

LAPORAN TUGAS 10



Kelas :

Pemrograman Jaringan

Dosen :

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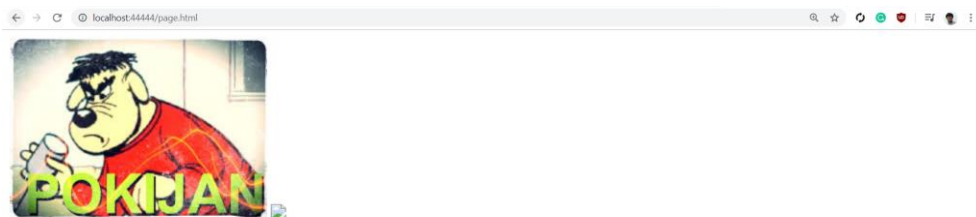
Institut Teknologi Sepuluh Nopember (ITS) Surabaya

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

Tampilan pada <http://localhost:44444/page.html> setelah menjalankan `runserver.sh` dan `lb.py`



Tampilan pada terminal setelah menjalankan `runserver.sh`

```
thlut@017-143: /mnt/d/KULIAH/Semester 6/Program Jaringan/Tugas10
thlut@017-143:/mnt/c/Windows/System32$ cd /mnt/d/KULIAH/Semester\ 6/Program\ Jaringan/Tugas10
thlut@017-143:/mnt/d/KULIAH/Semester 6/Program Jaringan/Tugas10$ bash runserver.sh
thlut@017-143:/mnt/d/KULIAH/Semester 6/Program Jaringan/Tugas10$ WARNING:root:running on port 9002
WARNING:root:running on port 9003
WARNING:root:running on port 9005
WARNING:root:running on port 9004
```

Tampilan pada terminal setelah menjalankan `lb.py`

```
thlut@017-143: /mnt/d/KULIAH/Semester 6/Program Jaringan/Tugas10
thlut@017-143:/mnt/c/Windows/System32$ cd /mnt/d/KULIAH/Semester\ 6/Program\ Jaringan/Tugas10
thlut@017-143:/mnt/d/KULIAH/Semester 6/Program Jaringan/Tugas10$ python3 lb.py
WARNING:root:load balancer running on port 44444
WARNING:root:connection from ('127.0.0.1', 50163)
WARNING:root:koneksi dari ('127.0.0.1', 50163) diteruskan ke ('127.0.0.1', 9002)
WARNING:root:connection from ('127.0.0.1', 50167)
WARNING:root:koneksi dari ('127.0.0.1', 50167) diteruskan ke ('127.0.0.1', 9003)
WARNING:root:connection from ('127.0.0.1', 50169)
WARNING:root:koneksi dari ('127.0.0.1', 50169) diteruskan ke ('127.0.0.1', 9004)
WARNING:root:connection from ('127.0.0.1', 50170)
WARNING:root:koneksi dari ('127.0.0.1', 50170) diteruskan ke ('127.0.0.1', 9005)
WARNING:root:connection from ('127.0.0.1', 50176)
```

Hasil Performance Test

1. Server Asynchronous + Load Balancer

No	Concurrency Level	Time Taken for Tests (seconds)	Completed Request	Failed Request	Total Transferred (bytes)	Request per Second (#/s)	Time per Request (ms)	Transfer Rate ([Kbytes/sec])
1	1	8,321	1000	0	122000	120,18	8,321	14,32
2	10	6,855	1000	0	122000	145,89	6,855	17,38
3	25	6,51	1000	0	122000	153,61	6,51	18,3
4	50	4,508	1000	0	122000	221,84	4,508	26,43
5	75	3,761	1000	0	122000	265,86	3,761	31,68
6	100	3,687	1000	0	122000	271,22	3,687	32,31

2. Server Thread

No	Concurrency Level	Time Taken for Tests (seconds)	Completed Request	Failed Request	Total Transferred (bytes)	Request per Second (#/s)	Time per Request (ms)	Transfer Rate ([Kbytes/sec])
1	1	1073,072	1000	0	122000	0,93	1073,072	0,11
2	10	680,538	1000	0	122000	1,47	680,538	0,18
3	25	696,912	1000	0	122000	1,43	696,912	0,17
4	50	630,537	1000	0	122000	1,59	630,537	0,19
5	75	611,969	1000	0	122000	1,63	611,969	0,19
6	100	584,715	1000	0	122000	1,71	584,715	0,2

3. Kesimpulan

Dari hasil percobaan yang telah saya lakukan, dapat saya simpulkan bahwa Server Asynchronous + Load Balancer memiliki performa yang lebih cepat dalam prosesnya dan lebih baik dibandingkan Server Multithread(Thread).

Screenshot

1. Server Asynchronous + 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:  8.321 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:     1000
Total transferred:     122000 bytes
HTML transferred:     4000 bytes
Requests per second:   120.18 [#/sec] (mean)
Time per request:      8.321 [ms] (mean)
Time per request:      8.321 [ms] (mean, across all concurrent requests)
Transfer rate:         14.32 [Kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median    max
Connect:        0      1   0.6      1      8
Processing:     2      7   7.5      6     149
Waiting:        2      7   6.7      5     149
Total:          3      8   7.5      6     150

Percentage of the requests served within a certain time (ms)
 50%      6
 66%      8
 75%      9
 80%     10
 90%     13
 95%     18
 98%     29
 99%     39
100%    150 (longest request)
```

- Concurrency 10

```
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:  6.855 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:     1000
Total transferred:     122000 bytes
HTML transferred:     4000 bytes
Requests per second:   145.89 [#/sec] (mean)
Time per request:      68.546 [ms] (mean)
Time per request:      6.855 [ms] (mean, across all concurrent requests)
Transfer rate:         17.38 [Kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median    max
Connect:        0      1   1.1      1     13
Processing:    33     67  27.4     58    212
Waiting:       18     61  25.4     52    205
Total:         37     68  27.6     59    212

Percentage of the requests served within a certain time (ms)
 50%     59
 66%     68
 75%     77
 80%     83
 90%    109
 95%    122
 98%    154
 99%    167
100%    212 (longest request)
```

- **Concurrency 25**

```
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:  6.510 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:     1000
Total transferred:     122000 bytes
HTML transferred:     4000 bytes
Requests per second:   153.61 [#/sec] (mean)
Time per request:      162.755 [ms] (mean)
Time per request:      6.510 [ms] (mean, across all concurrent requests)
Transfer rate:         18.30 [Kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median   max
Connect:        0      2   3.0      1     27
Processing:    33    159  53.2     141    331
Waiting:       27    154  51.9     136    320
Total:         61    161  52.7     142    332

Percentage of the requests served within a certain time (ms)
 50%    142
 66%    165
 75%    198
 80%    211
 90%    240
 95%    265
 98%    297
 99%    304
100%    332 (longest request)
```

- **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:  4.508 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:     1000
Total transferred:     122000 bytes
HTML transferred:     4000 bytes
Requests per second:   221.84 [#/sec] (mean)
Time per request:      225.386 [ms] (mean)
Time per request:      4.508 [ms] (mean, across all concurrent requests)
Transfer rate:         26.43 [Kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median   max
Connect:        0      2   5.5      1     38
Processing:    21    219  48.2     218    332
Waiting:       16    215  48.2     214    331
Total:         59    221  45.2     218    334

Percentage of the requests served within a certain time (ms)
 50%    218
 66%    240
 75%    250
 80%    254
 90%    277
 95%    300
 98%    324
 99%    331
100%    334 (longest request)
```

- **Concurrency 75**

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

Document Path:        /
Document Length:      4 bytes

Concurrency Level:     75
Time taken for tests:  3.761 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:     1000
Total transferred:     122000 bytes
HTML transferred:     4000 bytes
Requests per second:   265.86 [#/sec] (mean)
Time per request:      282.101 [ms] (mean)
Time per request:      3.761 [ms] (mean, across all concurrent requests)
Transfer rate:         31.68 [Kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median   max
Connect:        0      4  11.0       1     61
Processing:    35    270  78.8     260    519
Waiting:       30    267  78.3     257    516
Total:         97    274  75.2     263    519

Percentage of the requests served within a certain time (ms)
 50%    263
 66%    284
 75%    307
 80%    318
 90%    345
 95%    450
 98%    511
 99%    517
100%    519 (longest request)
```

- **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:  3.687 seconds
Complete requests:     1000
Failed requests:       0
Non-2xx responses:     1000
Total transferred:     122000 bytes
HTML transferred:     4000 bytes
Requests per second:   271.22 [#/sec] (mean)
Time per request:      368.705 [ms] (mean)
Time per request:      3.687 [ms] (mean, across all concurrent requests)
Transfer rate:         32.31 [Kbytes/sec] received

Connection Times (ms)
              min    mean[+/-sd] median   max
Connect:        0      6  15.3       1     80
Processing:    31    346 106.2     320    567
Waiting:       27    343 106.1     318    566
Total:        111    352  97.0     321    568

Percentage of the requests served within a certain time (ms)
 50%    321
 66%    334
 75%    435
 80%    452
 90%    476
 95%    547
 98%    558
 99%    564
100%    568 (longest request)
```

2. Server Thread

- **Concurrency 1**

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

Document Path:        /
Document Length:      4 bytes

Concurrency Level:     1
Time taken for tests:  1073.072 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:  0.93 [#/sec] (mean)
Time per request:     1073.072 [ms] (mean)
Time per request:     1073.072 [ms] (mean, across all concurrent requests)
Transfer rate:        0.11 [Kbytes/sec] received

Connection Times (ms)
      min    mean[+/-sd] median    max
Connect:    0      0   0.1      0      2
Processing:  3 1072 1136.7    691   6904
Waiting:    3 1012 1081.9    662   6449
Total:       3 1073 1136.7    692   6904

Percentage of the requests served within a certain time (ms)
 50%    692
 66%   1048
 75%   1500
 80%   1825
 90%   2649
 95%   3615
 98%   4378
 99%   4959
100%   6904 (longest request)
```

- **Concurrency 10**

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

Document Path:        /
Document Length:      4 bytes

Concurrency Level:     10
Time taken for tests:  680.538 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:  1.47 [#/sec] (mean)
Time per request:     6805.381 [ms] (mean)
Time per request:     680.538 [ms] (mean, across all concurrent requests)
Transfer rate:        0.18 [Kbytes/sec] received

Connection Times (ms)
      min    mean[+/-sd] median    max
Connect:    0      1   0.3      1      4
Processing: 15 6714 9564.0    3252  56158
Waiting:    15 6628 9485.2    3214  56152
Total:      19 6714 9564.0    3253  56159

Percentage of the requests served within a certain time (ms)
 50%    3253
 66%    5235
 75%    6848
 80%    9664
 90%   15040
 95%   28779
 98%   42815
 99%   50296
100%   56159 (longest request)
```


- **Concurrency 25**

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

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    25
Time taken for tests:  696.912 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:  1.43 [#/sec] (mean)
Time per request:     17422.798 [ms] (mean)
Time per request:     696.912 [ms] (mean, across all concurrent requests)
Transfer rate:        0.17 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:      0    1   1.2      0    12
Processing:   88  16635 19356.7   9635  99319
Waiting:      88  16544 19273.1   9544  98993
Total:        99  16635 19356.5   9635  99319

Percentage of the requests served within a certain time (ms)
 50%    9635
 66%   17698
 75%   21055
 80%   26640
 90%   37189
 95%   60246
 98%   88501
 99%   91542
100%  99319 (longest request)
```

- **Concurrency 50**

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

Document Path:        /
Document Length:      4 bytes

Concurrency Level:    50
Time taken for tests:  630.537 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:  1.59 [#/sec] (mean)
Time per request:     31526.849 [ms] (mean)
Time per request:     630.537 [ms] (mean, across all concurrent requests)
Transfer rate:        0.19 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:      0    1   3.2      1    22
Processing:   48  28744 33436.0  14977 141149
Waiting:      48  28660 33338.3  14908 141139
Total:        64  28746 33435.4  14977 141149

Percentage of the requests served within a certain time (ms)
 50%   14977
 66%   28619
 75%   35913
 80%   45455
 90%   81943
 95%  110445
 98%  135551
 99%  137251
100% 141149 (longest request)
```


- **Concurrency 75**

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

Document Path:        /
Document Length:      4 bytes

Concurrency Level:     75
Time taken for tests:  611.969 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:   1.63 [#/sec] (mean)
Time per request:      45897.697 [ms] (mean)
Time per request:      611.969 [ms] (mean, across all concurrent requests)
Transfer rate:         0.19 [Kbytes/sec] received

Connection Times (ms)
      min    mean[+/-sd] median   max
Connect:    0      3   8.1      1    44
Processing: 69 40966 37379.6 28001 143535
Waiting:    69 40881 37296.4 27840 143535
Total:      111 40969 37377.2 28001 143536

Percentage of the requests served within a certain time (ms)
 50%  28001
 66%  55174
 75%  61745
 80%  74809
 90%  95611
 95%  123435
 98%  138653
 99%  140094
100%  143536 (longest request)
```

- **Concurrency 100**

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

Document Path:        /
Document Length:      4 bytes

Concurrency Level:     100
Time taken for tests:  584.715 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:   1.71 [#/sec] (mean)
Time per request:      58471.458 [ms] (mean)
Time per request:      584.715 [ms] (mean, across all concurrent requests)
Transfer rate:         0.20 [Kbytes/sec] received

Connection Times (ms)
      min    mean[+/-sd] median   max
Connect:    0      4  10.1      1    57
Processing: 33 50234 44190.5 35068 168281
Waiting:    33 50160 44129.7 35053 168174
Total:      91 50238 44187.1 35068 168282

Percentage of the requests served within a certain time (ms)
 50%  35068
 66%  64273
 75%  78640
 80%  87649
 90%  116016
 95%  146195
 98%  160065
 99%  162198
100%  168282 (longest request)
```