LAPORAN TUGAS 10

PEMROGRAMAN JARINGAN

Kelas: Pemrograman Jaringan B

Disusun Oleh:

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Deskripsi Tugas

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

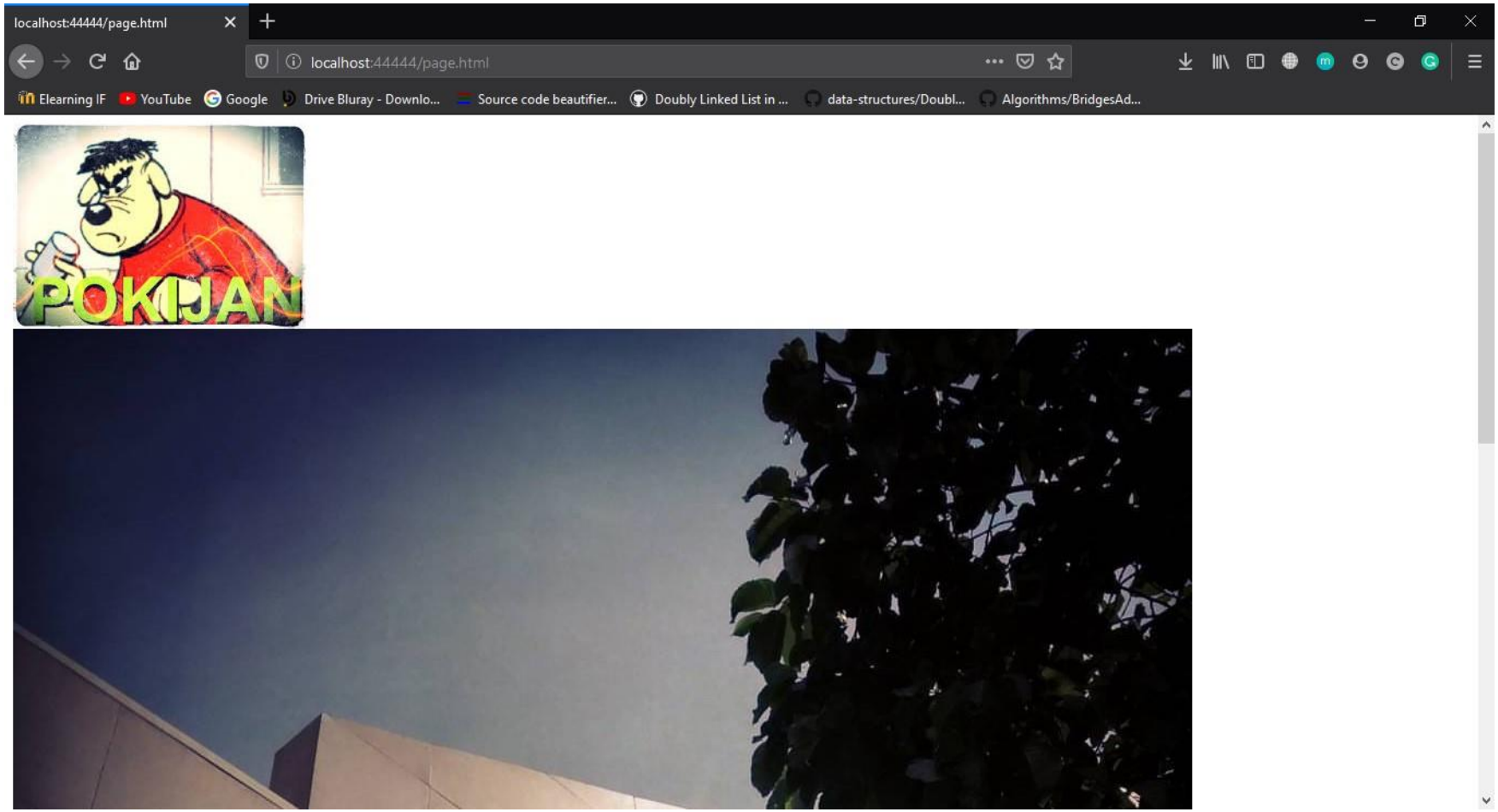
Variasi Level Konkurensi dan Jumlah Request

Variasi level konkurensi yang digunakan pada percobaan ini adalah 1, 10, 15, 50, 100, 200, dan 500.

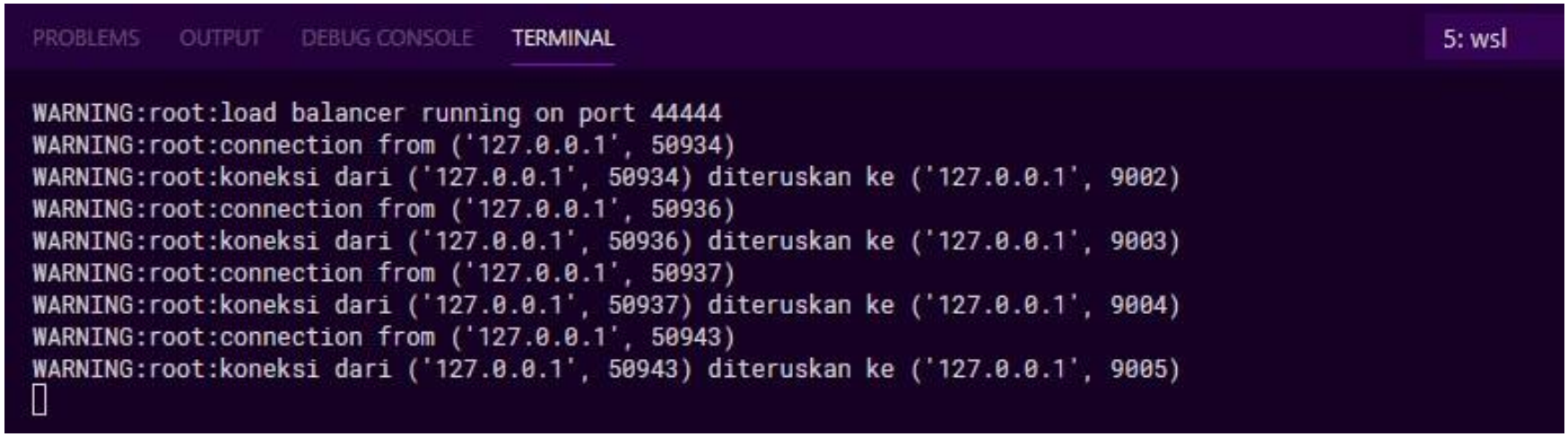
Sedangkan jumlah request yang digunakan adalah 1000 request.

Hasil Browser page.html

Berikut adalah hasil halaman setelah mengakses 127.0.0.1:4444/page.html



Log Program


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
5: wsl
WARNING:root:load balancer running on port 44444
WARNING:root:connection from ('127.0.0.1', 50934)
WARNING:root:koneksi dari ('127.0.0.1', 50934) diteruskan ke ('127.0.0.1', 9002)
WARNING:root:connection from ('127.0.0.1', 50936)
WARNING:root:koneksi dari ('127.0.0.1', 50936) diteruskan ke ('127.0.0.1', 9003)
WARNING:root:connection from ('127.0.0.1', 50937)
WARNING:root:koneksi dari ('127.0.0.1', 50937) diteruskan ke ('127.0.0.1', 9004)
WARNING:root:connection from ('127.0.0.1', 50943)
WARNING:root:koneksi dari ('127.0.0.1', 50943) diteruskan ke ('127.0.0.1', 9005)

Performance Test dan Perbandingan

Server Asinkronus (port 45000) pada Tugas 9

Hasil benchmark testing menggunakan apache-benchmark pada http://127.0.0.1:45000/ menggunakan server asinkronus

Platform yang digunakan:

- Windows Subsystem for Linux (Windows 10)
- WSL Distro: Ubuntu 18.04 LTS

Concurrency level	Time taken for test (sec)	Complete request	Failed request	Total transferred (bytes)	Request per second (#/sec)	Time per request (ms)	Transfer rate (Kbytes/sec)
1	3,324	1000	0	122000	300,88	3,324	35,85
10	2,844	1000	0	122000	351,65	2,844	41,90
15	3,016	1000	0	122000	331,54	3,016	39,50
50	2,946	1000	0	122000	339,41	2,946	40,44
100	3,012	1000	0	122000	332,01	3,012	39,56
200	0,855	1000	167	20374	1170,08	0,855	23,28
500	0,817	1000	226	27572	1223,29	0,817	32,94

***Note**: Time per request yang dicantumkan adalah mean pada semua request konkuren (mean, across all concurent requests)*

Server Thread (port 46000) pada Tugas 9

Hasil benchmark testing menggunakan apache-benchmark pada http://127.0.0.1:46000/ menggunakan server thread

Concurrency level	Time taken for test (sec)	Complete request	Failed request	Total transferred (bytes)	Request per second (#/sec)	Time per request (ms)	Transfer rate (Kbytes/sec)
1	1906,472	1000	0	122000	0,52	1906,472	0,06
10	471,406	1000	0	122000	2,12	471,406	0,25
15	475,540	1000	0	122000	2,10	475,540	0,25
50	480,935	1000	0	122000	2,08	480,935	0,25

100	461,906	1000	0	122000	2,16	461,906	0,26
200	3,522	1000	159	19398	283,93	3,522	5,38
500	1,307	1000	145	17690	765,25	1,307	13,22

***Note**: Time per request yang dicantumkan adalah mean pada semua request konkuren (mean, across all concurent requests)*

Server Asinkronus Menggunakan Load Balancer (port 44444)

Hasil benchmark testing menggunakan apache-benchmark pada http://127.0.0.1:4444/ menggunakan server asinkronus load balancer.

Concurrency level	Time taken for test (sec)	Complete request	Failed request	Total transferred (bytes)	Request per second (#/sec)	Time per request (ms)	Transfer rate (Kbytes/sec)
1	4,554	1000	0	122000	219,61	4,554	26,16
10	2,669	1000	0	122000	374,72	2,669	44,64
15	3,095	1000	0	122000	323,06	3,095	38,49
50	2,743	1000	0	122000	364,55	2,743	43,43
100	2,974	1000	0	122000	339,29	2,947	40,42
200	0,688	1000	179	21838	1454,08	0,688	31,01
500	0,553	1000	103	13298	1807,76	0,553	23,48

Kesimpulan

Dari hasil percobaan, dapat dilihat bahwa server yang menggunakan metode asinkronus dengan load balancer menunjukkan performa yang lebih baik daripada server yang menggunakan thread maupun server yang menggunakan asinkronus biasa. Beberapa indikator yang menunjukkannya adalah:

- Waktu running pada server asinkronus dengan load balancer lebih baik daripada server thread dan server asinkronus.
- Transfer rate per detik pada server asinkronus dengan load balancer menunjukkan angka lebih baik daripada dua server lainnya.

Dokumentasi Hasil Percobaan

Server asinkronus dengan load balancer

Concurrency Level 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:   4.554 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    219.61 [#/sec] (mean)
Time per request:       4.554 [ms] (mean)
Time per request:       4.554 [ms] (mean, across all concurrent requests)
Transfer rate:          26.16 [Kbytes/sec] received
```

Concurrency Level 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:   2.669 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    374.72 [#/sec] (mean)
Time per request:       26.686 [ms] (mean)
Time per request:       2.669 [ms] (mean, across all concurrent requests)
Transfer rate:          44.64 [Kbytes/sec] received
```

Concurrency Level 15

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

Document Path:          /
Document Length:        4 bytes

Concurrency Level:      15
Time taken for tests:   3.095 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    323.06 [#/sec] (mean)
Time per request:       46.431 [ms] (mean)
Time per request:       3.095 [ms] (mean, across all concurrent requests)
Transfer rate:          38.49 [Kbytes/sec] received
```

Concurrency Level 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:   2.743 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    364.55 [#/sec] (mean)
Time per request:       137.157 [ms] (mean)
Time per request:       2.743 [ms] (mean, across all concurrent requests)
Transfer rate:          43.43 [Kbytes/sec] received
```

Concurrency Level 100

Concurrency Level 200

```
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:   2.947 seconds
Complete requests:      1000
Failed requests:        0
Non-2xx responses:      1000
Total transferred:      122000 bytes
HTML transferred:       4000 bytes
Requests per second:    339.29 [#/sec] (mean)
Time per request:       294.732 [ms] (mean)
Time per request:       2.947 [ms] (mean, across all concurrent requests)
Transfer rate:          40.42 [Kbytes/sec] received
```

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

Document Path:          /
Document Length:        0 bytes

Concurrency Level:      200
Time taken for tests:   0.688 seconds
Complete requests:      1000
Failed requests:        179
   (Connect: 0, Receive: 0, Length: 179, Exceptions: 0)
Non-2xx responses:      179
Total transferred:      21838 bytes
HTML transferred:       716 bytes
Requests per second:    1454.08 [#/sec] (mean)
Time per request:       137.544 [ms] (mean)
Time per request:       0.688 [ms] (mean, across all concurrent requests)
Transfer rate:          31.01 [Kbytes/sec] received
```

Concurrency Level 500

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

Document Path:          /
Document Length:        0 bytes

Concurrency Level:      500
Time taken for tests:   0.553 seconds
Complete requests:      1000
Failed requests:        103
   (Connect: 0, Receive: 0, Length: 103, Exceptions: 0)
Non-2xx responses:      109
Total transferred:      13298 bytes
HTML transferred:       436 bytes
Requests per second:    1807.76 [#/sec] (mean)
Time per request:       276.585 [ms] (mean)
Time per request:       0.553 [ms] (mean, across all concurrent requests)
Transfer rate:          23.48 [Kbytes/sec] received
```