PERFORMANCE TEST

PEMROGRAMAN JARINGAN - B

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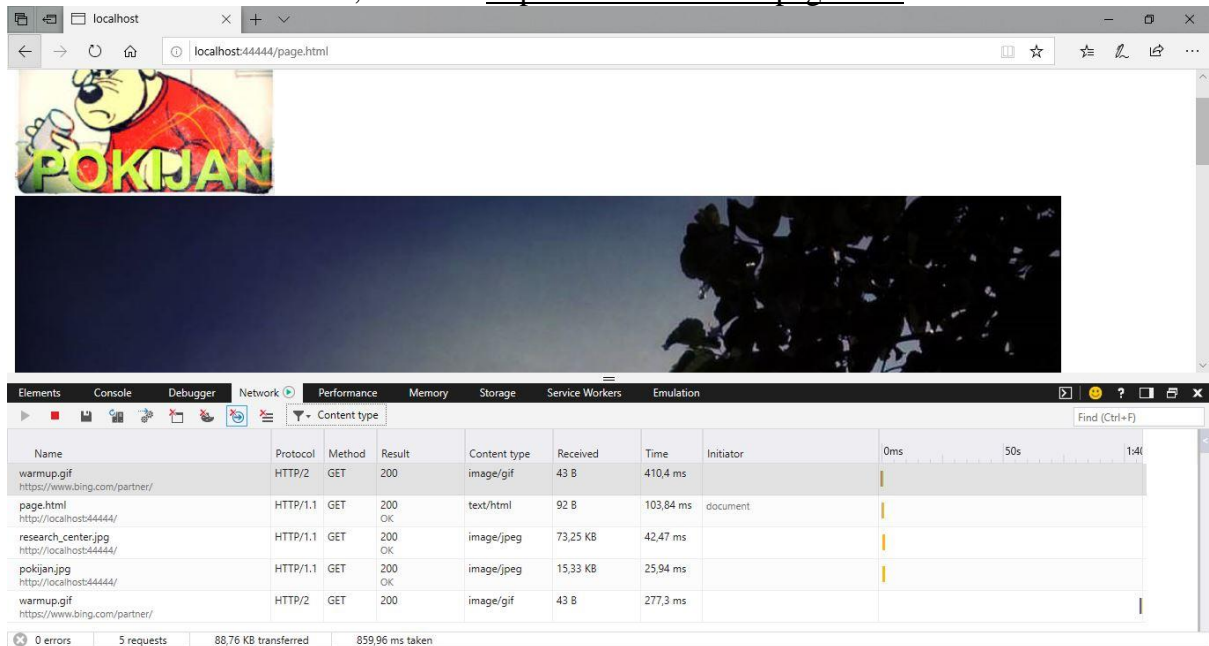Institut Teknologi Sepuluh Nopember (ITS)
Surabaya
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A. Langkah-langkah
1. Pull update terbaru
2. Jalankan async_server.py pada port 9002, 9003, 9004, 9005 (lihat pada BackendList)

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

   Dari screenshot diatas dapat kita lihat bahwa setiap request 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
   Jumlah Request   : 1000
   Konkurensi   : 1,50,100,250,500,1000
7. Buatlah tabel hasilnya

B. Hasil Performace Test
1. Server Async

No test	Concurrency level	Time taken for test	Complete request	Failed request	Total transferred	Request per second	Time per request	Transfer rate
1	1	1.192 seconds	1000	0	122000 bytes	839.14 [#/sec]	1.192 [ms]	99.98 [Kbytes /sec]
2	50	58.461 seconds	1000	0	122000 bytes	17.11 [#/sec]	58.461 [ms]	2.04 [Kbytes /sec]
3	100	57.493 seconds	1000	0	122000 bytes	17.39 [#/sec]	57.493 [ms]	2.07 [Kbytes /sec]
4	250	58.013 seconds	1000	0	122000 bytes	17.24 [#/sec]	58.013 [ms]	2.05 [Kbytes /sec]
5	500	59.020 seconds	1000	0	122000 bytes	16.94 [#/sec]	59.020 [ms]	2.02 [Kbytes /sec]
6	1000	62.574 seconds	1000	0	122000 bytes	15.98 [#/sec]	62.574 [ms]	1.90 [Kbytes /sec]

2. Server Thread

No test	Concurrency level	Time taken for test	Complete request	Failed request	Total transferred	Request per second	Time per request	Transfer rate
1	1	462.873 seconds	1000	0	122000 bytes	2.16 [#/sec]	462.873 [ms]	0.26 [Kbytes /sec]
2	50	260.294 seconds	1000	0	122000 bytes	3.84 [#/sec]	260.294 [ms]	0.46 [Kbytes /sec]
3	100	266.165 seconds	1000	0	122000 bytes	3.76 [#/sec]	266.165 [ms]	0.45 [Kbytes /sec]
4	250	271.513 seconds	1000	0	122000 bytes	3.68 [#/sec]	271.513 [ms]	0.44 [Kbytes /sec]
5	500	271.825 seconds	1000	0	122000 bytes	3.68 [#/sec]	271.825 [ms]	0.44 [Kbytes /sec]
6	1000	262.716 seconds	1000	0	122000 bytes	3.81 [#/sec]	262.716 [ms]	0.45 [Kbytes /sec]

3. Server Async Dengan Load Balancer

No test	Concurrency level	Time taken for test	Complete request	Failed request	Total transferred	Request per second	Time per request	Transfer rate
1	1	1.824 seconds	1000	0	122000 bytes	548.39 [#/sec]	1.824 [ms]	65.34 [Kbytes/sec]
2	50	52.137 seconds	1000	0	122000 bytes	19.18 [#/sec]	52.137 [ms]	2.29 [Kbytes/sec]
3	100	52.977 seconds	1000	0	122000 bytes	18.88 [#/sec]	52.977 [ms]	2.25 [Kbytes/sec]
4	250	52.506 seconds	1000	0	122000 bytes	19.05 [#/sec]	52.506 [ms]	2.27 [Kbytes/sec]
5	500	55.271 seconds	1000	0	122000 bytes	18.09 [#/sec]	55.271 [ms]	2.16 [Kbytes/sec]
6	1000	60.039 seconds	1000	0	122000 bytes	16.66 [#/sec]	60.039 [ms]	1.98 [Kbytes/sec]

C. Kesimpulan

Dari ketiga tabel performance test tersebut dapat kita lihat bahwa asyncronus server yang menggunakan load balancer memproses lebih cepat dibandingkan asyncronus server biasa dan multithread server yang menandakan bahwa performa asyncronus server yang menggunakan load balancer lebih baik dibandingkan asyncronus server biasa dan multithread server. Load balancer disini bertugas untuk mendistrubusikan request ke backend yang didefinisikan di class BackendList. Di dalam load balancer terdapat fungsi getserver pada class Backendlist yang akan membuat backend dipilih secara round robin atau bergantian secara fair sehingga setiap request akan dilayani oleh backend yang bergantian.

D. Capture Performance Test
1. Server Async Concurrency 1

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      1
Time taken for tests:   1.192 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    839.14 [#/sec] (mean)
Time per request:       1.192 [ms] (mean)
Time per request:       1.192 [ms] (mean, across all concurrent requests)
Transfer rate:          99.98 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    0   0.8      0       4
Processing:     0    1   2.2      0      44
Waiting:        0    1   2.2      0      44
Total:          0    1   2.3      0      44

Percentage of the requests served within a certain time (ms)
  50%      0
  66%      0
  75%      4
  80%      4
  90%      4
  95%      4
  98%      4
  99%      4
 100%     44 (longest request)
```

2. Server Async Concurrency 50

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      50
Time taken for tests:   58.461 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    17.11 [#/sec] (mean)
Time per request:       2923.054 [ms] (mean)
Time per request:       58.461 [ms] (mean, across all concurrent requests)
Transfer rate:          2.04 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0   58 160.8      0     508
Processing:     4 2803 428.1   3043    3061
Waiting:        0 1591 803.4   1528    3051
Total:          4 2861 423.1   3044    3552

Percentage of the requests served within a certain time (ms)
  50%   3044
  66%   3047
  75%   3049
  80%   3051
  90%   3055
  95%   3058
  98%   3061
  99%   3547
 100%   3552 (longest request)
```

3. Server Async Concurrency 100

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      100
Time taken for tests:   57.493 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    17.39 [#/sec] (mean)
Time per request:       5749.350 [ms] (mean)
Time per request:       57.493 [ms] (mean, across all concurrent requests)
Transfer rate:          2.07 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    57 159.4      0     506
Processing:    12  5406 1088.3   5595    6584
Waiting:        4  3032 1673.8   3045    6069
Total:         12  5463 1091.8   5597    6584

Percentage of the requests served within a certain time (ms)
  50%   5597
  66%   5647
  75%   6094
  80%   6097
  90%   6099
  95%   6101
  98%   6104
  99%   6105
 100%   6584 (longest request)
```

4. Server Async Concurrency 250

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      250
Time taken for tests:   58.013 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    17.24 [#/sec] (mean)
Time per request:       14503.150 [ms] (mean)
Time per request:       58.013 [ms] (mean, across all concurrent requests)
Transfer rate:          2.05 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    58 160.2      0     508
Processing:    48 12539 3802.3  14233   15729
Waiting:        0  7614 4280.7   7632   15708
Total:         48 12597 3803.0  14237   15729

Percentage of the requests served within a certain time (ms)
  50%  14237
  66%  14253
  75%  14736
  80%  14740
  90%  15223
  95%  15240
  98%  15725
  99%  15727
 100%  15729 (longest request)
```

5. Server Async Concurrency 500

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      500
Time taken for tests:   59.020 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    16.94 [#/sec] (mean)
Time per request:       29510.021 [ms] (mean)
Time per request:       59.020 [ms] (mean, across all concurrent requests)
Transfer rate:          2.02 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    59 161.4      0     508
Processing:    88 21673 9517.0  27489   31458
Waiting:        0 14981 8622.3  14763   31431
Total:         88 21732 9519.3  27490   31458

Percentage of the requests served within a certain time (ms)
  50%  27490
  66%  28487
  75%  29472
  80%  29953
  90%  30458
  95%  30950
  98%  31450
  99%  31453
 100%  31458 (longest request)
```

6. Server Async Concurrency 1000

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      1000
Time taken for tests:   62.574 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    15.98 [#/sec] (mean)
Time per request:       62573.843 [ms] (mean)
Time per request:       62.574 [ms] (mean, across all concurrent requests)
Transfer rate:          1.90 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    62 165.3      0     508
Processing:   156 31410 18032.3  31092   62466
Waiting:        0 31272 18061.4  31020   62430
Total:        156 31473 18031.9  31592   62466

Percentage of the requests served within a certain time (ms)
  50%  31592
  66%  41212
  75%  47280
  80%  50311
  90%  56393
  95%  59936
  98%  61454
  99%  62434
 100%  62466 (longest request)
```

7. Server Thread Concurrency 1

```
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:   462.873 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    2.16 [#/sec] (mean)
Time per request:       462.873 [ms] (mean)
Time per request:       462.873 [ms] (mean, across all concurrent requests)
Transfer rate:          0.26 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    0   0.4      0       1
Processing:     2  463 254.5    474    1374
Waiting:        1  438 245.3    448    1303
Total:          2  463 254.5    474    1374

Percentage of the requests served within a certain time (ms)
  50%    474
  66%    576
  75%    638
  80%    680
  90%    790
  95%    891
  98%    999
  99%   1084
 100%   1374 (longest request)
```

8. Server Thread Concurrency 50

```
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:   260.294 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    3.84 [#/sec] (mean)
Time per request:       13014.693 [ms] (mean)
Time per request:       260.294 [ms] (mean, across all concurrent requests)
Transfer rate:          0.46 [Kbytes/sec] received

Connection Times (ms)
              min   mean[+/-sd] median   max
Connect:        0   260 252.6    500    1001
Processing:   376 12451 1610.8  12537  14042
Waiting:        2  6825 3620.3   7015  14041
Total:        875 12711 1600.9  13032  14541

Percentage of the requests served within a certain time (ms)
  50%  13032
  66%  13037
  75%  13534
  80%  13537
  90%  13541
  95%  14038
  98%  14042
  99%  14539
 100%  14541 (longest request)
```

9. Server Thread Concurrency 100

```
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:   266.165 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    3.76 [#/sec] (mean)
Time per request:       26616.548 [ms] (mean)
Time per request:       266.165 [ms] (mean, across all concurrent requests)
Transfer rate:          0.45 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0   265 253.4    501    1013
Processing:   554 25084 4594.7  26064   31108
Waiting:        2 13558 7598.5  13529   30102
Total:        901 25350 4588.2  26071   31609

Percentage of the requests served within a certain time (ms)
  50%   26071
  66%   26574
  75%   27077
  80%   27572
  90%   28080
  95%   30093
  98%   30605
  99%   31107
 100%   31609 (longest request)
```

10. Server Thread Concurrency 250

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      250
Time taken for tests:   271.513 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    3.68 [#/sec] (mean)
Time per request:       67878.346 [ms] (mean)
Time per request:       271.513 [ms] (mean, across all concurrent requests)
Transfer rate:          0.44 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0   270 255.0    501    1002
Processing:   928 59659 17200.7  64684   73207
Waiting:        1 33885 19564.9  34084   72702
Total:       1019 59930 17192.0  64693   73208

Percentage of the requests served within a certain time (ms)
  50%   64693
  66%   69205
  75%   71199
  80%   71698
  90%   72202
  95%   72701
  98%   73203
  99%   73204
 100%   73208 (longest request)
```

11. Server Thread Concurrency 500

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      500
Time taken for tests:   271.825 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    3.68 [#/sec] (mean)
Time per request:       135912.603 [ms] (mean)
Time per request:       271.825 [ms] (mean, across all concurrent requests)
Transfer rate:          0.44 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0  271 258.8    501    1002
Processing:   604 104105 42115.4 128848  143879
Waiting:        1 69613 39468.0  70184  143874
Total:        854 104377 42096.3 129345  143880

Percentage of the requests served within a certain time (ms)
  50%  129345
  66%  131850
  75%  134356
  80%  136366
  90%  140365
  95%  142369
  98%  143368
  99%  143871
 100%  143880 (longest request)
```

12. Server Thread Concurrency 1000

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      1000
Time taken for tests:   262.716 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    3.81 [#/sec] (mean)
Time per request:       262716.463 [ms] (mean)
Time per request:       262.716 [ms] (mean, across all concurrent requests)
Transfer rate:          0.45 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0  262 253.5    501    1001
Processing:   962 134557 75128.2 136383  261674
Waiting:        2 134256 75161.2 135852  261660
Total:       1071 134819 75114.9 136385  261674

Percentage of the requests served within a certain time (ms)
  50%  136385
  66%  177473
  75%  200024
  80%  212551
  90%  237614
  95%  250143
  98%  257663
  99%  260169
 100%  261674 (longest request)
```

13. Server Async + Load Balancer Concurrency 1

```
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:   1.824 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    548.39 [#/sec] (mean)
Time per request:       1.824 [ms] (mean)
Time per request:       1.824 [ms] (mean, across all concurrent requests)
Transfer rate:          65.34 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    0   2.3      0      68
Processing:     0    1   2.0      0      16
Waiting:        0    1   1.9      0      16
Total:          0    2   3.0      0      72

Percentage of the requests served within a certain time (ms)
  50%      0
  66%      4
  75%      4
  80%      4
  90%      4
  95%      4
  98%      4
  99%      4
 100%     72 (longest request)
```

14. Server Async + Load Balancer Concurrency 50

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      50
Time taken for tests:   52.137 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    19.18 [#/sec] (mean)
Time per request:       2606.845 [ms] (mean)
Time per request:       52.137 [ms] (mean, across all concurrent requests)
Transfer rate:          2.29 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0   52 152.6      0     508
Processing:    12 2495 414.2   2556    3066
Waiting:        0 1672 668.1   1543    2560
Total:         12 2547 415.9   2557    3069

Percentage of the requests served within a certain time (ms)
  50%   2557
  66%   2561
  75%   2563
  80%   2565
  90%   3054
  95%   3057
  98%   3061
  99%   3065
 100%   3069 (longest request)
```

15. Server Async + Load Balancer Concurrency 100

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      100
Time taken for tests:   52.977 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    18.88 [#/sec] (mean)
Time per request:       5297.695 [ms] (mean)
Time per request:       52.977 [ms] (mean, across all concurrent requests)
Transfer rate:          2.25 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    53  153.0      1     502
Processing:    19  4980 1010.7   5099    6087
Waiting:        2  2840 1546.3   3043    5584
Total:         19  5032 1015.9   5100    6088

Percentage of the requests served within a certain time (ms)
  50%   5100
  66%   5585
  75%   5592
  80%   5597
  90%   5600
  95%   5601
  98%   5605
  99%   6084
 100%   6088 (longest request)
```

16. Server Async + Load Balancer Concurrency 250

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      250
Time taken for tests:   52.506 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    19.05 [#/sec] (mean)
Time per request:       13126.600 [ms] (mean)
Time per request:       52.506 [ms] (mean, across all concurrent requests)
Transfer rate:          2.27 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    52  152.3      1     503
Processing:    29 11262 3537.3  12747   14714
Waiting:        1  6955 3876.6   7101   14689
Total:         29 11314 3539.4  12748   15202

Percentage of the requests served within a certain time (ms)
  50%  12748
  66%  12756
  75%  12788
  80%  13250
  90%  14209
  95%  14690
  98%  14707
  99%  14712
 100%  15202 (longest request)
```

17. Server Async + Load Balancer Concurrency 500

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      500
Time taken for tests:   55.271 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    18.09 [#/sec] (mean)
Time per request:       27635.440 [ms] (mean)
Time per request:       55.271 [ms] (mean, across all concurrent requests)
Transfer rate:          2.16 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    55 156.5      0     508
Processing:    92 20132 8985.6  25169   30022
Waiting:        0 14009 8068.2  13897   30003
Total:         92 20187 8989.0  25172   30022

Percentage of the requests served within a certain time (ms)
  50%   25172
  66%   26588
  75%   27554
  80%   28054
  90%   29027
  95%   29518
  98%   30015
  99%   30022
 100%   30022 (longest request)
```

18. Server Async + Load Balancer Concurrency 1000

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      1000
Time taken for tests:   60.039 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    16.66 [#/sec] (mean)
Time per request:       60039.097 [ms] (mean)
Time per request:       60.039 [ms] (mean, across all concurrent requests)
Transfer rate:          1.98 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    60 162.6      0     508
Processing:   104 30005 17339.2  30054   59971
Waiting:        4 29897 17352.1  30006   59947
Total:        108 30065 17339.3  30054   59971

Percentage of the requests served within a certain time (ms)
  50%   30054
  66%   39696
  75%   45271
  80%   47808
  90%   54393
  95%   56928
  98%   58959
  99%   59951
 100%   59971 (longest request)
```