

# **Laporan Tugas 10**



**Mata Kuliah :**

**Pemrograman Jaringan**

**Kelas : B**

**Oleh :**

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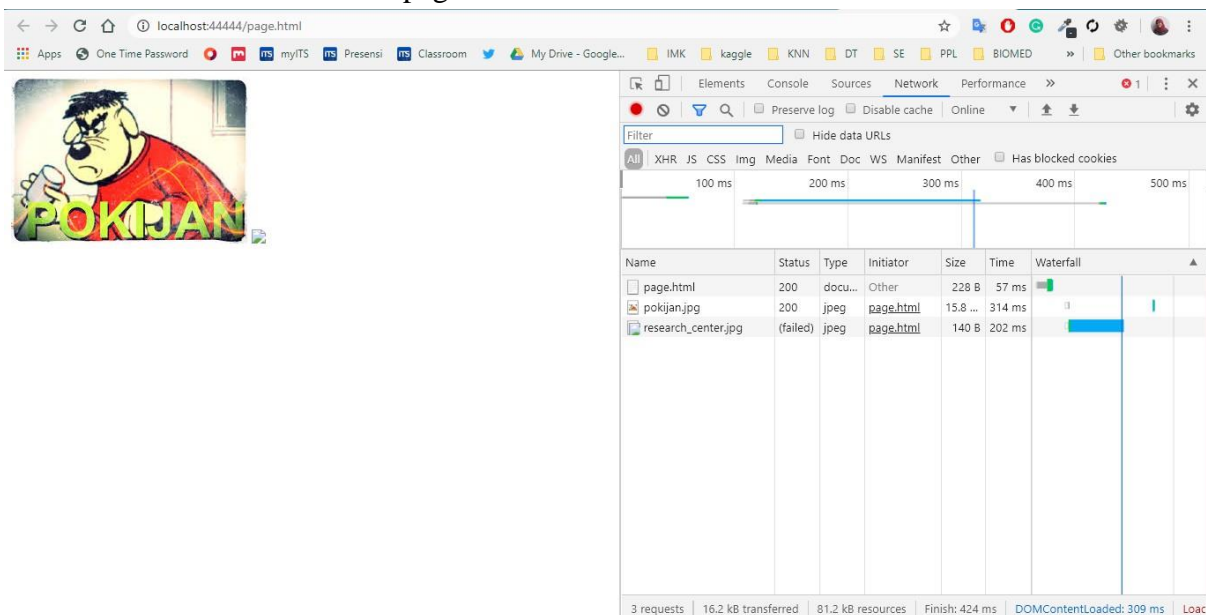
**Departemen Teknik Informatika  
Fakultas Teknologi Informasi dan Komunikasi  
Institut Teknologi Sepuluh Nopember (ITS)  
Surabaya**

**2020**

## 1. Tugas 10

- Pull update terbaru progjar6
- Jalankan `async_server.py` pada port 9002, 9003, 9004, 9005 (lihat pada BackendList)
- Jalankan file `lb.py` pada port 44444
- Jalankan browser, akseslah `http://localhost:4444/page.html`
- Lihatlah di log program, bahwa setiap request akan dilayani oleh backend yang bergantian
- Lakukan performance test seperti pada tugas 9, bandingkan penggunaan load balancer dengan `async_server` dengan `server_thread_http` pada folder `progjar5`
- Buatlah tabel hasilnya

Pada browser `127.0.0.1:44444/page.html`



Untuk foto `research_center.jpg` tidak berhasil diload oleh server. Dan di bawah ini dapat dilihat bahwa setiap request akan dilayani oleh backend yang bergantian

```
jihan@jihan:/mnt/f/Jihan/Document/Semester 6/PROGJAR/Tugas git/progjar-b-its-2020/tugas10$ python3 lb.py
WARNING:root:load balancer running on port 44444
WARNING:root:connection from ('127.0.0.1', 54615)
WARNING:root:koneksi dari ('127.0.0.1', 54615) diteruskan ke ('127.0.0.1', 9002)
WARNING:root:connection from ('127.0.0.1', 54617)
WARNING:root:koneksi dari ('127.0.0.1', 54617) diteruskan ke ('127.0.0.1', 9003)
WARNING:root:connection from ('127.0.0.1', 54619)
WARNING:root:koneksi dari ('127.0.0.1', 54619) diteruskan ke ('127.0.0.1', 9004)
WARNING:root:connection from ('127.0.0.1', 54621)
WARNING:root:koneksi dari ('127.0.0.1', 54621) diteruskan ke ('127.0.0.1', 9005)
WARNING:root:connection from ('127.0.0.1', 54623)
WARNING:root:koneksi dari ('127.0.0.1', 54623) diteruskan ke ('127.0.0.1', 9002)
WARNING:root:connection from ('127.0.0.1', 54625)
WARNING:root:koneksi dari ('127.0.0.1', 54625) diteruskan ke ('127.0.0.1', 9003)
WARNING:root:connection from ('127.0.0.1', 54627)
```

## 2. Parameter Test

- Jumlah request : 1000
- Jumlah konkurensi : 1, 5, 10, 20, 50, 100

### 3. Hasil Performance Test

- Server Async dengan Load Balancer

No Test	Concurrency	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	2,309	1000	0	122000	433,06	2,309	51,6
2	5	1,616	1000	0	122000	618,93	8,078	73,74
3	10	1,856	1000	0	122000	538,88	18,557	64,2
4	20	1,69	1000	0	122000	591,56	33,809	70,48
5	50	1,57	1000	0	122000	636,86	78,511	75,88
6	100	1,701	1000	0	122000	587,81	170,123	70,03

- Server Thread

No Test	Concurrency	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	2875,522	1000	0	122000	0,35	2875,522	0,04
2	5	1293,22	1000	0	122000	0,77	6466,099	0,09
3	10	2579,568	1000	0	122000	0,39	25795,682	0,05
4	20	2141,564	1000	0	122000	0,47	42831,277	0,06
5	50	1515,492	1000	0	122000	0,66	75774,611	0,08
6	100	774,286	1000	0	122000	1,29	77428,64	0,15

### 4. Hasil (Screenshot)

- Async server dan load balancer konkurensi 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:  2.309 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:     1000
Keep-Alive requests:   0
Total transferred:     122000 bytes
HTML transferred:      4000 bytes
Requests per second:   433.06 [#/sec] (mean)
Time per request:      2.309 [ms] (mean)
Time per request:      2.309 [ms] (mean, across all concurrent requests)
Transfer rate:         51.60 [Kbytes/sec] received

Connection Times (ms)
      min  mean[+/-sd] median  max
Connect:    0      0  0.0      0      1
Processing:  2      2  0.4      2      8
Waiting:    1      2  0.4      2      8
Total:      2      2  0.4      2      8

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

```

- Async server dan load balancer konkurensi 5

```

Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:     5
Time taken for tests:  1.616 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:     1000
Keep-Alive requests:   0
Total transferred:     122000 bytes
HTML transferred:     4000 bytes
Requests per second:   618.93 [#/sec] (mean)
Time per request:      8.078 [ms] (mean)
Time per request:      1.616 [ms] (mean, across all concurrent requests)
Transfer rate:         73.74 [Kbytes/sec] received

Connection Times (ms)
      min    mean[+/-sd] median   max
Connect:    0      0   0.2      0     2
Processing:  3      8   1.2      8    12
Waiting:    3      6   1.2      6    11
Total:      4      8   1.2      8    12

Percentage of the requests served within a certain time (ms)
 50%      8
 66%      8
 75%      9
 80%      9
 90%      9
 95%     10
 98%     11
 99%     12
100%     12 (longest request)

```

- Async server dan load balancer konkurensi 10

```

Server Hostname:      127.0.0.1
Server Port:          44444

Document Path:        /
Document Length:      4 bytes

Concurrency Level:     10
Time taken for tests:  1.856 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:     1000
Keep-Alive requests:   0
Total transferred:     122000 bytes
HTML transferred:     4000 bytes
Requests per second:   538.88 [#/sec] (mean)
Time per request:      18.557 [ms] (mean)
Time per request:      1.856 [ms] (mean, across all concurrent requests)
Transfer rate:         64.20 [Kbytes/sec] received

Connection Times (ms)
      min    mean[+/-sd] median   max
Connect:    0      0   0.3      0     9
Processing:  6     18  10.0     16   112
Waiting:    5     17   9.1     14   105
Total:      8     18  10.0     16   113

Percentage of the requests served within a certain time (ms)
 50%     16
 66%     17
 75%     18
 80%     19
 90%     21
 95%     32
 98%     48
 99%     74
100%    113 (longest request)

```

- Async server dan load balancer konkurensi 20

```

Server Hostname:      127.0.0.1
Server Port:         44444

Document Path:       /
Document Length:     4 bytes

Concurrency Level:    20
Time taken for tests: 1.690 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Keep-Alive requests:  0
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  591.56 [#/sec] (mean)
Time per request:     33.809 [ms] (mean)
Time per request:     1.690 [ms] (mean, across all concurrent requests)
Transfer rate:        70.48 [Kbytes/sec] received

Connection Times (ms)
      min    mean[+/-sd] median    max
Connect:    0      0   0.5       0      5
Processing:  8     33  10.3     31    102
Waiting:    6     32  10.0     29    100
Total:      13     33  10.3     31    102

Percentage of the requests served within a certain time (ms)
 50%    31
 66%    32
 75%    33
 80%    34
 90%    39
 95%    42
 98%    92
 99%    98
100%   102 (longest request)

```

- Async server dan load balancer konkurensi 50

```

Server Hostname:      127.0.0.1
Server Port:         44444

Document Path:       /
Document Length:     4 bytes

Concurrency Level:    50
Time taken for tests: 1.570 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Keep-Alive requests:  0
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  636.86 [#/sec] (mean)
Time per request:     78.511 [ms] (mean)
Time per request:     1.570 [ms] (mean, across all concurrent requests)
Transfer rate:        75.88 [Kbytes/sec] received

Connection Times (ms)
      min    mean[+/-sd] median    max
Connect:    0      1   1.7       0     11
Processing: 11     76  10.2     77     90
Waiting:    8     75  10.2     75     89
Total:      22     76   8.6     77     90

Percentage of the requests served within a certain time (ms)
 50%    77
 66%    79
 75%    80
 80%    80
 90%    83
 95%    87
 98%    88
 99%    89
100%    90 (longest request)

```

- Async server dan load balancer konkurensi 100

```

Server Hostname:      127.0.0.1
Server Port:         4444

Document Path:       /
Document Length:     4 bytes

Concurrency Level:    100
Time taken for tests: 1.701 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Keep-Alive requests:  0
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  587.81 [#/sec] (mean)
Time per request:     170.123 [ms] (mean)
Time per request:     1.701 [ms] (mean, across all concurrent requests)
Transfer rate:        70.03 [Kbytes/sec] received

Connection Times (ms)
      min    mean[+/-sd] median   max
Connect:    0      2   5.3      0    28
Processing: 10    158  44.9    156   277
Waiting:    8     157  44.9    155   275
Total:      38    160  41.3    156   277

Percentage of the requests served within a certain time (ms)
 50%    156
 66%    159
 75%    162
 80%    164
 90%    200
 95%    264
 98%    273
 99%    275
100%    277 (longest request)

```

- Thread Server konkurensi 1

```

Server Port:          46000

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    1
Time taken for tests:  2875.522 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Keep-Alive requests:  0
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  0.35 [#/sec] (mean)
Time per request:     2875.522 [ms] (mean)
Time per request:     2875.522 [ms] (mean, across all concurrent requests)
Transfer rate:        0.04 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:      0    0   0.3      0     10
Processing:    2  2875 4653.8    886   31815
Waiting:       2  2727 4420.1    834   31302
Total:         3  2875 4653.8    887   31816

Percentage of the requests served within a certain time (ms)
 50%    887
 66%   2085
 75%   3410
 80%   4879
 90%   7930
 95%  12134
 98%  19877
 99%  23674
100%  31816 (longest request)

```

- Thread Server konkurensi 5

```

Server Port:          46000

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    5
Time taken for tests:  1293.220 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Keep-Alive requests:  0
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  0.77 [#/sec] (mean)
Time per request:     6466.099 [ms] (mean)
Time per request:     1293.220 [ms] (mean, across all concurrent requests)
Transfer rate:        0.09 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:      0    0   0.2      0      3
Processing:    3  6382 8904.3   2205  44477
Waiting:       3  6194 8658.0   2141  44160
Total:         4  6382 8904.3   2206  44478

Percentage of the requests served within a certain time (ms)
 50%    2206
 66%    4665
 75%    7843
 80%   11179
 90%   21373
 95%   26850
 98%   33157
 99%   37095
100%  44478 (longest request)

```

- Thread Server konkurensi 10

```

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: 2579.568 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Keep-Alive requests:  0
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  0.39 [#/sec] (mean)
Time per request:     25795.682 [ms] (mean)
Time per request:     2579.568 [ms] (mean, across all concurrent requests)
Transfer rate:        0.05 [Kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median    max
Connect:      0      7  85.2      0    1104
Processing:   55 24956 42595.4   6277  268310
Waiting:      55 24625 42062.6   6151  268308
Total:        62 24962 42591.6   6277  268311

Percentage of the requests served within a certain time (ms)
 50%    6277
 66%   17554
 75%   32083
 80%   37706
 90%   62534
 95%  136458
 98%  169286
 99%  199581
100% 268311 (longest request)

```

- Thread Server konkurensi 20

```

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

Document Path:       /
Document Length:     4 bytes

Concurrency Level:    20
Time taken for tests: 2141.564 seconds
Complete requests:    1000
Failed requests:      0
Non-2xx responses:    1000
Keep-Alive requests:  0
Total transferred:    122000 bytes
HTML transferred:     4000 bytes
Requests per second:  0.47 [#/sec] (mean)
Time per request:     42831.277 [ms] (mean)
Time per request:     2141.564 [ms] (mean, across all concurrent requests)
Transfer rate:        0.06 [Kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median    max
Connect:      0      0   0.6      0      6
Processing:   8 39398 56236.9   10162  325840
Waiting:      7 39129 55857.9   10157  323382
Total:       14 39399 56236.9   10162  325841

Percentage of the requests served within a certain time (ms)
 50%    10162
 66%   45869
 75%   54584
 80%   77938
 90%   111797
 95%   166447
 98%   205017
 99%   257786
100%  325841 (longest request)

```

- Thread Server konkurensi 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:  1515.492 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:    1000
Keep-Alive requests:   0
Total transferred:     122000 bytes
HTML transferred:     4000 bytes
Requests per second:   0.66 [#/sec] (mean)
Time per request:      75774.611 [ms] (mean)
Time per request:      1515.492 [ms] (mean, across all concurrent requests)
Transfer rate:         0.08 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:        0    1   2.6      0    15
Processing:    29  64513 99104.3 18923 466088
Waiting:       29  64321 98808.6 18876 464020
Total:         43  64513 99103.9 18923 466088

Percentage of the requests served within a certain time (ms)
 50% 18923
 66% 49769
 75% 78691
 80% 85683
 90% 222041
 95% 293023
 98% 418542
 99% 438536
100% 466088 (longest request)

```

- Thread Server konkurensi 100

```

Server Port:          46000

Document Path:        /
Document Length:      4 bytes

Concurrency Level:     100
Time taken for tests:  774.286 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:    1000
Keep-Alive requests:   0
Total transferred:     122000 bytes
HTML transferred:     4000 bytes
Requests per second:   1.29 [#/sec] (mean)
Time per request:      77428.640 [ms] (mean)
Time per request:      774.286 [ms] (mean, across all concurrent requests)
Transfer rate:         0.15 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:        0    2   5.0      0    30
Processing:    45  58865 73368.8 27253 332497
Waiting:       45  58763 73219.3 27225 332023
Total:        66  58867 73367.6 27253 332497

Percentage of the requests served within a certain time (ms)
 50% 27253
 66% 53312
 75% 79430
 80% 103583
 90% 170590
 95% 227353
 98% 290053
 99% 306751
100% 332497 (longest request)

```

## **5. Kesimpulan**

Perbedaan waktu yang didapat antara menjalankan server async dengan load balancer dan server thread sangat signifikan hingga 2000 detik. Server async atau asynchronous dengan load balancer memproses jauh lebih cepat daripada server thread atau multithread.