

Tugas Kasus Concurrency

Pemrograman Jaringan



Kelas E

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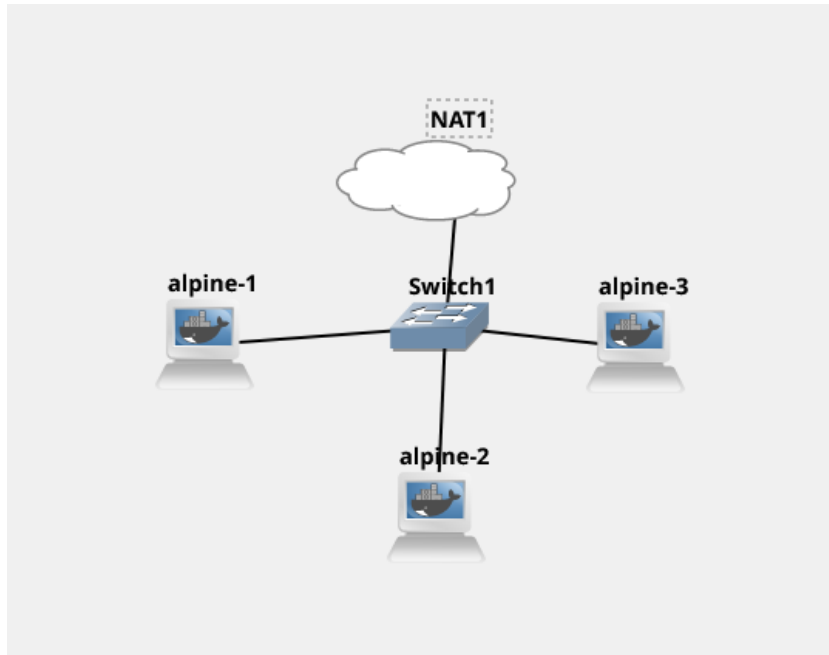
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2021

1. Kasus yang akan diimplementasikan adalah mengunduh gambar dengan project GNS3

a. Server: alpine-1
alpine-2

b. Client: alpine-3

2. Arsitektur Jaringan



3. a. file_server1.py

```
1  import socket
2
3  UDP_IP_ADDRESS = '192.168.122.217'
4  UDP_PORT = 5758
5
6  serverSock = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
7  serverSock.bind((UDP_IP_ADDRESS, UDP_PORT))
8  filename='server1.jpg'
9  fp = open(filename, 'wb+')
10 ditulis=0
11 count=0
12 while True:
13     data, addr = serverSock.recvfrom(1024)
14     count=count+len(data)
15     print(addr, count, len(data), data)
16     fp.write(data)
```

b. file_server2.py

```
1 import socket
2
3 UDP_IP_ADDRESS = '192.168.122.254'
4 UDP_PORT = 5758
5
6 serverSock = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
7 serverSock.bind((UDP_IP_ADDRESS, UDP_PORT))
8 filename = 'server2.jpg'
9 fp = open(filename, 'wb+')
10 ditulis = 0
11 count = 0
12 while True:
13     data, addr = serverSock.recvfrom(1024)
14     count = count + len(data)
15     print(addr, count, len(data), data)
16     fp.write(data)
17
```

c. library.py

```
1 import logging
2 import requests
3 import socket
4 import os
5 import time
6 import datetime
7
8 def get_url_list():
9     urls = dict()
10     urls['olivia'] = 'https://m.media-amazon.com/images/M/MV5BYTYxODRmNzItMGEkNSQ0Mzk4LTk0NTMtYjdiYjgwYWNhODQ2XkEyXkFqcGdeQXVyNTg1MDY4NjQ0._V1_UY1200_CR285_0_6'
11     urls['taylor'] = 'http://jadiberita.com/wp-content/uploads/2014/06/taylor-swift-presenting-jpg.jpg'
12     return urls
13
14 def download_gambar(url=None, tuliskefile='image'):
15     waktu_awal = datetime.datetime.now()
16     if url is None:
17         return False
18     ff = requests.get(url)
19     tipe = dict()
20     tipe['image/png'] = 'png'
21     tipe['image/jpeg'] = 'jpg'
22     tipe['image/gif'] = 'gif'
23     tipe['image/jpg'] = 'jpg'
24     tipe['application/zip'] = 'jpg'
25     tipe['video/quicktime'] = 'mov'
26     # time.sleep(2) # untuk simulasi, diberi tambahan delay 2 detik
27
28     content_type = ff.headers['Content-Type']
29     logging.warning(content_type)
30     if content_type in list(tipe.keys()):
31         namafile = os.path.basename(url)
32         ekstensi = tipe[content_type]
33         if tuliskefile:
34             fp = open(f'{tuliskefile}-{ekstensi}', 'wb')
```

```

34         fp = open(f"{tuliskefile}.{ekstensi}", "wb")
35         fp.write(ff.content)
36         fp.close()
37         waktu_process = datetime.datetime.now() - waktu_awal
38         waktu_akhir = datetime.datetime.now()
39         logging.warning(f"writing {tuliskefile}.{ekstensi} dalam waktu {waktu_process} {waktu_awal} s/d {waktu_akhir}")
40         return waktu_process
41     else:
42         return False
43
44 def kirim_gambar(IP_ADDRESS, PORT, filename):
45     print(IP_ADDRESS, PORT, filename)
46     ukuran=os.stat(filename).st_size
47     clientSock = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
48
49     fp=open(filename,'rb')
50     k=fp.read()
51     terkirim=0
52     for x in k:
53         k_bytes=bytes([x])
54         clientSock.sendto(k_bytes, (IP_ADDRESS,PORT))
55         terkirim=terkirim+1
56
57 if __name__=='__main__':
58     #check fungsi
59     k = download_gambar('https://m.media-amazon.com/images/H/MV5BYTYxODRmNzItMGFkNS00Mzk4LTk0NThtVjdiYjgwVWNhODQ2XkEyXkFqcGdeQXVyNTg1MDY4NjQ0._V1_UY1200_CR28
60     print(k)

```

d. multi_process.py

```

1  from library import download_gambar, get_url_list, kirim_gambar
2  import time
3  import datetime
4  from multiprocessing import Process
5
6  def kirim_server():
7      texec = dict()
8      urls = get_url_list()
9      temp = 0
10     catat_awal = datetime.datetime.now()
11     for k in urls:
12         print(f"mendownload {urls[k]}")
13         waktu = time.time()
14         UDP_IP_ADDRESS = "192.168.122.217"
15         UDP_IP_ADDRESS2 = "192.168.122.254"
16         PORT = 5758
17         #bagian ini merupakan bagian yang menginstruksikan eksekusi fungsi download gambar secara multiprocess
18         if temp == 0:
19             texec[k] = Process(target=kirim_gambar, args=(UDP_IP_ADDRESS,PORT,f"{k}.jpg"))
20             print('Masuk server 1')
21             temp = temp+1
22         elif temp == 1:
23             print('Masuk server 2')
24             texec[k] = Process(target=kirim_gambar, args=(UDP_IP_ADDRESS2,PORT,f"{k}.jpg"))
25             texec[k].start()
26         #setelah menyelesaikan tugasnya, dikembalikan ke main process dengan join
27         for k in urls:
28             texec[k].join()
29         catat_akhir = datetime.datetime.now()
30         selesai = catat_akhir - catat_awal
31         print(f"Waktu TOTAL yang dibutuhkan {selesai} detik {catat_awal} s/d {catat_akhir}")
32         #fungsi download_gambar akan dijalankan secara multi process
33     if __name__=='__main__':
34         kirim_server()

```

e. multi_process_async.py

```
1 from library import download_gambar, get_url_list, kirim_gambar
2 import time
3 import datetime
4 from multiprocessing import Process, Pool
5
6 def kirim_server():
7     texec = dict()
8     urls = get_url_list()
9     status_task = dict()
10    temp = 0
11    task_pool = Pool(processes=20) #2 task yang dapat dikerjakan secara simultan, dapat diset sesuai jumlah core
12    catat_awal = datetime.datetime.now()
13    for k in urls:
14        download_gambar(urls[k],k)
15        print(f"mendownload {urls[k]}")
16        #bagian ini merupakan bagian yang menginstruksikan eksekusi fungsi download gambar secara multiprocess
17        UDP_IP_ADDRESS = "192.168.122.217"
18        UDP_IP_ADDRESS2 = "192.168.122.254"
19        PORT = 5758
20        if temp == 0:
21            texec[k] = task_pool.apply_async(func=kirim_gambar, args=(UDP_IP_ADDRESS,PORT,f"{k}.jpg"))
22            print('Masuk server 1')
23            temp = temp+1
24        elif temp == 1:
25            print('Masuk server 2')
26            texec[k] = task_pool.apply_async(func=kirim_gambar, args=(UDP_IP_ADDRESS2,PORT,f"{k}.jpg"))
27    #setelah menyelesaikan tugasnya, dikembalikan ke main process dengan mengambil hasilnya dengan get
28    for k in urls:
29        status_task[k]=texec[k].get(timeout=10)
30
31    catat_akhir = datetime.datetime.now()
32    selesai = catat_akhir - catat_awal
33    print(f"Waktu TOTAL yang dibutuhkan {selesai} detik {catat_awal} s/d {catat_akhir}")
34    print("status TASK")
35    print(status_task)
36    #fungsi download_gambar akan dijalankan secara multi process
37    if __name__=='__main__':
38        kirim_server()
```

f. multi_thread.py

```
1 from library import download_gambar, get_url_list, kirim_gambar
2 import time
3 import datetime
4 import threading
5
6 def kirim_server():
7     texec = dict()
8     urls = get_url_list()
9     temp = 0
10    catat_awal = datetime.datetime.now()
11    for k in urls:
12        download_gambar(urls[k], k)
13        print(f"mendownload {urls[k]}")
14        waktu = time.time()
15        UDP_IP_ADDRESS = "192.168.122.217"
16        UDP_IP_ADDRESS2 = "192.168.122.254"
17        PORT = 5758
18        #bagian ini merupakan bagian yang menginstruksikan eksekusi fungsi download gambar secara multithread
19        if temp == 0:
20            texec[k] = threading.Thread(target=kirim_gambar, args=(UDP_IP_ADDRESS, PORT, f"{k}.jpg"))
21            print('Masuk server 1')
22            temp = temp+1
23        elif temp == 1:
24            print('Masuk server 2')
25            texec[k] = threading.Thread(target=kirim_gambar, args=(UDP_IP_ADDRESS2, PORT, f"{k}.jpg"))
26            texec[k].start()
27
28    #setelah menyelesaikan tugasnya, dikembalikan ke main thread dengan join
29    for k in urls:
30        texec[k].join()
31
32    catat_akhir = datetime.datetime.now()
33    selesai = catat_akhir - catat_awal
34    print(f"Waktu TOTAL yang dibutuhkan {selesai} detik {catat_awal} s/d {catat_akhir}")
35
36    #fungsi download_gambar akan dijalankan secara multithreading
37
38    if __name__ == '__main__':
39        kirim_server()
```

g. multi_thread_async.py

```

1  from library import download_gambar, get_url_list, kirim_gambar
2  import time
3  import datetime
4  import concurrent.futures
5
6  def kirim_server():
7      texec = dict()
8      urls = get_url_list()
9      status_task = dict()
10     temp = 0
11     task = concurrent.futures.ThreadPoolExecutor(max_workers=4)
12     catat_awal = datetime.datetime.now()
13     for k in urls:
14         download_gambar(urls[k], k)
15         print(f"mendownload {urls[k]}")
16         waktu = time.time()
17         UDP_IP_ADDRESS = "192.168.122.217"
18         UDP_IP_ADDRESS2 = "192.168.122.254"
19         PORT = 5758
20         #bagian ini merupakan bagian yang menginstruksikan eksekusi fungsi download gambar secara multithread
21         if temp == 0:
22             texec[k] = task.submit(kirim_gambar, UDP_IP_ADDRESS, PORT, f"{k}.jpg")
23             print('Masuk server 1')
24             temp = temp+1
25         elif temp == 1:
26             print('Masuk server 2')
27             texec[k] = task.submit(kirim_gambar, UDP_IP_ADDRESS2, PORT, f"{k}.jpg")
28         #setelah menyelesaikan tugasnya, dikembalikan ke main thread dengan memanggil result
29         for k in urls:
30             status_task[k]=texec[k].result()
31         catat_akhir = datetime.datetime.now()
32         selesai = catat_akhir - catat_awal
33         print(f"Waktu TOTAL yang dibutuhkan {selesai} detik {catat_awal} s/d {catat_akhir}")
34         print("hasil task yang dijalankan")
35         print(status_task)
36         #fungsi download_gambar akan dijalankan secara multithreading
37     if __name__=='__main__':
38         kirim_server()

```

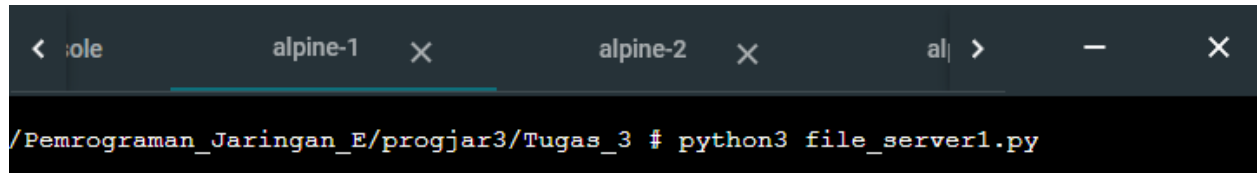
h. single_thread.py

```

1  from library import download_gambar, get_url_list
2  import time
3  import datetime
4
5  def download_semua():
6      urls = get_url_list()
7
8      catat = datetime.datetime.now()
9      for k in urls:
10         print(f"mendownload {urls[k]}")
11         waktu_proses = download_gambar(urls[k])
12         print(f"completed {waktu_proses} detik")
13         selesai = datetime.datetime.now() - catat
14         print(f"Waktu TOTAL yang dibutuhkan {selesai} detik")
15
16     #fungsi download_gambar akan dijalankan secara berurutan
17
18     if __name__=='__main__':
19         download_semua()
20

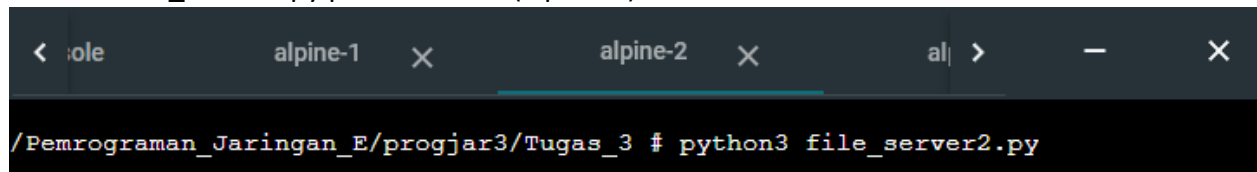
```

4. a. Jalankan file_server1.py pada server 1 (alpine-1)

A terminal window titled 'alpine-1' is shown. The command prompt is '/Pemrograman_Jaringan_E/progjar3/Tugas_3 #'. The command 'python3 file_server1.py' has been entered and executed.

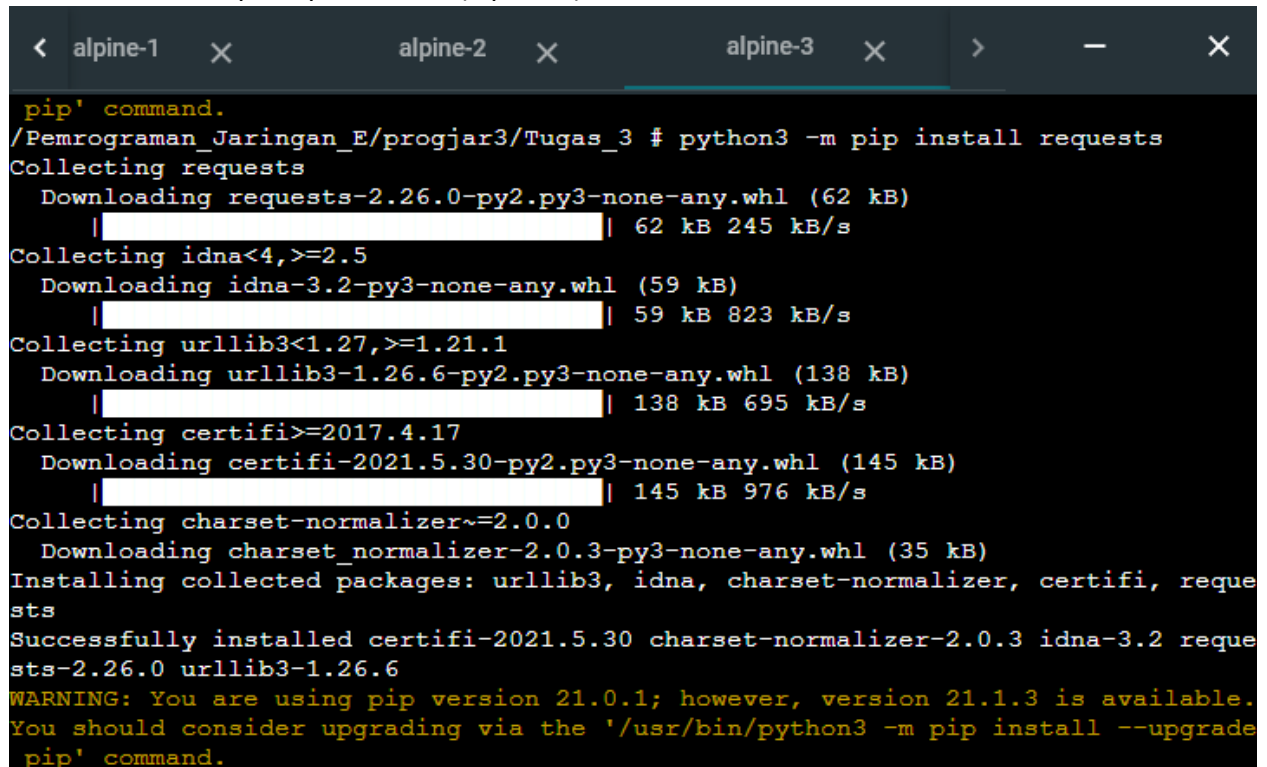
```
< alpine-1 x alpine-2 x alpine-3 x > - x
/Pemrograman_Jaringan_E/progjar3/Tugas_3 # python3 file_server1.py
```

- b. Jalankan file_server2.py pada server 2 (alpine-2)

A terminal window titled 'alpine-2' is shown. The command prompt is '/Pemrograman_Jaringan_E/progjar3/Tugas_3 #'. The command 'python3 file_server2.py' has been entered and executed.

```
< alpine-1 x alpine-2 x alpine-3 x > - x
/Pemrograman_Jaringan_E/progjar3/Tugas_3 # python3 file_server2.py
```

- c. Install module request pada client (alpine-3)

A terminal window titled 'alpine-3' is shown. The command prompt is '/Pemrograman_Jaringan_E/progjar3/Tugas_3 #'. The command 'python3 -m pip install requests' has been entered and executed. The output shows the installation progress for requests and its dependencies: idna, urllib3, certifi, and charset-normalizer. A warning message at the bottom suggests upgrading pip.

```
< alpine-1 x alpine-2 x alpine-3 x > - x
pip' command.
/Pemrograman_Jaringan_E/progjar3/Tugas_3 # python3 -m pip install requests
Collecting requests
  Downloading requests-2.26.0-py2.py3-none-any.whl (62 kB)
    | 62 kB 245 kB/s
Collecting idna<4,>=2.5
  Downloading idna-3.2-py3-none-any.whl (59 kB)
    | 59 kB 823 kB/s
Collecting urllib3<1.27,>=1.21.1
  Downloading urllib3-1.26.6-py2.py3-none-any.whl (138 kB)
    | 138 kB 695 kB/s
Collecting certifi>=2017.4.17
  Downloading certifi-2021.5.30-py2.py3-none-any.whl (145 kB)
    | 145 kB 976 kB/s
Collecting charset-normalizer~=2.0.0
  Downloading charset_normalizer-2.0.3-py3-none-any.whl (35 kB)
Installing collected packages: urllib3, idna, charset-normalizer, certifi, requests
Successfully installed certifi-2021.5.30 charset-normalizer-2.0.3 idna-3.2 requests-2.26.0 urllib3-1.26.6
WARNING: You are using pip version 21.0.1; however, version 21.1.3 is available.
You should consider upgrading via the '/usr/bin/python3 -m pip install --upgrade pip' command.
```


- d. Jalankan multi_process_async.py pada client (alpine-3)

```
< alpine-1 x alpine-2 x alpine-3 x > - x
WARNING: You are using pip version 21.0.1; however, version 21.1.3 is available.
You should consider upgrading via the '/usr/bin/python3 -m pip install --upgrade
pip' command.
/Pemrograman_Jaringan_E/progjar3/Tugas_3 # python3 multi_process_async.py
WARNING:root:image/jpeg
WARNING:root:writing olivia.jpg dalam waktu 0:00:00.576574 2021-07-21 02:04:10.1
29635 s/d 2021-07-21 02:04:10.706216
mendownload https://m.media-amazon.com/images/M/MV5BYTYxODRmNzItMGFkNS00Mzk4LTk0
NTMtYjdiYjgwYWNhODQ2XkEyXkFqcGdeQXVyNTg1MDY4NjQ@._V1_UY1200_CR285,0,630,1200_AL
.jpg
192.168.122.217 5758 olivia.jpg
Masuk server 1
WARNING:root:image/jpeg
WARNING:root:writing taylor.jpg dalam waktu 0:00:01.548511 2021-07-21 02:04:10.7
32730 s/d 2021-07-21 02:04:12.281246
mendownload http://jadiberita.com/wp-content/uploads/2014/06/taylor-swift-presen
ting-jpg.jpg
Masuk server 2
192.168.122.254 5758 taylor.jpg
Waktu TOTAL yang dibutuhkan 0:00:03.499712 detik 2021-07-21 02:04:10.129615 s/d
2021-07-21 02:04:13.629327
status TASK
{'olivia': None, 'taylor': None}
```

- e. Jalankan multi_process.py pada client (alpine-3)

```
< alpine-1 x alpine-2 x alpine-3 x > - x
WARNING:root:image/jpeg
WARNING:root:writing taylor.jpg dalam waktu 0:00:01.548511 2021-07-21 02:04:10.7
32730 s/d 2021-07-21 02:04:12.281246
mendownload http://jadiberita.com/wp-content/uploads/2014/06/taylor-swift-presen
ting-jpg.jpg
Masuk server 2
192.168.122.254 5758 taylor.jpg
Waktu TOTAL yang dibutuhkan 0:00:03.499712 detik 2021-07-21 02:04:10.129615 s/d
2021-07-21 02:04:13.629327
status TASK
{'olivia': None, 'taylor': None}
/Pemrograman_Jaringan_E/progjar3/Tugas_3 # python3 multi_process.py
mendownload https://m.media-amazon.com/images/M/MV5BYTYxODRmNzItMGFkNS00Mzk4LTk0
NTMtYjdiYjgwYWNhODQ2XkEyXkFqcGdeQXVyNTg1MDY4NjQ@._V1_UY1200_CR285,0,630,1200_AL
.jpg
Masuk server 1
192.168.122.217 5758 olivia.jpg
mendownload http://jadiberita.com/wp-content/uploads/2014/06/taylor-swift-presen
ting-jpg.jpg
Masuk server 2
192.168.122.254 5758 taylor.jpg
Waktu TOTAL yang dibutuhkan 0:00:02.502629 detik 2021-07-21 02:05:50.810333 s/d
2021-07-21 02:05:53.312962
```

- f. Jalankan multi_thread_async.py pada client (alpine-3)

```
< alpine-1 x alpine-2 x alpine-3 x > - x
192.168.122.254 5758 taylor.jpg
Waktu TOTAL yang dibutuhkan 0:00:02.502629 detik 2021-07-21 02:05:50.810333 s/d
2021-07-21 02:05:53.312962
/Pemrograman_Jaringan_E/progjar3/Tugas_3 # python3 multi_process_async.py
WARNING:root:image/jpeg
WARNING:root:writing olivia.jpg dalam waktu 0:00:00.213146 2021-07-21 02:06:59.7
04801 s/d 2021-07-21 02:06:59.917954
mendownload https://m.media-amazon.com/images/M/MV5BYTYxODRmNzItMGFkNS00Mzk4LTk0
NTMtYjdiYjgwYWNhODQ2XkEyXkFqcGdeQXVyNTg1MDY4NjQ@._V1_UY1200_CR285,0,630,1200_AL
.jpg
192.168.122.217 5758 olivia.jpg
Masuk server 1
WARNING:root:image/jpeg
WARNING:root:writing taylor.jpg dalam waktu 0:00:03.935037 2021-07-21 02:06:59.9
28223 s/d 2021-07-21 02:07:03.863265
mendownload http://jadiberita.com/wp-content/uploads/2014/06/taylor-swift-presen
ting-jpg.jpg
Masuk server 2
192.168.122.254 5758 taylor.jpg
Waktu TOTAL yang dibutuhkan 0:00:05.251403 detik 2021-07-21 02:06:59.704787 s/d
2021-07-21 02:07:04.956190
status TASK
{'olivia': None, 'taylor': None}
```

- g. Jalankan multi_thread.py pada client (alpine-3)

```
< alpine-1 x alpine-2 x alpine-3 x > - x
192.168.122.254 5758 taylor.jpg
Waktu TOTAL yang dibutuhkan 0:00:05.251403 detik 2021-07-21 02:06:59.704787 s/d
2021-07-21 02:07:04.956190
status TASK
{'olivia': None, 'taylor': None}
/Pemrograman_Jaringan_E/progjar3/Tugas_3 # python3 multi_thread.py
WARNING:root:image/jpeg
WARNING:root:writing olivia.jpg dalam waktu 0:00:00.200264 2021-07-21 02:08:15.2
96090 s/d 2021-07-21 02:08:15.496359
mendownload https://m.media-amazon.com/images/M/MV5BYTYxODRmNzItMGFkNS00Mzk4LTk0
NTMtYjdiYjgwYWNhODQ2XkEyXkFqcGdeQXVyNTg1MDY4NjQ@._V1_UY1200_CR285,0,630,1200_AL
.jpg
Masuk server 1
192.168.122.217 5758 olivia.jpg
WARNING:root:image/jpeg
WARNING:root:writing taylor.jpg dalam waktu 0:00:01.567694 2021-07-21 02:08:15.4
97164 s/d 2021-07-21 02:08:17.064865
mendownload http://jadiberita.com/wp-content/uploads/2014/06/taylor-swift-presen
ting-jpg.jpg
Masuk server 2
192.168.122.254 5758 taylor.jpg
Waktu TOTAL yang dibutuhkan 0:00:03.039775 detik 2021-07-21 02:08:15.296086 s/d
2021-07-21 02:08:18.335861
```

h. Hasil pada server 1 (alpine-1)

```
< role alpine-1 x alpine-2 x al| > - X
('192.168.122.185', 44424) 34546 1 b'}'
('192.168.122.185', 44424) 34547 1 b'\xa6'
('192.168.122.185', 44424) 34548 1 b'x'
('192.168.122.185', 44424) 34549 1 b'\xd5'
('192.168.122.185', 44424) 34550 1 b'^'
('192.168.122.185', 44424) 34551 1 b'%'
('192.168.122.185', 44424) 34552 1 b'\xb6'
('192.168.122.185', 44424) 34553 1 b'\x14'
('192.168.122.185', 44424) 34554 1 b'\x0c'
('192.168.122.185', 44424) 34555 1 b'\xda'
('192.168.122.185', 44424) 34556 1 b'!'
('192.168.122.185', 44424) 34557 1 b'\xe1'
('192.168.122.185', 44424) 34558 1 b'5'
('192.168.122.185', 44424) 34559 1 b'\x18'
('192.168.122.185', 44424) 34560 1 b'X'
('192.168.122.185', 44424) 34561 1 b'\xe9'
('192.168.122.185', 44424) 34562 1 b'o'
('192.168.122.185', 44424) 34563 1 b'\xa9'
('192.168.122.185', 44424) 34564 1 b'0'
('192.168.122.185', 44424) 34565 1 b'a'
('192.168.122.185', 44424) 34566 1 b'B'
('192.168.122.185', 44424) 34567 1 b'k'
('192.168.122.185', 44424) 34568 1 b'|'
```

i. Hasil pada server 2 (alpine-2)

```
< role alpine-1 x alpine-2 x al| > - X
('192.168.122.185', 56319) 34648 1 b's'
('192.168.122.185', 56319) 34649 1 b'\x8f'
('192.168.122.185', 56319) 34650 1 b'\xbc'
('192.168.122.185', 56319) 34651 1 b'\xa0'
('192.168.122.185', 56319) 34652 1 b'\xe3'
('192.168.122.185', 56319) 34653 1 b'8'
('192.168.122.185', 56319) 34654 1 b'\xbe'
('192.168.122.185', 56319) 34655 1 b'\x19'
('192.168.122.185', 56319) 34656 1 b'.'
('192.168.122.185', 56319) 34657 1 b'\x12'
('192.168.122.185', 56319) 34658 1 b'\x11'
('192.168.122.185', 56319) 34659 1 b'\xca'
('192.168.122.185', 56319) 34660 1 b'r'
('192.168.122.185', 56319) 34661 1 b'\x0f'
('192.168.122.185', 56319) 34662 1 b'3'
('192.168.122.185', 56319) 34663 1 b'\x8c'
('192.168.122.185', 56319) 34664 1 b'i'
('192.168.122.185', 56319) 34665 1 b'\xb5'
('192.168.122.185', 56319) 34666 1 b'\xb8'
('192.168.122.185', 56319) 34667 1 b'\x90'
('192.168.122.185', 56319) 34668 1 b'\x95'
('192.168.122.185', 56319) 34669 1 b'\x05'
('192.168.122.185', 56319) 34670 1 b'\x94'
('192.168.122.185', 56319) 34671 1 b'\x85'
```