

*Nama : Fajar Satria*  
*NRP : 05111940000083*  
*Kelas : Progjar E*

## **Tugas 2 individu**

Progjar5 merupakan implementasi sederhana dari protokol HTTP 1.0 (RFC 2616). Metode yang diimplementasikan adalah GET dan POST

- File http.py merupakan implementasi http server
- File server\_thread\_http.py merupakan implementasi servernya, dijalankan di port 8889

Pendahuluan:

- Jalankan environment lab ([progjar/environment at master · rm77/progjar \(github.com\)](https://github.com/rm77/progjar))
- Jalankan server\_thread.py pada server 16.101
- Dengan menggunakan browser akseslah alamat
  - <http://172.16.16.101:8889/>
  - <http://172.16.16.101:8889/rfc2616.pdf>
  - <http://172.16.16.101:8889/testing.txt>
  - <http://172.16.16.101:8889/pokijan.jpg>
- Install apache-benchmark (ab) di console shell **172.16.16.102**
  - #sudo bash
  - #apt update -y && apt install -y apache2-utils
  - Jalankan perintah ab
    - Ab merupakan apache-benchmark, tool untuk melakukan performance test pada web server

Tugas

- Jalankan file server\_thread\_http.py
- Lakukan performance test dengan menggunakan ab dalam hal jumlah request dan concurrency dengan format
  - ab -n <jumlah request> -c <jumlah concurrency> <url>
- Lakukan percobaan dengan kombinasi
  - Jumlah request 10, 50, 100, 500 sampai server tidak dapat melayani
  - Jumlah konkurensi (simulasi client mengakses konkuren), 1 client - maks yang dapat dilayani
  - Tipe media (pdf, txt, jpg)
  - Catatlah hasil ab tersebut dalam metrik hasil yang tertulis di tabel di bawah ini
  - Jika server tidak mampu menangani request, tulislah di kolom tersebut dengan "OVERLOAD"
- Pada saat server "OVERLOAD", berikan usulan optimasi agar server masih bisa melayani
- Capturelah semua aktifitas anda dengan screenshot, termasuk usulan optimasinya. Berikan deskripsi yang cukup untuk penjelasan screenshot. Dan satukan semua dalam file PDF maks 10 halaman lalu kirimkan ke asisten

Input parameter				Hasil						
Jumlah request	Concurrency level	url	Tipe media	Complete requests	Failed requests	Time per request(ms)	Transfer rate (Kbytes/sec)	Connect time(mean)	Processing time (mean)	Waiting time(mean)
10	1	http://172.16.16.101:8889/testing.txt	txt	10	0	215	0,72	0	215	207
50	1	http://172.16.16.101:8889/testing.txt	txt	50	0	431	0,36	0	430	418
100	1	http://172.16.16.101:8889/testing.txt	txt	100	0	550	0,28	0	550	551
500	1	http://172.16.16.101:8889/testing.txt	txt	500	0	804	0,19	0	803	774
10	10	http://172.16.16.101:8889/testing.txt	txt	10	0	19	8,02	1	54	51
50	10	http://172.16.16.101:8889/testing.txt	txt	50	0	59	2,62	172	297	288
100	10	http://172.16.16.101:8889/testing.txt	txt	100	0	128	1,21	343	789	770
500	10	http://172.16.16.101:8889/testing.txt	txt	500	0	227	0,68	738	1514	1481
10	1	http://172.16.16.101:8889/pokijan.jpg	jpg	10	0	40	377	0	40	39
50	1	http://172.16.16.101:8889/pokijan.jpg	jpg	50	0	226	68	0	226	216
100	1	http://172.16.16.101:8889/pokijan.jpg	jpg	100	0	325	47	0	325	312
500	1	http://172.16.16.101:8889/pokijan.jpg	jpg	500	0	587	26,35	0	587	567
10	10	http://172.16.16.101:8889/pokijan.jpg	jpg	10	0	34	450	1	86	82
50	10	http://172.16.16.101:8889/pokijan.jpg	jpg	50	0	66	232	213	341	329
100	10	http://172.16.16.101:8889/pokijan.jpg	jpg	100	0	160	96,47	468	1020	997
500	10	http://172.16.16.101:8889/pokijan.jpg	jpg	500	0	172	98,96	518	1086	1058
10	1	http://172.16.16.101:8889/rfc2616.pdf	pdf	10	0	798	673	0	798	792
50	1	http://172.16.16.101:8889/rfc2616.pdf	pdf	50	0	1051	511	0	1051	1040
100	1	http://172.16.16.101:8889/rfc2616.pdf	pdf	100	0	1173	458	0	1173	1151
500	1	http://172.16.16.101:8889/rfc2616.pdf	pdf	434	66	OVERLOAD	OVERLOAD	OVERLOAD	OVERLOAD	OVERLOAD
10	10	http://172.16.16.101:8889/rfc2616.pdf	pdf	10	0	893	601	506	3195	3183
50	10	http://172.16.16.101:8889/rfc2616.pdf	pdf	50	0	1128	476	2549	6775	6756
100	10	http://172.16.16.101:8889/rfc2616.pdf	pdf	100	0	1181	455	2871	7046	7014
500	10	http://172.16.16.101:8889/rfc2616.pdf	pdf	23	477	OVERLOAD	OVERLOAD	OVERLOAD	OVERLOAD	OVERLOAD

- **Analisis tabel metrik**

Dari tabel metrik diatas, terlihat bahwa semakin besar *jumlah request* maka semakin besar pula *total time* nya. Hal tersebut juga dapat dioptimasi dengan menambah jumlah konkurensi.

Pada *jumlah request* dibawah 100, dengan menaikkan jumlah konkurensi, maka dapat memperkecil *total time*. Namun pada jumlah request diatas 100, menaikkan jumlah konkurensi tidak dapat menghasilkan perubahan yang berarti.

Tipe media tidak berpengaruh pada *request time*, namun panjang dari data itu lah yang mempengaruhi *total time*. Namun pada kasus nyata, tipe txt biasanya memiliki panjang data yang lebih kecil daripada jpg, begitu juga jpg lebih kecil daripada pdf. Sehingga pada pengukuran diatas rata-rata *total time* menghasilkan txt yang paling cepat, disusul jpg, lalu pdf.

- **Solusi OVERLOAD**

Untuk mengatasi OVERLOAD adalah dengan mendisable logging pada server. Sehingga penggunaan *resources* pada server akan berkurang dan akan lebih berfokus untuk melayani request dari client. Pada kasus ini logging menghambat waktu proses pada server, atau lebih sering dikenal dengan I/O Bottleneck.

Hal tersebut dapat dibuktikan dengan melakukan performance test baik dengan adanya logging dan tidak adanya logging.

```
jovyan@e8679a46422a: ~/pi X
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 500 -c 1 http://172.16.16.101:8889/rfc2616.pdf
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 172.16.16.101 (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
apr_pollset_poll: The timeout specified has expired (70007)
Total of 434 requests completed
(base) jovyan@e8679a46422a:~/progjar/Tugas2$
```

(gambar 1 : 500 request & 1 konkurensi dengan logging pada server)

```
jovyan@e8679a46422a: ~/pi X
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 500 -c 1 http://172.16.16.101:8889/rfc2616.pdf
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 172.16.16.101 (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Finished 500 requests

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /rfc2616.pdf
Document Length:      550562 bytes

Concurrency Level:    1
Time taken for tests:  304.358 seconds
Complete requests:    500
Failed requests:       0
Total transferred:    275354000 bytes
HTML transferred:     275281000 bytes
Requests per second:  1.64 [#/sec] (mean)
Time per request:     608.716 [ms] (mean)
Time per request:     608.716 [ms] (mean, across all concurrent requests)
Transfer rate:        883.50 [Kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd] median   max
Connect:    0       0   0.4      0      8
Processing:  8     608  332.5    574   2208
Waiting:    5     579  319.1    555   2172
Total:      10     609  332.5    574   2208
```

(gambar 2 : 500 request dan 1 konkurensi tanpa logging pada server)

```
jovyan@e8679a46422a: ~/piX

(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 500 -c 10 http://172.16.16.101:8889/rfc2616.pdf
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 172.16.16.101 (be patient)
apr_pollset_poll: The timeout specified has expired (70007)
Total of 23 requests completed
(base) jovyan@e8679a46422a:~/progjar/Tugas2$
```

(gambar 3 : 500 request & 10 konkurensi dengan logging pada server)

```
jovyan@e8679a46422a: ~/piX

(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 500 -c 10 http://172.16.16.101:8889/rfc2616.pdf
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 172.16.16.101 (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Finished 500 requests

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /rfc2616.pdf
Document Length:      550562 bytes

Concurrency Level:    10
Time taken for tests:  62.829 seconds
Complete requests:    500
Failed requests:       0
Total transferred:    275354000 bytes
HTML transferred:     275281000 bytes
Requests per second:  7.96 [#/sec] (mean)
Time per request:     1256.583 [ms] (mean)
Time per request:     125.658 [ms] (mean, across all concurrent requests)
Transfer rate:        4279.87 [Kbytes/sec] received

Connection Times (ms)
      min      mean[+/-sd] median   max
Connect:    0   260  978.2      0  15681
Processing:  17   968  656.3     787   3344
Waiting:    13   930  636.3     753   3325
Total:      17  1228  1227.5     933  16237
```

(gambar 4 : 500 request & 10 konkurensi dengan logging pada server)

Terlihat bahwa time per request dengan 500 request dan 10 konkurensi tanpa adanya logging adalah sebesar 125ms, bahkan angka ini masih lebih kecil daripada 100 request dan 10 konkurensi dengan logging yaitu sebesar 1181ms.

- **Menghapus logging**

Logging dapat dihapus dari file `server_thread_http.py` dari folder `progjar5`. Dengan asumsi commit terakhir dari github kelas, maka logging akan berada pada line 6, 30, 35, dan 60. Hapus line tersebut untuk optimasi sehingga tidak terjadi I/O Bottleneck.

```
file_client_cli.py  docker-compose.yml  server_thread_http.py  server_async_http.py

27 rcv=rcv+d
28 if rcv[-2:]=='\r\n':
29     #end of command, proses string
30     logging.warning("data dari client: {}".format(rcv))
31     hasil = httpserver.proses(rcv)
32     #hasil akan berupa bytes
33     #untuk bisa ditambahi dengan string, maka string harus di encode
34     hasil=hasil+"\r\n\r\n".encode()
35     logging.warning("balas ke client: {}".format(hasil))
36     #hasil sudah dalam bentuk bytes
37     self.connection.sendall(hasil)
38     rcv=""
39     self.connection.close()
```

(gambar 5 : tampilan sourcecode server\_thread\_http.py)

Berikut adalah perbedaan tampilan output dari `server_thread_http.py` dengan adanya logging dan tanpa adanya logging.

[illegible]

(gambar 6 : ouput dengan logging)

[illegible]

(gambar 7 : output tanpa logging)

- Lampiran tipe txt dengan konkurensi = 1

<pre>jovyan@e8679a46422a: ~/piX 100% 419 (longest request) (base) jovyan@e8679a46422a:~/progjar/Tugas2\$ ab -n 10 -c 1 http://172.16.16.101:8889/testing.txt This is ApacheBench, Version 2.3 &lt;Revision: 1843412 &gt; Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/ Licensed to The Apache Software Foundation, http://www.apache.org/  Benchmarking 172.16.16.101 (be patient).....done  Server Software:      myserver/1.0 Server Hostname:      172.16.16.101 Server Port:          8889  Document Path:        /testing.txt Document Length:      22 bytes  Concurrency Level:    1 Time taken for tests:  2.152 seconds Complete requests:    10 Failed requests:      0 Total transferred:    1590 bytes HTML transferred:     220 bytes Requests per second:  4.65 [#/sec] (mean) Time per request:     215.242 [ms] (mean) Time per request:     215.242 [ms] (mean, across all concurrent requests) Transfer rate:        0.72 [Kbytes/sec] received  Connection Times (ms)               min  mean[+/-sd] median  max Connect:      0    0  0.1    0    0 Processing:   159  215  28.5   221  258 Waiting:      159  207  26.7   210  251 Total:        159  215  28.6   221  258</pre>	<pre>jovyan@e8679a46422a: ~/piX 100% 258 (longest request) (base) jovyan@e8679a46422a:~/progjar/Tugas2\$ ab -n 50 -c 1 http://172.16.16.101:8889/testing.txt This is ApacheBench, Version 2.3 &lt;Revision: 1843412 &gt; Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/ Licensed to The Apache Software Foundation, http://www.apache.org/  Benchmarking 172.16.16.101 (be patient).....done  Server Software:      myserver/1.0 Server Hostname:      172.16.16.101 Server Port:          8889  Document Path:        /testing.txt Document Length:      22 bytes  Concurrency Level:    1 Time taken for tests:  21.539 seconds Complete requests:    50 Failed requests:      0 Total transferred:    7950 bytes HTML transferred:     1100 bytes Requests per second:  2.32 [#/sec] (mean) Time per request:     430.778 [ms] (mean) Time per request:     430.778 [ms] (mean, across all concurrent requests) Transfer rate:        0.36 [Kbytes/sec] received  Connection Times (ms)               min  mean[+/-sd] median  max Connect:      0    0  1.1    0    7 Processing:   208  430  239.1  381  1328 Waiting:      208  418  236.1  359  1322 Total:        208  431  239.3  382  1328</pre>
<pre>jovyan@e8679a46422a: ~/piX (base) jovyan@e8679a46422a:~/progjar/Tugas2\$ ab -n 100 -c 1 http://172.16.16.101:8889/testing.txt This is ApacheBench, Version 2.3 &lt;Revision: 1843412 &gt; Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/ Licensed to The Apache Software Foundation, http://www.apache.org/  Benchmarking 172.16.16.101 (be patient).....done  Server Software:      myserver/1.0 Server Hostname:      172.16.16.101 Server Port:          8889  Document Path:        /testing.txt Document Length:      22 bytes  Concurrency Level:    1 Time taken for tests:  55.081 seconds Complete requests:    100 Failed requests:      0 Total transferred:    15900 bytes HTML transferred:     2200 bytes Requests per second:  1.82 [#/sec] (mean) Time per request:     550.814 [ms] (mean) Time per request:     550.814 [ms] (mean, across all concurrent requests) Transfer rate:        0.28 [Kbytes/sec] received  Connection Times (ms)               min  mean[+/-sd] median  max Connect:      0    0  0.1    0    1 Processing:   265  550  266.3  473  1847 Waiting:      230  532  261.9  464  1814 Total:        265  551  266.3  473  1847</pre>	<pre>jovyan@e8679a46422a: ~/piX (base) jovyan@e8679a46422a:~/progjar/Tugas2\$ ab -n 500 -c 1 http://172.16.16.101:8889/testing.txt This is ApacheBench, Version 2.3 &lt;Revision: 1843412 &gt; Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/ Licensed to The Apache Software Foundation, http://www.apache.org/  Benchmarking 172.16.16.101 (be patient) Completed 100 requests Completed 200 requests Completed 300 requests Completed 400 requests Completed 500 requests Finished 500 requests  Server Software:      myserver/1.0 Server Hostname:      172.16.16.101 Server Port:          8889  Document Path:        /testing.txt Document Length:      22 bytes  Concurrency Level:    1 Time taken for tests:  402.027 seconds Complete requests:    500 Failed requests:      0 Total transferred:    79500 bytes HTML transferred:     11000 bytes Requests per second:  1.24 [#/sec] (mean) Time per request:     804.053 [ms] (mean) Time per request:     804.053 [ms] (mean, across all concurrent requests) Transfer rate:        0.19 [Kbytes/sec] received  Connection Times (ms)               min  mean[+/-sd] median  max Connect:      0    0  0.5    0    6 Processing:   3  803  522.0  705  3653 Waiting:      3  774  502.5  682  3511 Total:        3  804  522.0  705  3653</pre>

- Lampiran tipe txt dengan konkurensi = 10

<pre>jovyan@e8679a46422a: ~/piX 100% 3653 (longest request) (base) jovyan@e8679a46422a:~/progjar/Tugas2\$ ab -n 10 -c 10 http://172.16.16.101:8889/testing.txt This is ApacheBench, Version 2.3 &lt;Revision: 1843412 &gt; Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/ Licensed to The Apache Software Foundation, http://www.apache.org/  Benchmarking 172.16.16.101 (be patient).....done  Server Software:      myserver/1.0 Server Hostname:      172.16.16.101 Server Port:          8889  Document Path:        /testing.txt Document Length:      22 bytes  Concurrency Level:    10 Time taken for tests:  0.193 seconds Complete requests:    10 Failed requests:      0 Total transferred:    1590 bytes HTML transferred:     220 bytes Requests per second:  51.68 [#/sec] (mean) Time per request:     193.496 [ms] (mean) Time per request:     19.350 [ms] (mean, across all concurrent requests) Transfer rate:        8.02 [Kbytes/sec] received  Connection Times (ms)               min  mean[+/-sd] median  max Connect:      0    1  0.5    0    2 Processing:    4   54  32.3   53  105 Waiting:      3   51  30.2   51   97 Total:        6   55  31.9   53  105 WARNING: The median and mean for the initial connection time are not within a normal deviation These results are probably not that reliable.</pre>	<pre>jovyan@e8679a46422a: ~/piX 100% 105 (longest request) (base) jovyan@e8679a46422a:~/progjar/Tugas2\$ ab -n 50 -c 10 http://172.16.16.101:8889/testing.txt This is ApacheBench, Version 2.3 &lt;Revision: 1843412 &gt; Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/ Licensed to The Apache Software Foundation, http://www.apache.org/  Benchmarking 172.16.16.101 (be patient).....done  Server Software:      myserver/1.0 Server Hostname:      172.16.16.101 Server Port:          8889  Document Path:        /testing.txt Document Length:      22 bytes  Concurrency Level:    10 Time taken for tests:  2.965 seconds Complete requests:    50 Failed requests:      0 Total transferred:    7950 bytes HTML transferred:     1100 bytes Requests per second:  16.86 [#/sec] (mean) Time per request:     593.022 [ms] (mean) Time per request:     59.302 [ms] (mean, across all concurrent requests) Transfer rate:        2.62 [Kbytes/sec] received  Connection Times (ms)               min  mean[+/-sd] median  max Connect:      0   172  397.9    0  1083 Processing:   71   297  250.5   215  1264 Waiting:     67   288  246.2   199  1257 Total:       72  469  586.3   218  2346</pre>
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```
jovyan@e8679a46422a: ~/piX
100% 2346 (longest request)
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 100 -c 10 http://172.16.16.101:8889/testing.txt
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /testing.txt
Document Length:      22 bytes

Concurrency Level:    10
Time taken for tests:  12.848 seconds
Complete requests:    100
Failed requests:      0
Total transferred:    15900 bytes
HTML transferred:     2200 bytes
Requests per second:  7.78 [#/sec] (mean)
Time per request:     1284.795 [ms] (mean)
Time per request:     128.479 [ms] (mean, across all concurrent requests)
Transfer rate:         1.21 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:     0   943 662.5      0   3133
Processing:   236   789 407.8    685   1976
Waiting:     213   770 407.4    670   1970
Total:       238  1132 899.9    806   4887
```

```
jovyan@e8679a46422a: ~/piX
100% 4887 (longest request)
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 500 -c 10 http://172.16.16.101:8889/testing.txt
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 172.16.16.101 (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Finished 500 requests

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /testing.txt
Document Length:      22 bytes

Concurrency Level:    10
Time taken for tests:  113.879 seconds
Complete requests:    500
Failed requests:      0
Total transferred:    79500 bytes
HTML transferred:     11000 bytes
Requests per second:  4.39 [#/sec] (mean)
Time per request:     2277.576 [ms] (mean)
Time per request:     227.758 [ms] (mean, across all concurrent requests)
Transfer rate:         0.68 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:     0   738 2139.4      0  32313
Processing:  207  1514 688.0   1361   4514
Waiting:     207  1481 677.5   1319   4514
Total:       208  2252 2268.0   1843 34439
```

- Lampiran tipe jpg dengan konkurensi = 1

```
jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 10 -c 1 http://172.16.16.101:8889/pokijan.jpg
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /pokijan.jpg
Document Length:      15706 bytes

Concurrency Level:    1
Time taken for tests:  0.410 seconds
Complete requests:    10
Failed requests:      0
Total transferred:    158460 bytes
HTML transferred:     157060 bytes
Requests per second:  24.41 [#/sec] (mean)
Time per request:     40.963 [ms] (mean)
Time per request:     40.963 [ms] (mean, across all concurrent requests)
Transfer rate:         377.77 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:     0      0  0.3      0      1
Processing:   10     40 18.9     44     71
Waiting:     10     39 18.7     43     70
Total:       11     41 18.7     44     71
```

```
jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 50 -c 1 http://172.16.16.101:8889/pokijan.jpg
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /pokijan.jpg
Document Length:      15706 bytes

Concurrency Level:    1
Time taken for tests:  11.313 seconds
Complete requests:    50
Failed requests:      0
Total transferred:    792300 bytes
HTML transferred:     785300 bytes
Requests per second:  4.42 [#/sec] (mean)
Time per request:     226.265 [ms] (mean)
Time per request:     226.265 [ms] (mean, across all concurrent requests)
Transfer rate:         68.39 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:     0      0  0.5      0      4
Processing:   17    226 155.8    205    616
Waiting:     16    216 151.5    184    603
Total:       17    226 155.8    205    616
```

```
jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 100 -c 1 http://172.16.16.101:8889/pokijan.jpg
This is ApacheBench, Version 2.3 <$Revision: 1843412 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /pokijan.jpg
Document Length:      15706 bytes

Concurrency Level:    1
Time taken for tests:  32.586 seconds
Complete requests:    100
Failed requests:      0
Total transferred:    1584600 bytes
HTML transferred:     1570600 bytes
Requests per second:  3.07 [#/sec] (mean)
Time per request:     325.859 [ms] (mean)
Time per request:     325.859 [ms] (mean, across all concurrent requests)
Transfer rate:         47.40 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:     0      0  0.6      0      6
Processing:   7   325 219.7    301   960
Waiting:     7   312 215.0    283   943
Total:       8   326 219.8    302   960
```

```
jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 500 -c 1 http://172.16.16.101:8889/pokijan.jpg
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Benchmarking 172.16.16.101 (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Finished 500 requests

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /pokijan.jpg
Document Length:      15706 bytes

Concurrency Level:    1
Time taken for tests:  293.655 seconds
Complete requests:    500
Failed requests:      0
Total transferred:    7923000 bytes
HTML transferred:     7853000 bytes
Requests per second:  1.70 [#/sec] (mean)
Time per request:     587.310 [ms] (mean)
Time per request:     587.310 [ms] (mean, across all concurrent requests)
Transfer rate:         26.35 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:     0      0  0.6      0      8
Processing:  10   587 237.2    585  1596
Waiting:     10   567 232.9    567  1595
Total:       10   587 237.1    585  1596
```

- Lampiran tipe jpg dengan konkurensi = 10

```
jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 10 -c 1 http://172.16.16.101:8889/pokijan.jpg
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Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /pokijan.jpg
Document Length:      15706 bytes

Concurrency Level:    1
Time taken for tests:  0.410 seconds
Complete requests:    10
Failed requests:      0
Total transferred:    158460 bytes
HTML transferred:     157060 bytes
Requests per second:  24.41 [#/sec] (mean)
Time per request:     40.963 [ms] (mean)
Time per request:     40.963 [ms] (mean, across all concurrent requests)
Transfer rate:        377.77 [Kbytes/sec] received

Connection Times (ms)
  min   mean[+/-sd] median   max
Connect:  0    0  0.3      0      1
Processing: 10  40 18.9    44     71
Waiting:   10  39 18.7    43     70
Total:     11  41 18.7    44     71

jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 100 -c 1 http://172.16.16.101:8889/pokijan.jpg
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Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /pokijan.jpg
Document Length:      15706 bytes

Concurrency Level:    1
Time taken for tests:  32.586 seconds
Complete requests:    100
Failed requests:      0
Total transferred:    1584600 bytes
HTML transferred:     1570600 bytes
Requests per second:  3.07 [#/sec] (mean)
Time per request:     325.859 [ms] (mean)
Time per request:     325.859 [ms] (mean, across all concurrent requests)
Transfer rate:        47.49 [Kbytes/sec] received

Connection Times (ms)
  min   mean[+/-sd] median   max
Connect:  0    0  0.6      0      6
Processing: 7  325 219.7   301   960
Waiting:   7  312 215.0   283   943
Total:     8  326 219.8   302   960

jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 500 -c 1 http://172.16.16.101:8889/pokijan.jpg
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Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /pokijan.jpg
Document Length:      15706 bytes

Concurrency Level:    1
Time taken for tests:  293.655 seconds
Complete requests:    500
Failed requests:      0
Total transferred:    7923000 bytes
HTML transferred:     7853000 bytes
Requests per second:  1.70 [#/sec] (mean)
Time per request:     587.310 [ms] (mean)
Time per request:     587.310 [ms] (mean, across all concurrent requests)
Transfer rate:        26.35 [Kbytes/sec] received

Connection Times (ms)
  min   mean[+/-sd] median   max
Connect:  0    0  0.6      0      8
Processing: 10  587 237.2   585  1596
Waiting:   10  567 232.9   567  1595
Total:     10  587 237.1   585  1596
```

- Lampiran tipe pdf dengan konkurensi = 1

```
jovyan@e8679a46422a: ~/piX
100% 135 (longest request)
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 10 -c 1 http://172.16.16.101:8889/rfc2616.pdf
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Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /rfc2616.pdf
Document Length:      550562 bytes

Concurrency Level:    1
Time taken for tests:  7.986 seconds
Complete requests:    10
Failed requests:      0
Total transferred:    5507080 bytes
HTML transferred:     5505620 bytes
Requests per second:  1.25 [#/sec] (mean)
Time per request:     798.625 [ms] (mean)
Time per request:     798.625 [ms] (mean, across all concurrent requests)
Transfer rate:        673.41 [Kbytes/sec] received

Connection Times (ms)
  min   mean[+/-sd] median   max
Connect:  0    0  0.1      0      0
Processing: 195 798 392.0   839  1417
Waiting:   191 792 390.5   833  1405
Total:     196 798 392.0   839  1418

jovyan@e8679a46422a: ~/piX
100% 1418 (longest request)
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 50 -c 1 http://172.16.16.101:8889/rfc2616.pdf
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Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /rfc2616.pdf
Document Length:      550562 bytes

Concurrency Level:    1
Time taken for tests:  52.563 seconds
Complete requests:    50
Failed requests:      0
Total transferred:    27535400 bytes
HTML transferred:     27528100 bytes
Requests per second:  0.95 [#/sec] (mean)
Time per request:     1051.263 [ms] (mean)
Time per request:     1051.263 [ms] (mean, across all concurrent requests)
Transfer rate:        511.58 [Kbytes/sec] received

Connection Times (ms)
  min   mean[+/-sd] median   max
Connect:  0    0  0.3      0      2
Processing: 149 1051 447.6  1024  2792
Waiting:   139 1040 448.8  1017  2790
Total:     149 1051 447.6  1025  2793
```



```
jovyan@e8679a46422a: ~/piX
100% 2793 (longest request)
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 100 -c 1 http://172.16.16.101:8889/rfc2616.pdf
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Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /rfc2616.pdf
Document Length:      550562 bytes

Concurrency Level:    1
Time taken for tests:  117.371 seconds
Complete requests:    100
Failed requests:      0
Total transferred:    55070800 bytes
HTML transferred:     55056200 bytes
Requests per second:  0.85 [#/sec] (mean)
Time per request:     1173.712 [ms] (mean)
Time per request:     1173.712 [ms] (mean, across all concurrent requests)
Transfer rate:        458.21 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0        0  0.6      0      4
Processing:    151 1173 575.0    1068   4221
Waiting:       149 1151 569.2     1048   4145
Total:         152 1173 575.1     1068   4222
```

```
jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 500 -c 1 http://172.16.16.101:8889/rfc2616.pdf
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Benchmarking 172.16.16.101 (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
apr_pollset_poll: The timeout specified has expired (70007)
Total of 434 requests completed
(base) jovyan@e8679a46422a:~/progjar/Tugas2$
```

- Lampiran tipe pdf dengan konkurensi = 10

```
jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 10 -c 10 http://172.16.16.101:8889/rfc2616.pdf
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Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /rfc2616.pdf
Document Length:      550562 bytes

Concurrency Level:    10
Time taken for tests:  8.938 seconds
Complete requests:    10
Failed requests:      0
Total transferred:    5507080 bytes
HTML transferred:     5505620 bytes
Requests per second:  1.12 [#/sec] (mean)
Time per request:     8938.001 [ms] (mean)
Time per request:     893.800 [ms] (mean, across all concurrent requests)
Transfer rate:        601.70 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0   506 532.7    1011   1012
Processing:    173 3195 2434.2    2961   7754
Waiting:       168 3183 2427.6    2949   7738
Total:         174 3701 2883.1    3973   8766
```

```
jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 50 -c 10 http://172.16.16.101:8889/rfc2616.pdf
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Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /rfc2616.pdf
Document Length:      550562 bytes

Concurrency Level:    10
Time taken for tests:  56.441 seconds
Complete requests:    50
Failed requests:      0
Total transferred:    27535400 bytes
HTML transferred:     27528100 bytes
Requests per second:  0.89 [#/sec] (mean)
Time per request:     11288.264 [ms] (mean)
Time per request:     1128.826 [ms] (mean, across all concurrent requests)
Transfer rate:        476.42 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0  2549 5637.6    1052  32349
Processing:    187  6776 3318.2    6527  17988
Waiting:       179  6756 3312.5    6495  17901
Total:         187  9325 6493.1    7525  38095
```

```
jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 100 -c 10 http://172.16.16.101:8889/rfc2616.pdf
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Benchmarking 172.16.16.101 (be patient).....done

Server Software:      myserver/1.0
Server Hostname:      172.16.16.101
Server Port:          8889

Document Path:        /rfc2616.pdf
Document Length:      550562 bytes

Concurrency Level:    10
Time taken for tests:  118.113 seconds
Complete requests:    100
Failed requests:      0
Total transferred:    55070800 bytes
HTML transferred:     55056200 bytes
Requests per second:  0.85 [#/sec] (mean)
Time per request:     11811.281 [ms] (mean)
Time per request:     1181.128 [ms] (mean, across all concurrent requests)
Transfer rate:        455.33 [Kbytes/sec] received

Connection Times (ms)
              min      mean[+/-sd] median   max
Connect:        0  2071 5083.0    1021  32258
Processing:    103  7046 3506.3    6393  19889
Waiting:       98  7014 3502.1    6385  19838
Total:         103  9917 6983.2    7614  44661
```

```
jovyan@e8679a46422a: ~/piX
(base) jovyan@e8679a46422a:~/progjar/Tugas2$ ab -n 500 -c 10 http://172.16.16.101:8889/rfc2616.pdf
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Benchmarking 172.16.16.101 (be patient)
apr_pollset_poll: The timeout specified has expired (70007)
Total of 23 requests completed
(base) jovyan@e8679a46422a:~/progjar/Tugas2$
```

- SourceCode  
<https://github.com/Fajar19051/progjar>