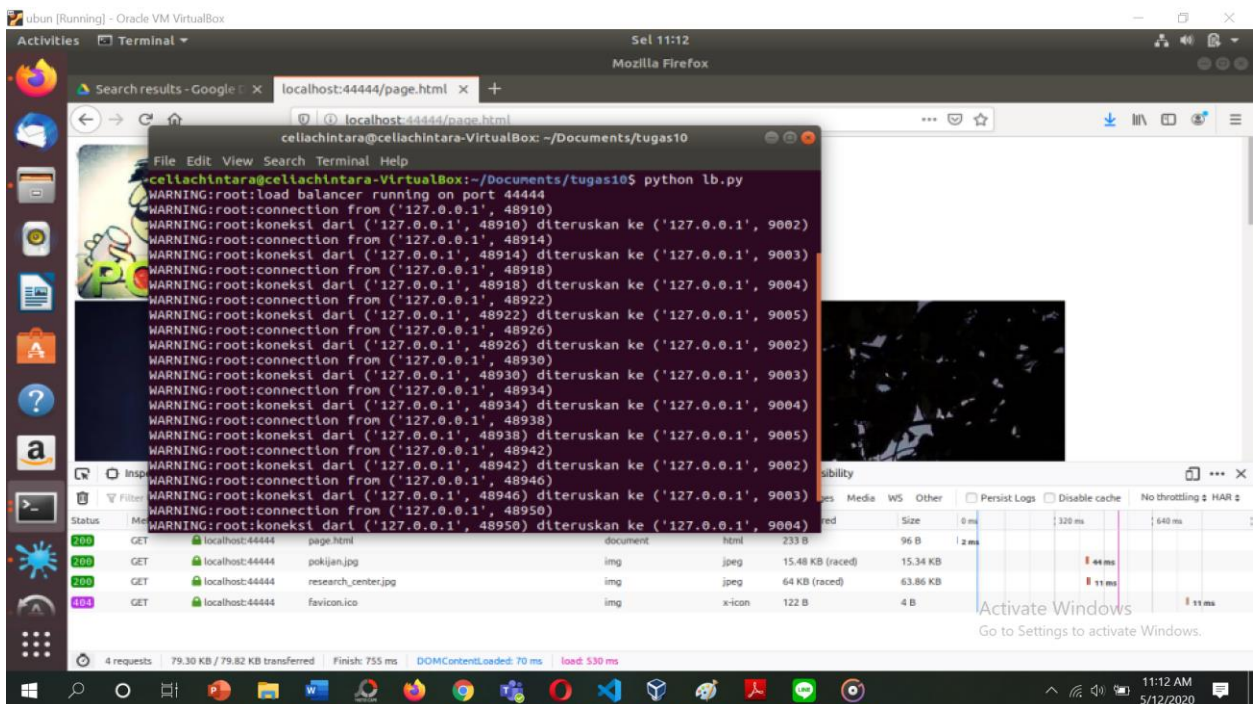
```
celliachintara@celliachintara-VirtualBox:~/Documents/tugas10$ python lb.py
WARNING:root:load balancer running on port 44444
```

3. Akses halaman <http://localhost:44444/page.html>





4. Lihat log program, bahwa setiap request akan dilayani oleh backend yang bergantian



5. Performance Test

Atur request sebesar 1000 request

1) `server_async_http.py` pada port 45000

1.3) Level concurrency 10

```
celiachintara@celiachintara:~$ curl -v http://localhost:8080/
File Edit View Search Terminal Help

Server Software:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          45000

Document Path:        /
Document Length:       4 bytes

Concurrency Level:     10
Time taken for tests:   2.646 seconds
Complete requests:      1000
Failed requests:         0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    377.99 [#/sec] (mean)
Time per request:        26.456 [ms] (mean)
Time per request:        2.646 [ms] (mean, across all concurrent requests)
Transfer rate:           45.03 [Kbytes/sec] received


Connection Times (ms)
  min    mean[+/-sd] median   max
Connect:    0       6  78.3      0   1030
Processing:   1      19  14.9     18    426
Waiting:     0      19  14.9     18    425
Total:       4      25  87.2     18   1432


Percentage of the requests served within a certain time (ms)
 50%    18
 66%    20
 75%    21
 80%    21
 90%    23
 95%    25
 98%    30
 99%    32
100%   1432 (longest request)
```

1.4) Level concurrency 15

```

cellachintara@cellachin
File Edit View Search Terminal Help

Server Software:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          45000

Document Path:        /
Document Length:      4 bytes

Concurrency Level:     15
Time taken for tests:  1.904 seconds
Complete requests:     1000
Failed requests:        0
Non-2xx responses:     1000
Total transferred:     122800 bytes
HTML transferred:      4000 bytes
Requests per second:   525.09 [#/sec] (mean)
Time per request:      28.567 [ms] (mean)
Time per request:      1.904 [ms] (mean, across all concurrent requests)
Transfer rate:         62.56 [Kbytes/sec] received

Connection Times (ms)
  min      mean[+/-sd] median   max
Connect:    0      9  96.4      0    1028
Processing:  6     17  60.0     12    840
Waiting:    6     17  60.0     12    840
Total:      6     26 150.0     12   1860

Percentage of the requests served within a certain time (ms)
 50%    12
 66%    13
 75%    14
 80%    15
 90%    16
 95%    18
 98%    32
 99%    42
100%   1860 (longest request)

```

1.5) Level concurrency 50


```
cellachintara@cellachintara:~$ curl -v http://127.0.0.1:45000/
* Host 127.0.0.1:45000 was resolved
* Connected to 127.0.0.1:45000 (0.000s)
> GET / HTTP/1.1
* HTTP/1.1 200 OK (text/html)
* Transfer rate: 8.33 [Kbytes/sec] received
* Total transfer time: 0.000s
* Complete requests: 1000
* Failed requests: 0
* Non-2xx responses: 0
* Total transferred: 122000 bytes
* HTML transferred: 4000 bytes
* Requests per second: 69.89 [#sec] (mean)
* Time per request: 715.365 [ms] (mean)
* Time per request: 14.307 [ms] (mean, across all concurrent requests)
* Transfer rate: 8.33 [Kbytes/sec] received

Connection Times (ms)
  min      mean[+/-sd] median   max
Connect:    0    46 210.4      0    1031
Processing:  4   195 1201.7     15   13290
Waiting:    4   195 1201.7     15   13290
Total:      4   241 1355.0     16   14302

Percentage of the requests served within a certain time (ms)
 50%    16
 66%    17
 75%    19
 80%    19
 90%    22
 95%    37
 98%   4311
 99%   7638
100%  14302 (longest request)
```

1.6) Level concurrency 100

```
cellachintara@cellachintara:~$ curl -v http://127.0.0.1:45000/
* Host 127.0.0.1:45000 was resolved
* Connected to 127.0.0.1:45000 (0.000s)
> GET / HTTP/1.1
* HTTP/1.1 200 OK (text/html)
* Transfer rate: 2.13 [Kbytes/sec] received
* Total transfer time: 0.000s
* Complete requests: 1000
* Failed requests: 0
* Non-2xx responses: 0
* Total transferred: 122000 bytes
* HTML transferred: 4000 bytes
* Requests per second: 17.88 [#sec] (mean)
* Time per request: 5594.054 [ms] (mean)
* Time per request: 55.941 [ms] (mean, across all concurrent requests)
* Transfer rate: 2.13 [Kbytes/sec] received

Connection Times (ms)
  min      mean[+/-sd] median   max
Connect:    0   106 311.0      0    1039
Processing:  3   748 4847.4     19   54908
Waiting:    3   748 4847.4     19   54908
Total:      3   854 4993.2     19   55933

Percentage of the requests served within a certain time (ms)
 50%    19
 66%    21
 75%    23
 80%    25
 90%   1028
 95%   2767
 98%   7806
 99%  27773
100% 55933 (longest request)
```

2) server_thread_http.py pada port 46000

No test	Concurrency Level	Time taken for test (second)	Complete request	Failed request	Total transferred (bytes)	Request per second [#sec]	Time per request [ms]	Transfer rate [Kbytes/sec]
1	1	2.278	1000	0	122000	439.02	2.278	52.31
2	5	3.476	1000	0	122000	287.71	3.476	34.28
3	10	3.486	1000	0	122000	286.88	3.486	34.18
4	15	3.865	1000	0	122000	258.76	3.865	30.83

5	50	7.806	1000	0	122000	128.11	7.806	15.26
6	100	4.372	1000	0	122000	228.74	4.372	27.25

2.1) Level concurrency 1

```

cellachintara@cellachintara:~$ curl -x 127.0.0.1 -v http://127.0.0.1:46000/
File Edit View Search Terminal Help

Server Software:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          46000

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    1
Time taken for tests:  2.278 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  439.02 [#/sec] (mean)
Time per request:      2.278 [ms] (mean)
Time per request:      2.278 [ms] (mean, across all concurrent requests)
Transfer rate:         52.31 [Kbytes/sec] received

Connection Times (ms)
  min    mean[+/-sd] median   max
Connect:  0       0   0.1      0     2
Processing: 1       2   1.6      2    25
Waiting:    1       2   1.6      2    24
Total:      1       2   1.6      2    25

Percentage of the requests served within a certain time (ms)
 50%    2
 66%    2
 75%    2
 80%    3
 90%    4
 95%    5
 98%    7
 99%    8
100%   25 (longest request)

```

2.2) Level concurrency 5

```

cellachintara@cellachintara:~$ curl -x 127.0.0.1 -v http://127.0.0.1:46000/
File Edit View Search Terminal Help

Server Software:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          46000

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    5
Time taken for tests:  3.476 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  287.71 [#/sec] (mean)
Time per request:      17.378 [ms] (mean)
Time per request:      3.476 [ms] (mean, across all concurrent requests)
Transfer rate:         34.28 [Kbytes/sec] received

Connection Times (ms)
  min    mean[+/-sd] median   max
Connect:  0       5  72.1      0  1024
Processing: 2      11  26.7     10   847
Waiting:    0      11  26.7     10   847
Total:      3      16  87.4     10  1871

Percentage of the requests served within a certain time (ms)
 50%    10
 66%    11
 75%    12
 80%    12
 90%    14
 95%    15
 98%    18
 99%    27
100%  1871 (longest request)

```

2.3) Level concurrency 10

```
File Edit View Search Terminal Help
```

```
Server Software:      myserver/1.0
Server Hostname:     127.0.0.1
Server Port:         46000

Document Path:       /
Document Length:     4 bytes

Concurrency Level:    10
Time taken for tests: 3.486 seconds
Complete requests:   1000
Failed requests:      0
Non-2xx responses:   1000
Total transferred:   122000 bytes
HTML transferred:    4000 bytes
Requests per second: 286.88 [#/sec] (mean)
Time per request:    34.858 [ms] (mean)
Time per request:    3.486 [ms] (mean, across all concurrent requests)
Transfer rate:        34.18 [Kbytes/sec] received

Connection Times (ms)
```

	n/n	mean[+/-sd]	median	max
Connect:	0	17 204.9	0	3048
Processing:	2	11 22.4	9	438
Waiting:	0	11 22.3	9	437
Total:	2	28 220.5	9	3456

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

	%
50%	9
66%	10
75%	11
80%	12
90%	14
95%	19
98%	26
99%	103
100%	3456 (longest request)

2.4) Level concurrency 15

```
celiachintara@celiachintara
File Edit View Search Terminal Help

Server Software:      myserver/1.0
Server Hostname:     127.0.0.1
Server Port:         46000

Document Path:       /
Document Length:     4 bytes

Concurrency Level:    15
Time taken for tests: 3.865 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  258.76 [#/sec] (mean)
Time per request:     57.968 [ms] (mean)
Time per request:     3.865 [ms] (mean, across all concurrent requests)
Transfer rate:        30.83 [Kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd]      median      max
Connect:    0      12 191.2      0      3027
Processing:  2      12 31.7      10      834
Waiting:    2      12 31.7      10      834
Total:      2      24 217.6      10      3861

Percentage of the requests served within a certain time (ms)
 50%    10
 66%    11
 75%    12
 80%    12
 90%    13
 95%    14
 98%    18
 99%    23
100% 3861 (longest request)
```

2.5) Level concurrency 50


```

File Edit View Search Terminal Help
Server Software:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          46000

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    50
Time taken for tests:  7.806 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  128.11 [#/sec] (mean)
Time per request:     390.301 [ms] (mean)
Time per request:     7.806 [ms] (mean, across all concurrent requests)
Transfer rate:        15.26 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:      0   11 106.6      0   1030
Processing:    2   31 336.4      9   6753
Waiting:      0   31 336.4      9   6753
Total:        2   42 410.0      9   7776

Percentage of the requests served within a certain time (ms)
 50%    9
 66%   10
 75%   11
 80%   11
 90%   13
 95%   15
 98%   24
 99%  1022
100%  7776 (longest request)

```

2.6) Level concurrency 100

```

File Edit View Search Terminal Help
Server Software:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          46000

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    100
Time taken for tests:  4.372 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  228.74 [#/sec] (mean)
Time per request:     437.174 [ms] (mean)
Time per request:     4.372 [ms] (mean, across all concurrent requests)
Transfer rate:        27.25 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:      0   11 107.0      0   1031
Processing:    2   16 117.4     10   3297
Waiting:      2   16 117.4     10   3297
Total:        2   28 191.3     10   4328

Percentage of the requests served within a certain time (ms)
 50%   10
 66%   12
 75%   12
 80%   13
 90%   15
 95%   17
 98%   36
 99%  1030
100%  4328 (longest request)

```

3) load balancer pada port 44444

No test	Concurrency Level	Time taken for test (second)	Complete request	Failed request	Total transferred (bytes)	Request per second [#/sec]	Time per request [ms]	Transfer rate [Kbytes/sec]
1	1	2.417	1000	0	122000	413.69	2.417	49.29
2	5	1.988	1000	0	122000	502.97	1.988	59.92
3	10	2.459	1000	0	122000	406.66	2.459	48.45
4	15	2.216	1000	0	122000	451.35	2.216	53.77

5	50	54.132	1000	0	122000	18.47	54.132	2.20
6	100	173.820	969	31	118218	5.57	179.380	0.66

3.1) Level concurrency 1

```

celiachintara@celiachintara-VirtualB
File Edit View Search Terminal Help

Server Software:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    1
Time taken for tests:  2.417 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  413.09 [#/sec] (mean)
Time per request:      2.417 [ms] (mean)
Time per request:      2.417 [ms] (mean, across all concurrent requests)
Transfer rate:         49.29 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0       0  0.1      0     4
Processing:      1       2  1.7      2    18
Waiting:         1       2  1.6      1    17
Total:           1       2  1.7      2    18

Percentage of the requests served within a certain time (ms)
 50%    2
 66%    3
 75%    3
 80%    3
 90%    4
 95%    5
 98%    7
 99%    9
100%   18 (longest request)

```

3.2) Level concurrency 5

```

celiachintara@celiachintara-VirtualB
File Edit View Search Terminal Help

Server Software:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    5
Time taken for tests:  1.988 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  502.97 [#/sec] (mean)
Time per request:      9.941 [ms] (mean)
Time per request:      1.988 [ms] (mean, across all concurrent requests)
Transfer rate:         59.92 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0       0  0.2      0     5
Processing:      2      10  3.3     10    28
Waiting:         1       8  3.3      8    27
Total:           2      10  3.3     10    28

Percentage of the requests served within a certain time (ms)
 50%    10
 66%    11
 75%    11
 80%    12
 90%    14
 95%    15
 98%    19
 99%    22
100%   28 (longest request)

```

3.3) Level concurrency 10

```

cellachintara@cellachintara-Virtual
File Edit View Search Terminal Help

Server Software:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    10
Time taken for tests:  2.459 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  406.66 [#/sec] (mean)
Time per request:     24.591 [ms] (mean)
Time per request:     2.459 [ms] (mean, across all concurrent requests)
Transfer rate:        48.45 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:      0   4  64.1      0   1023
Processing:    7  20   4.7     19    43
Waiting:       5  18   4.5     17    42
Total:         7  24  64.3     20  1038

Percentage of the requests served within a certain time (ms)
 50%    20
 66%    21
 75%    23
 80%    24
 90%    26
 95%    28
 98%    32
 99%    35
100%   1038 (longest request)

```

3.4) Level concurrency 15

```

cellachintara@cellachintara-Virtual
File Edit View Search Terminal Help

Server Software:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    15
Time taken for tests:  2.216 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  451.35 [#/sec] (mean)
Time per request:     33.234 [ms] (mean)
Time per request:     2.216 [ms] (mean, across all concurrent requests)
Transfer rate:        53.77 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:      0   9  96.3      0   1023
Processing:    5  21  49.7     17   898
Waiting:       4  19  49.7     15   894
Total:         5  31 134.9     17  1917

Percentage of the requests served within a certain time (ms)
 50%    17
 66%    19
 75%    20
 80%    21
 90%    25
 95%    33
 98%    41
 99%    63
100%   1917 (longest request)

```

3.5) Level concurrency 50

```
cellachintara@cellachintara-VirtualBo
File Edit View Search Terminal Help

Server Software:      nyserver/1.0
Server Hostname:      127.0.0.1
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    50
Time taken for tests:  54.132 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  18.47 [#/sec] (mean)
Time per request:     2706.596 [ms] (mean)
Time per request:     54.132 [ms] (mean, across all concurrent requests)
Transfer rate:        2.20 [Kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd] median   max
Connect:    0   44 209.4      0   1032
Processing:  3   649 4707.6    17  53096
Waiting:    2   647 4707.8    15  53096
Total:      5   694 4843.1    17  54128

Percentage of the requests served within a certain time (ms)
 50%    17
 66%    18
 75%    19
 80%    20
 90%    23
 95%    29
 98%   7796
 99%  27501
100%  54128 (longest request)
```

3.6) Level concurrency 100

```
cellachintara@cellachintara-VirtualBo
File Edit View Search Terminal Help

Server Software:      nyserver/1.0
Server Hostname:      127.0.0.1
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    100
Time taken for tests:  173.820 seconds
Complete requests:    969
Failed requests:       0
Non-2xx responses:    969
Total transferred:    118218 bytes
HTML transferred:     3876 bytes
Requests per second:  5.57 [#/sec] (mean)
Time per request:     17938.044 [ms] (mean)
Time per request:     179.380 [ms] (mean, across all concurrent requests)
Transfer rate:        0.66 [Kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd] median   max
Connect:    0   65 248.7      0   1017
Processing:  7  1517 9802.4    16 106595
Waiting:    6  1515 9802.6    14 106594
Total:      7  1582 9950.1    17 107611

Percentage of the requests served within a certain time (ms)
 50%    17
 66%    18
 75%    19
 80%    20
 90%    24
 95%   2684
 98%   27483
 99%   54361
100% 107611 (longest request)
```

6. Kesimpulan

Dari hasil performance test pada server async, server thread, dan dengan load balancer, dapat dilihat dari hasil yang tertera pada table-table diatas bahwa server dengan load balancer memiliki performa yang lebih baik dari pada server yang lainnya.

