

Pemrograman Jaringan B
Laporan Performance Test
Tugas 10



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Dokumentasi Tugas 10

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:

Tabel Hasil Benchmark **Asynchronous Server dengan Load Balancer.**

No test	Concurrency level	Time taken for test [seconds]	Complete request	Failed request	Total transferred [bytes]	Request per second [#/sec]	Time per request [ms]	Transfer rate [Kbytes/sec]
1	1	5.056	1000	0	122000	197.80	5.056	23.57
2	5	2.973	1000	0	122000	336.34	14.866	40.07
3	10	50.154	1000	0	122000	19.94	501.537	2.38
4	50	66.487	1000	0	122000	15.04	3324.360	1.79
5	100	66.988	1000	0	122000	14.93	6698.846	1.78
6	250	67.005	1000	0	122000	14.92	16751.242	1.78
7	500	68.477	1000	0	122000	14.60	34238.582	1.74
8	1000	72.944	1000	0	122000	13.71	72943.633	1.63

Screenshots:

Concurrency Level 1

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    1
Time taken for tests:  5.056 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  197.80 [#/sec] (mean)
Time per request:     5.056 [ms] (mean)
Time per request:     5.056 [ms] (mean, across all concurrent requests)
Transfer rate:        23.37 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:      0   0   0.4      0      1
Processing:   1   3   3.3      2     13
Waiting:      0   3   3.3      2     12
Total:        1   3   3.2      2     13

Percentage of the requests served within a certain time (ms)
 50%    2
 66%    2
 75%    3
 80%    3
 90%   11
 95%   12
 98%   12
 99%   12
100%   13 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 5

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    5
Time taken for tests:  2.973 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  336.34 [#/sec] (mean)
Time per request:     14.866 [ms] (mean)
Time per request:     2.973 [ms] (mean, across all concurrent requests)
Transfer rate:        40.07 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:      0   0   0.4      0      1
Processing:   2   5   1.4      4      9
Waiting:      2   4   1.2      4      8
Total:        2   5   1.4      4      9

Percentage of the requests served within a certain time (ms)
 50%    4
 66%    5
 75%    6
 80%    6
 90%    7
 95%    7
 98%    8
 99%    8
100%    9 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 10

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    10
Time taken for tests:  50.154 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  19.94 [#/sec] (mean)
Time per request:     501.537 [ms] (mean)
Time per request:     50.154 [ms] (mean, across all concurrent requests)
Transfer rate:        2.38 [kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median   max
Connect:      0    48 146.9      0     503
Processing:    6   433 296.7    504   1007
Waiting:      4    372 218.1    502   511
Total:        6   481 338.2    504  1008

Percentage of the requests served within a certain time (ms)
 50%    504
 66%    505
 75%    506
 80%   1003
 90%   1005
 95%   1006
 98%   1006
 99%   1007
100%   1008 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 50

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    50
Time taken for tests:  66.487 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  15.04 [#/sec] (mean)
Time per request:     3324.360 [ms] (mean)
Time per request:     66.487 [ms] (mean, across all concurrent requests)
Transfer rate:        1.79 [kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median   max
Connect:      0    64 167.3      0     503
Processing:    7  3088 472.9   3024   3527
Waiting:      2  1834 880.8   2012   3522
Total:        8  3152 481.8   3026   3529

Percentage of the requests served within a certain time (ms)
 50%   3026
 66%   3520
 75%   3523
 80%   3523
 90%   3524
 95%   3526
 98%   3526
 99%   3527
100%   3529 (longest request)

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#
```

Concurrency Level 100

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    100
Time taken for tests:  66.988 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  14.93 [#/sec] (mean)
Time per request:     6698.846 [ms] (mean)
Time per request:     66.988 [ms] (mean, across all concurrent requests)
Transfer rate:        1.78 [kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd] median   max
Connect:    0      65 167.9      0     509
Processing:  5 6117 1210.8    6544   7047
Waiting:    2 3961 1757.1    4028   7037
Total:      5 6182 1211.1    6547   7054

Percentage of the requests served within a certain time (ms)
 50%    6547
 66%    6550
 75%    6552
 80%    6553
 90%    7038
 95%    7043
 98%    7045
 99%    7047
100%    7054 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 250

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    250
Time taken for tests:  67.005 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  14.92 [#/sec] (mean)
Time per request:     16751.242 [ms] (mean)
Time per request:     67.005 [ms] (mean, across all concurrent requests)
Transfer rate:        1.78 [kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd] median   max
Connect:    0      65 167.9      0     509
Processing: 14 14065 4165.8   15629  17607
Waiting:    2  8166  4736.5    8063   17595
Total:      14 14130 4166.3   15632  17608

Percentage of the requests served within a certain time (ms)
 50%   15632
 66%   16125
 75%   16131
 80%   16133
 90%   17102
 95%   17108
 98%   17601
 99%   17604
100%   17608 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 500

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    500
Time taken for tests:  68.477 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  14.60 [#/sec] (mean)
Time per request:     34238.582 [ms] (mean)
Time per request:     68.477 [ms] (mean, across all concurrent requests)
Transfer rate:        1.74 [kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd] median   max
Connect:    0      66 169.6      0     502
Processing: 30 24474 10996.0 31245  35198
Waiting:    2 16788 9752.1 16628  35184
Total:      30 24541 10999.1 31246  35200

Percentage of the requests served within a certain time (ms)
 50%  31246
 66%  32735
 75%  33714
 80%  33723
 90%  34695
 95%  35185
 98%  35192
 99%  35194
100%  35200 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 1000

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    1000
Time taken for tests:  72.944 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  13.71 [#/sec] (mean)
Time per request:     72943.633 [ms] (mean)
Time per request:     72.944 [ms] (mean, across all concurrent requests)
Transfer rate:        1.63 [kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd] median   max
Connect:    0      71 174.3      0     502
Processing: 61 35529 20540.9 35226  70880
Waiting:    2 35429 20553.7 35196  70872
Total:      61 35600 20540.6 35725  70880

Percentage of the requests served within a certain time (ms)
 50%  35725
 66%  46778
 75%  53305
 80%  56822
 90%  64350
 95%  67866
 98%  69875
 99%  70378
100%  70880 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Tabel Hasil Benchmark **Thread Server**.

No test	Concurrency level	Time taken for test [seconds]	Complete request	Failed request	Total transferred [bytes]	Request per second [#/sec]	Time per request [ms]	Transfer rate [Kbytes/sec]
1	1	148.444	1000	0	122000	6.74	148.444	0.80
2	5	282.335	1000	0	122000	3.54	1411.677	0.42
3	10	391.393	1000	0	122000	2.55	3913.930	0.30
4	50	252.264	1000	0	122000	3.96	12613.218	0.47
5	100	252.266	1000	0	122000	3.96	25226.610	0.47
6	250	266.864	1000	0	122000	3.75	66716.100	0.45
7	500	344.041	1000	0	122000	2.91	172020.514	0.35
8	1000	569.898	1000	0	122000	1.75	569898.083	0.21

Screenshots:

Concurrency Level 1

```

XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:       4 bytes

Concurrency Level:     1
Time taken for tests:   148.444 seconds
Complete requests:      1000
Failed requests:         0
Non-2xx responses:      0
Total transferred:      122000 bytes
HTML transferred:       4800 bytes
Requests per second:    6.74 [#/sec] (mean)
Time per request:       148.444 [ms] (mean)
Time per request:       148.444 [ms] (mean, across all concurrent requests)
Transfer rate:          0.80 [Kbytes/sec] received

Connection Times (ms)
      min    mean[+/-sd] median   max
Connect:    0      0  0.4      0      1
Processing:  1  146  93.3    138    485
Waiting:    1  136  87.9    127    485
Total:       1  146  93.3    138    485

Percentage of the requests served within a certain time (ms)
 50%    138
 66%    179
 75%    206
 80%    225
 90%    275
 95%    316
 98%    368
 99%    404
100%    485 (longest request)

elang@ELANG-NITROS c:\xampp
#

```

Concurrency Level 5

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:       4 bytes

Concurrency Level:     5
Time taken for tests:  282.335 seconds
Complete requests:     1000
Failed requests:        0
Non-2xx responses:     1000
Total transferred:     122000 bytes
HTML transferred:      4000 bytes
Requests per second:   3.54 [#/sec] (mean)
Time per request:      1411.677 [ms] (mean)
Time per request:      282.335 [ms] (mean, across all concurrent requests)
Transfer rate:         0.42 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:        0   264 252.3    500   1003
Processing:    500 1133 266.5   1003   2677
Waiting:       291  981 351.2   1003   2677
Total:         501 1397 337.3   1503   2789

Percentage of the requests served within a certain time (ms)
 50%    1503
 66%    1504
 75%    1505
 80%    1507
 90%    1821
 95%    2007
 98%    2218
 99%    2348
100%    2789 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 10

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:       4 bytes

Concurrency Level:     10
Time taken for tests:  391.393 seconds
Complete requests:     1000
Failed requests:        0
Non-2xx responses:     1000
Total transferred:     122000 bytes
HTML transferred:      4000 bytes
Requests per second:   2.55 [#/sec] (mean)
Time per request:      391.930 [ms] (mean)
Time per request:      391.393 [ms] (mean, across all concurrent requests)
Transfer rate:         0.30 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:        0   388 309.4    501   1506
Processing:   1142 3487 790.2   3508   6020
Waiting:       236 2664 917.1   2507   5520
Total:       2093 3875 850.0   4008   6523

Percentage of the requests served within a certain time (ms)
 50%    4008
 66%    4014
 75%    4512
 80%    4515
 90%    5014
 95%    5512
 98%    5515
 99%    6011
100%    6523 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 50


```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    50
Time taken for tests:  252.264 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  3.96 [#/sec] (mean)
Time per request:     12613.218 [ms] (mean)
Time per request:     252.264 [ms] (mean, across all concurrent requests)
Transfer rate:         0.47 [Kbytes/sec] received

Connection Times (ms)
  min  mean[+/-sd] median  max
Connect:    0   250 250.7      1   505
Processing: 162 11978 1559.4 12034 12538
Waiting:    1 6205 3462.0   6017 12034
Total:      502 12229 1539.2 12530 12538

Percentage of the requests served within a certain time (ms)
 50% 12530
 66% 12530
 75% 12531
 80% 12532
 90% 12533
 95% 12535
 98% 12536
 99% 12537
100% 12538 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Tubagus Irkham

Concurrency Level 100

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    100
Time taken for tests:  252.266 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  3.96 [#/sec] (mean)
Time per request:     25226.610 [ms] (mean)
Time per request:     252.266 [ms] (mean, across all concurrent requests)
Transfer rate:         0.47 [Kbytes/sec] received

Connection Times (ms)
  min  mean[+/-sd] median  max
Connect:    0   250 250.6      1   504
Processing: 212 23575 4342.1 24555 25058
Waiting:    9 12345 7168.1 12521 25055
Total:      509 23825 4334.9 25052 25557

Percentage of the requests served within a certain time (ms)
 50% 25052
 65% 25054
 75% 25055
 80% 25055
 90% 25056
 95% 25057
 98% 25057
 99% 25058
100% 25557 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 250

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:       4 bytes

Concurrency Level:    250
Time taken for tests:  266.864 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  3.75 [#/sec] (mean)
Time per request:     66716.100 [ms] (mean)
Time per request:     266.864 [ms] (mean, across all concurrent requests)
Transfer rate:         0.45 [Kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd] median   max
Connect:    0   264 258.2   500   1004
Processing: 801 53003 14681.6  62649  75180
Waiting:    280 33683 19220.0  34077  74180
Total:      970 58266 14651.3  62654  75181

Percentage of the requests served within a certain time (ms)
 50%  62654
 66%  63642
 75%  64155
 80%  64658
 90%  66660
 95%  69674
 98%  72680
 99%  74178
100%  75181 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 500

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:       4 bytes

Concurrency Level:    500
Time taken for tests:  344.041 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  2.91 [#/sec] (mean)
Time per request:     172020.514 [ms] (mean)
Time per request:     344.041 [ms] (mean, across all concurrent requests)
Transfer rate:         0.35 [Kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd] median   max
Connect:    0   340 276.3   501   1503
Processing: 888 131690 53483.6 161371 181927
Waiting:    862 87407 50270.3  89202 180921
Total:     1388 132031 53458.1 161377 181928

Percentage of the requests served within a certain time (ms)
 50%  161377
 66%  169903
 75%  171414
 80%  172920
 90%  175919
 95%  179419
 98%  180425
 99%  180924
100%  181928 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Concurrency Level 1000

```
XAMPP for Windows
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:      myserver/1.0
Server Hostname:      localhost
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    1000
Time taken for tests:  569.898 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  1.75 [#/sec] (mean)
Time per request:     569898.083 [ms] (mean)
Time per request:     569.898 [ms] (mean, across all concurrent requests)
Transfer rate:        0.21 [kbytes/sec] received

Connection Times (ms)
      min    mean[./-sd]  median    max
Connect:    0   563.374.1    502     2007
Processing: 3667 208330 163704.9 307849 563837
Waiting:    440 297738 163771.6 307321 563397
Total:      4079 298893 163646.8 308349 563837

Percentage of the requests served within a certain time (ms)
 50%   308349
 66%   394557
 75%   442152
 80%   471209
 90%   517088
 95%   541854
 98%   555883
 99%   560398
100%   563837 (longest request)

Elang@ELANG-NITROS c:\xampp
#
```

Kesimpulan

Dari hasil benchmark yang telah dilakukan diatas, bisa disimpulkan bahwa penggunaan asynchronous server yang ditambah dengan load balancer jauh lebih baik daripada thread server.