

LAPORAN TUGAS 10



Kelas :

Pemrograman Jaringan - B

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Tugas 10

1. Menjalankan `async_server.py` dengan jumlah 4 port yaitu 9002, 9003, 9004, 9005 dengan menjalankan `runserver.sh`

```
alfia@alfia-X455LD:~/Desktop/progjar-b-its-2020-master/Tugas10$ bash runserver.sh
alfia@alfia-X455LD:~/Desktop/progjar-b-its-2020-master/Tugas10$ WARNING:root:running on port 9004
WARNING:root:running on port 9005
WARNING:root:running on port 9003
WARNING:root:running on port 9002
WARNING:root:connection from ('127.0.0.1', 51280)
WARNING:root:connection from ('127.0.0.1', 53382)
WARNING:root:connection from ('127.0.0.1', 57634)
WARNING:root:connection from ('127.0.0.1', 59318)
```

2. Lalu step kedua yaitu menjalankan `lb.py` pada port 44444

```
alfia@alfia-X455LD:~/Desktop/progjar-b-its-2020-master/Tugas10$ python lb.py
WARNING:root:load balancer running on port 44444
```

3. Mencoba mengakses <http://localhost:44444/page.html> pada browser



4. hasil log di program, bahwa setiap request dilayani oleh backend yang bergantian

```
alfia@alfia-X455LD:~/Desktop/progjar-b-its-2020-master/Tugas10$ python lb.py
WARNING:root:load balancer running on port 44444
WARNING:root:connection from ('127.0.0.1', 54306)
WARNING:root:koneksi dari ('127.0.0.1', 54306) diteruskan ke ('127.0.0.1', 9002)
WARNING:root:connection from ('127.0.0.1', 54310)
WARNING:root:koneksi dari ('127.0.0.1', 54310) diteruskan ke ('127.0.0.1', 9003)
WARNING:root:connection from ('127.0.0.1', 54318)
WARNING:root:koneksi dari ('127.0.0.1', 54318) diteruskan ke ('127.0.0.1', 9004)
WARNING:root:connection from ('127.0.0.1', 54324)
WARNING:root:koneksi dari ('127.0.0.1', 54324) diteruskan ke ('127.0.0.1', 9005)
```

Perbandingan Uji Coba Test

1. Server Asynchronous + load balancer

A. Concurrent Level 1

```
alfia@alfia-X455LD:~/Desktop/progjar-b-its-2020-master/Tugas10$ ab -n 1000 -c 1 http://127.0.0.1:4444/
This is ApacheBench, Version 2.3 <$Revision: 1874286 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 127.0.0.1 (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:      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:  1.088 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  918.96 [#/sec] (mean)
Time per request:      1.088 [ms] (mean)
Time per request:      1.088 [ms] (mean, across all concurrent requests)
Transfer rate:         109.49 [Kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median    max
Connect:        0      0   0.0      0      0
Processing:      1      1   1.0      1     28
Waiting:         1      1   1.0      1     28
Total:           1      1   1.1      1     29

Percentage of the requests served within a certain time (ms)
 50%      1
 66%      1
 75%      1
 80%      1
 90%      1
 95%      1
 98%      2
 99%      3
100%     29 (longest request)
```

B. Concurrent Level 5

```
alfie@alfia-X455LD:~/Desktop/progjar-b-its-2020-master/Tugas10$ ab -n 1000 -c 5 http://127.0.0.1:4444/
This is ApacheBench, Version 2.3 <$Revision: 1874286 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 127.0.0.1 (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:      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:  0.574 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  1740.94 [#/sec] (mean)
Time per request:      2.872 [ms] (mean)
Time per request:      0.574 [ms] (mean, across all concurrent requests)
Transfer rate:         207.42 [Kbytes/sec] received


Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0        0   0.0      0      0
Processing:      1        3   0.7      3      9
Waiting:         1        2   0.8      2      9
Total:           1        3   0.7      3      9


Percentage of the requests served within a certain time (ms)
 50%    3
 66%    3
 75%    3
 80%    3
 90%    4
 95%    4
 98%    5
 99%    6
100%    9 (longest request)
```

C. Concurrent Level 10

```
alfie@alfia-X455LD:~/Desktop/progjar-b-its-2020-master/Tugas10$ ab -n 1000 -c 10 http://127.0.0.1:4444/
This is ApacheBench, Version 2.3 <$Revision: 1874286 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 127.0.0.1 (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:      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:  0.573 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  1746.59 [#/sec] (mean)
Time per request:     5.725 [ms] (mean)
Time per request:     0.573 [ms] (mean, across all concurrent requests)
Transfer rate:        208.09 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0         0   0.1      0       1
Processing:      1         4   1.0      4      12
Waiting:         1         3   0.9      3      11
Total:           1         4   1.0      4      12

Percentage of the requests served within a certain time (ms)
 50%    4
 66%    4
 75%    4
 80%    4
 90%    5
 95%    6
 98%    7
 99%    8
100%   12 (longest request)
```

D. Concurrent Level 25

```
alfia@alfia-X455LD:~/Desktop/progjar-b-its-2020-master/Tugas10$ ab -n 1000 -c 25 http://127.0.0.1:4444/
This is ApacheBench, Version 2.3 <$Revision: 1874286 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 127.0.0.1 (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:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    25
Time taken for tests:  0.596 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  1676.59 [#/sec] (mean)
Time per request:     14.911 [ms] (mean)
Time per request:     0.596 [ms] (mean, across all concurrent requests)
Transfer rate:        199.75 [Kbytes/sec] received

Connection Times (ms)
  min   mean[+/-sd] median   max
Connect:    0      0   0.2      0      2
Processing:  1      5   9.4      5     212
Waiting:    1      5   9.4      4     211
Total:      1      5   9.4      5     212

Percentage of the requests served within a certain time (ms)
 50%    5
 66%    5
 75%    5
 80%    6
 90%    7
 95%    8
 98%   10
 99%   12
100%  212 (longest request)
```

E. Concurrent Level 50

```
alfia@alfia-X455LD:~/Desktop/progjar-b-its-2020-master/Tugas10$ ab -n 1000 -c 50 http://127.0.0.1:4444/
This is ApacheBench, Version 2.3 <$Revision: 1874286 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 127.0.0.1 (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:      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:  0.578 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  1730.79 [#/sec] (mean)
Time per request:     28.889 [ms] (mean)
Time per request:     0.578 [ms] (mean, across all concurrent requests)
Transfer rate:        206.21 [Kbytes/sec] received

Connection Times (ms)
      min   mean[+/-sd] median   max
Connect:    0      0   0.3      0      3
Processing:  2      4   1.1      4     12
Waiting:    1      3   1.0      3     11
Total:      2      4   1.2      4     13

Percentage of the requests served within a certain time (ms)
 50%      4
 66%      4
 75%      4
 80%      4
 90%      5
 95%      6
 98%      9
 99%     10
100%     13 (longest request)
alfia@alfia-X455LD:~/Desktop/progjar-b-its-2020-master/Tugas10$
```

2. Server Thread

A. Concurrent Level 1

```
alfia@alfia-X455LD:~$ ab -n 1000 -c 1 http://127.0.0.1:46000/
This is ApacheBench, Version 2.3 <Revision: 1874286 >
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 127.0.0.1 (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:      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:  1.126 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  888.47 [#/sec] (mean)
Time per request:     1.126 [ms] (mean)
Time per request:     1.126 [ms] (mean, across all concurrent requests)
Transfer rate:        105.85 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    0   0.0      0     0
Processing:      0    1   0.4      1     5
Waiting:        0    1   0.4      1     5
Total:          1    1   0.4      1     5

Percentage of the requests served within a certain time (ms)
 50%    1
 66%    1
 75%    1
 80%    1
 90%    1
 95%    1
 98%    2
 99%    3
100%    5 (longest request)
```

B. Concurrent Level 5

```
alfia@alfia-X455LD:~$ ab -n 1000 -c 5 http://127.0.0.1:46000/
This is ApacheBench, Version 2.3 <Revision: 1874286 >
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 127.0.0.1 (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:      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:  1.244 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  803.62 [#/sec] (mean)
Time per request:     6.222 [ms] (mean)
Time per request:     1.244 [ms] (mean, across all concurrent requests)
Transfer rate:        95.74 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    3  55.6      0  1022
Processing:      1    3   1.1      2    12
Waiting:        1    3   1.0      2    12
Total:          1    6  55.7      2  1027

Percentage of the requests served within a certain time (ms)
 50%    2
 66%    3
 75%    3
 80%    3
 90%    4
 95%    5
 98%    6
 99%    7
100%  1027 (longest request)
```


C. Concurrent Level 10

```
alfia@alfia-X455LD:~$ ab -n 1000 -c 10 http://127.0.0.1:46000/
This is ApacheBench, Version 2.3 <$Revision: 1874286 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 127.0.0.1 (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:      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:  1.852 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  539.95 [#/sec] (mean)
Time per request:     18.520 [ms] (mean)
Time per request:     1.852 [ms] (mean, across all concurrent requests)
Transfer rate:        64.33 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0       8   90.7      0    1021
Processing:      1       5   35.7      2     834
Waiting:         1       5   35.7      2     834
Total:          1      13  128.4      3    1851

Percentage of the requests served within a certain time (ms)
 50%    3
 66%    3
 75%    3
 80%    4
 90%    4
 95%    5
 98%    7
 99%    8
100%   1851 (longest request)
```

D. Concurrent Level 25

```
alfia@alfia-X455LD:~$ ab -n 1000 -c 25 http://127.0.0.1:46000/
This is ApacheBench, Version 2.3 <$Revision: 1874286 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 127.0.0.1 (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:      myserver/1.0
Server Hostname:      127.0.0.1
Server Port:          46000

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    25
Time taken for tests:  7.756 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  128.94 [#/sec] (mean)
Time per request:     193.894 [ms] (mean)
Time per request:     7.756 [ms] (mean, across all concurrent requests)
Transfer rate:        15.36 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0      22  148.2      0    1032
Processing:      1      27  277.0      3    6754
Waiting:         1      27  276.9      3    6754
Total:          1      49  380.2      3    7754

Percentage of the requests served within a certain time (ms)
 50%    3
 66%    4
 75%    4
 80%    4
 90%    5
 95%    6
 98%   1025
 99%   1841
100%   7754 (longest request)
```

E. Concurrent Level 50

```
alfia@alfia-x455L0:~$ ab -n 1000 -c 50 http://127.0.0.1:46000/
This is ApacheBench, Version 2.3 <$Revision: 1874286 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 127.0.0.1 (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

ab -n 1000 -c 1 http://127.0.0.1:46000/

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:  1.242 seconds
Complete requests:    1000
Failed requests:       0
Non-2xx responses:    1000
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  805.01 [#/sec] (mean)
Time per request:     62.111 [ms] (mean)
Time per request:     1.242 [ms] (mean, across all concurrent requests)
Transfer rate:        95.91 [Kbytes/sec] received

Connection Times (ms)
  min   mean[+/-sd] median   max
Connect:    0     5  71.4      0   1022
Processing:   1     3   9.2      2    209
Waiting:     1     3   9.2      2    209
Total:       1     8  77.6      2   1216

Percentage of the requests served within a certain time (ms)
 50%    2
 66%    3
 75%    3
 80%    3
 90%    4
 95%    5
 98%    6
 99%    7
100%   1216 (longest request)
```

Tabel Hasil Performance

Asynchronous + Load balancer

No.	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	1.088	1000	0	122000	918.96	1.088	109.49
2	5	0.574	1000	0	122000	1740.94	0.574	207.42
3	10	0.573	1000	0	122000	1746.59	0.573	208.09
4	25	0.596	1000	0	122000	1676.59	0.596	199.75
5	50	0.578	1000	0	122000	1730.79	0.578	206.21

Thread

No.	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	1.126	1000	0	122000	888.47	1.126	105.85
2	5	1.244	1000	0	122000	803.62	1.244	95.74
3	10	1.852	1000	0	122000	539.95	1.852	64.33
4	25	7.756	1000	0	122000	128.94	7.756	15.36
5	50	1.242	1000	0	122000	805.01	1.242	95.91

Kesimpulan

Dari hasil yang didapat, dapat disimpulkan bahwa Server Asynchronous + load balancer memiliki performa yang jauh lebih baik dari server multithread. Karena kecepatan yang ada pada Server Asynchronous + load balancer, baik dari transfer rate maupun waktu yang dibutuhkan Server Asynchronous+load balancer lebih unggul dibanding server multithread.