

Tugas – 3
Implementasi Kasus Menggunakan Concurrency



Kelas : Pemrograman Jaringan D

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SOAL

Buatlah program yang mengimplementasikan

1. Multi Process
2. Multi Thread
3. Multi Process Asynchronous
4. Multi Thread Asynchronous

dengan menggunakan protokol transport UDP. kasus dapat didefinisikan sendiri. dan Buatlah arsitektur jaringan anda sendiri di simulator GNS3

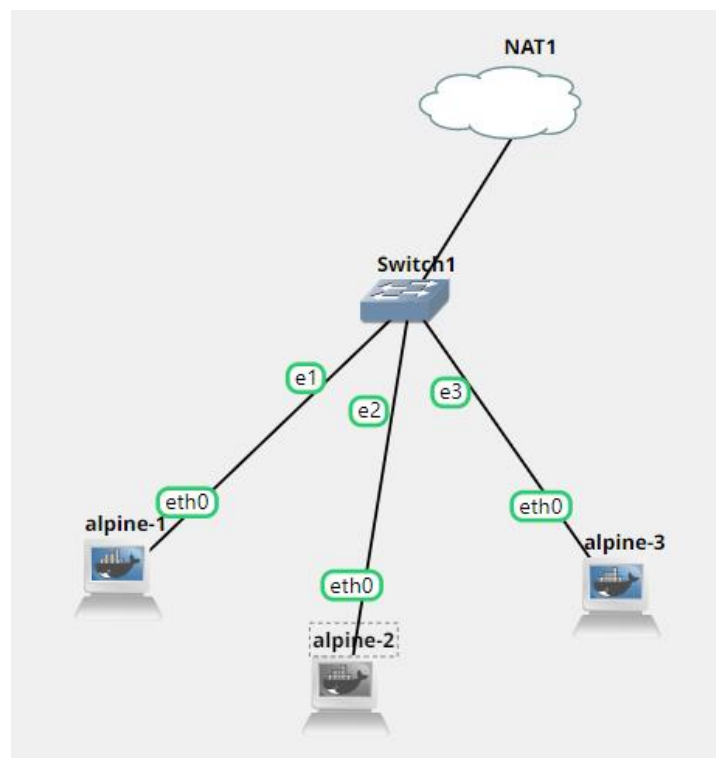
Buatlah laporan dalam bentuk PDF yang berisikan screenshot dari

1. Deskripsi kasus yang dibuat
2. Gambar arsitektur jaringan (dalam simulator gns3)
3. Program yang dibuat (1-4)
4. Hasil outputnya

1. Deskripsi Kasus

Terdapat 2 server dan 1 client, dimana client tersebut mendownload terlebih dahulu 2 file gambar, kemudian melakukan pengiriman file kepada 2 server tersebut menggunakan protokol transport UDP. Terdapat 2 file gambar yang diunduh client, dengan 1 file gambar tersebut diberikan kepada server 1, dan 1 file gambar lainnya diberikan kepada server 2. Pengiriman dari client kepada kedua server dilakukan dengan 5 program yang berbeda yaitu multi thread, multi process, multi thread async, multi process async, dan single thread.

2. Gambar Arsitektur Jaringan (Dalam Simulator Gns3)



Note: Alpine-1 sebagai server 1, Alpine 2 sebagai client, Alpine-3 sebagai server 2

3. Program yang Dibuat (1-4)

Library.py


marsellaeve multiprocessing
Latest commit aad22e


1 contributor

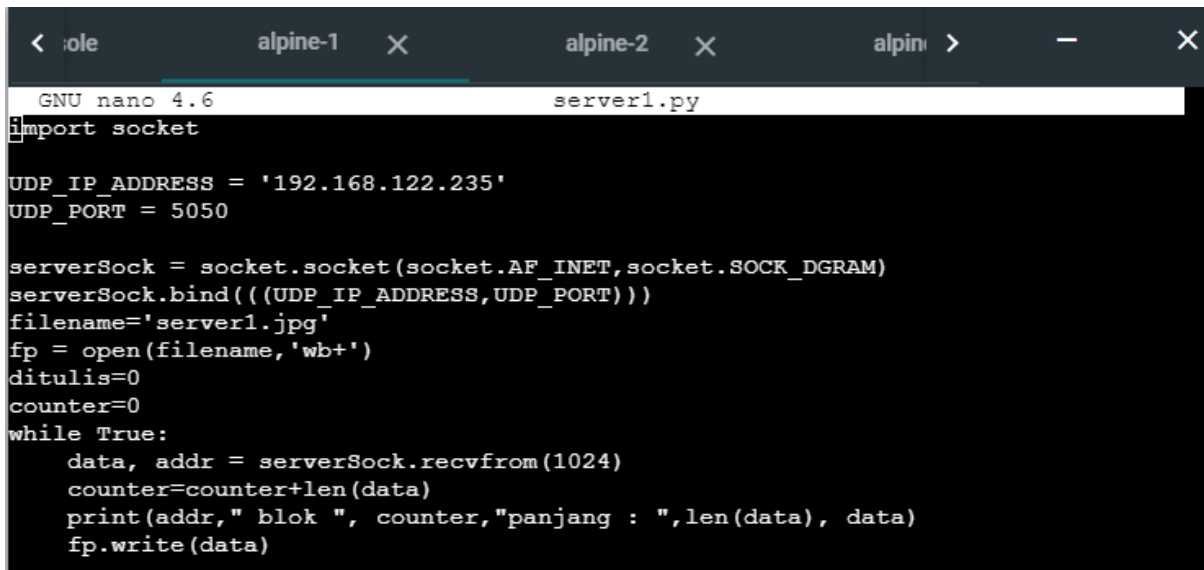
65 lines (56 sloc) | 2.09 KB
Raw

```

1  import logging
2  import requests
3  import socket
4  import os
5  import time
6  import datetime
7
8
9  def get_url_list():
10     urls = dict()
11     urls['kompas'] = 'https://asset.kompas.com/crops/qz_jjXyaZgGgboomdCEXsfbSpec=/0x0:998x665/740x500/data/photo/2020/03/01/5e5b52f4db896.jpg'
12     # urls['its'] = 'https://awsimages.detik.net.id/customthumb/2012/03/02/398/ITS-Tech-dalam.jpg'
13     urls['detik'] = 'https://awscdn.detik.net.id/detik2/images/logo.jpg'
14     return urls
15
16
17 def download_gambar(url=None, tuliskefile='image'):
18     waktu_awal = datetime.datetime.now()
19     if url is None:
20         return False
21     ff = requests.get(url)
22     tipe = dict()
23     tipe['image/png'] = 'png'
24     tipe['image/jpg'] = 'jpg'
25     tipe['image/gif'] = 'gif'
26     tipe['image/jpeg'] = 'jpg'
27     tipe['application/zip'] = 'jpg'
28     tipe['video/quicktime'] = 'mov'
29     # time.sleep(2) #untuk simulasi, diberi tambahan delay 2 detik
30
31     content_type = ff.headers['Content-Type']
32     logging.warning(content_type)
33     if (content_type in list(tipe.keys())):
34         namafile = os.path.basename(url)
35         ekstensi = tipe[content_type]
36         if (tuliskefile):
37             fp = open(f"{tuliskefile}.{ekstensi}", "wb")
38             fp.write(ff.content)
39             fp.close()
40             waktu_process = datetime.datetime.now() - waktu_awal
41             waktu_akhir = datetime.datetime.now()
42             logging.warning(f"writing {tuliskefile}.{ekstensi} dalam waktu {waktu_process} {waktu_awal} s/d {waktu_akhir}")
43             return waktu_process
44     else:
45         return False
46
47 def kirim_gambar(IP_ADDRESS, PORT, filename):
48     print(IP_ADDRESS, PORT, filename)
49     ukuran = os.stat(filename).st_size
50     clientSock = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
51
52     fp = open(filename, 'rb')
53     k = fp.read()
54     terkirim = 0
55     for x in k:
56         k_bytes = bytes([x])
57         clientSock.sendto(k_bytes, (IP_ADDRESS, PORT))
58         terkirim = terkirim + 1
59     # print(k_bytes, f"terkirim {terkirim} of {ukuran}")
60
61
62 if __name__ == '__main__':
63     #check fungsi
64     k = download_gambar('https://asset.kompas.com/crops/qz_jjXyaZgGgboomdCEXsfbSpec=/0x0:998x665/740x500/data/photo/2020/03/01/5e5b52f4db896.jpg')
65     print(k)

```

Server1.py

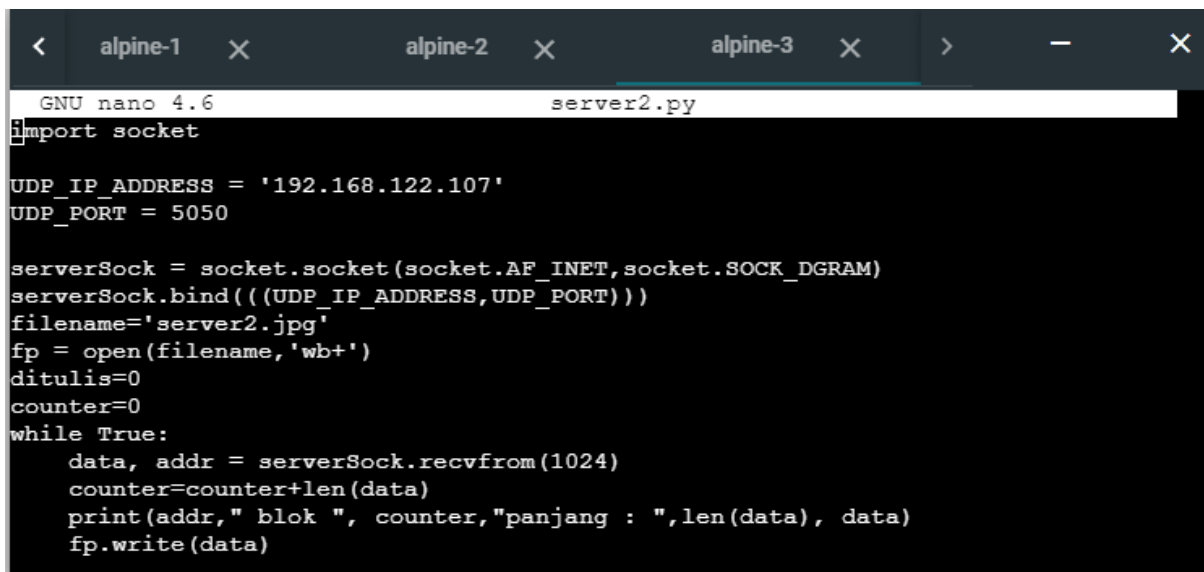


```
GNU nano 4.6 server1.py
import socket

UDP_IP_ADDRESS = '192.168.122.235'
UDP_PORT = 5050

serverSock = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
serverSock.bind((UDP_IP_ADDRESS, UDP_PORT))
filename='server1.jpg'
fp = open(filename, 'wb+')
ditulis=0
counter=0
while True:
    data, addr = serverSock.recvfrom(1024)
    counter=counter+len(data)
    print(addr, " blok ", counter, "panjang : ", len(data), data)
    fp.write(data)
```

Server2.py



```
GNU nano 4.6 server2.py
import socket

UDP_IP_ADDRESS = '192.168.122.107'
UDP_PORT = 5050

serverSock = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
serverSock.bind((UDP_IP_ADDRESS, UDP_PORT))
filename='server2.jpg'
fp = open(filename, 'wb+')
ditulis=0
counter=0
while True:
    data, addr = serverSock.recvfrom(1024)
    counter=counter+len(data)
    print(addr, " blok ", counter, "panjang : ", len(data), data)
    fp.write(data)
```

multi_process_udp.py

master ▾

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marsellaeve tugas3_client

1 contributor

34 lines (33 sloc) | 1.28 KB

```

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_semua():
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         #bagian ini merupakan bagian yang menginstruksikan eksekusi fungsi download gambar secara multiprocess
16         UDP_IP_ADDRESS = "192.168.122.235"
17         UDP_IP_ADDRESS2 = "192.168.122.107"
18         if temp == 0:
19             texec[k] = Process(target=kirim_gambar, args=(UDP_IP_ADDRESS,5050,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_ADDRESS2,5050,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_semua()

```

multi_process_async_udp.py

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marsellaeve tugas3_client

1 contributor

42 lines (36 sloc) 1.58 KB

```

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_semua():
7      texec = dict()
8      urls = get_url_list()
9      temp = 0
10     status_task = dict()
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         UDP_IP_ADDRESS = "192.168.122.235"
17         UDP_IP_ADDRESS2 = "192.168.122.107"
18         if temp == 0:
19             texec[k] = task_pool.apply_async(func=kirim_gambar, args=(UDP_IP_ADDRESS, 5050, f"{k}.jpg"))
20             print('masuk server 1')
21             temp = temp + 1
22         elif temp == 1:
23             print('masuk server 2')
24             texec[k] = task_pool.apply_async(func=kirim_gambar, args=(UDP_IP_ADDRESS2, 5050, f"{k}.jpg"))
25             #bagian ini merupakan bagian yang menginstruksikan eksekusi fungsi download gambar secara multiprocess
26             # texec[k] = task_pool.apply_async(func=download_gambar, args=(urls[k],))
27
28     #setelah menyelesaikan tugasnya, dikembalikan ke main process dengan mengambil hasilnya dengan get
29     for k in urls:
30         status_task[k]=texec[k].get(timeout=10)
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     print("status TASK")
36     print(status_task)
37
38
39 #fungsi download_gambar akan dijalankan secara multi process
40
41 if __name__=='__main__':
42     kirim_semua()

```

multi_thread_udp.py

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marsellaeve tugas3_client

1 contributor

40 lines (34 sloc) 1.37 KB

```

1  from library import download_gambar, get_url_list, kirim_gambar
2  import time
3  import datetime
4  import threading
5
6  def kirim_semua():
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         #bagian ini merupakan bagian yang menginstruksikan eksekusi fungsi download gambar secara multithread
16         UDP_IP_ADDRESS = "192.168.122.235"
17         UDP_IP_ADDRESS2 = "192.168.122.107"
18         if temp == 0:
19             texec[k] = threading.Thread(target=kirim_gambar, args=(UDP_IP_ADDRESS, 5050, f"{k}.jpg"))
20             print('masuk server 1')
21             temp = temp + 1
22         elif temp == 1:
23             print('masuk server 2')
24             texec[k] = threading.Thread(target=kirim_gambar, args=(UDP_IP_ADDRESS2, 5050, f"{k}.jpg"))
25             # texec[k] = threading.Thread(target=download_gambar, args=(urls[k],))
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
37     #fungsi download_gambar akan dijalankan secara multithreading
38
39     if __name__ == '__main__':
40         kirim_semua()

```


multi_thread_async_udp.py

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marsellaeve tugas3_client

1 contributor

43 lines (37 sloc) | 1.47 KB

```

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_semua():
7      texec = dict()
8      urls = get_url_list()
9      temp = 0
10     status_task = dict()
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 = "192.168.122.235"
18         UDP_IP_ADDRESS2 = "192.168.122.107"
19         if temp == 0:
20             texec[k] = task.submit(kirim_gambar, UDP_IP_ADDRESS, 5050, f"{k}.jpg")
21             print('masuk server 1')
22             temp = temp + 1
23         elif temp == 1:
24             print('masuk server 2')
25             texec[k] = task.submit(kirim_gambar, UDP_IP_ADDRESS2, 5050, f"{k}.jpg")
26             #bagian ini merupakan bagian yang menginstruksikan eksekusi fungsi download gambar secara multithread
27             # texec[k] = task.submit(download_gambar, urls[k])
28
29     #setelah menyelesaikan tugasnya, dikembalikan ke main thread dengan memanggil result
30     for k in urls:
31         status_task[k] = texec[k].result()
32
33     catat_akhir = datetime.datetime.now()
34     selesai = catat_akhir - catat_awal
35     print(f"Waktu TOTAL yang dibutuhkan {selesai} detik {catat_awal} s/d {catat_akhir}")
36     print("hasil task yang dijalankan")
37     print(status_task)
38
39
40 #fungsi download_gambar akan dijalankan secara multithreading
41
42 if __name__ == '__main__':
43     kirim_semua()

```

single_thread_udp.py

master ▾

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marsellaeve change multithread

1 contributor

31 lines (26 sloc) | 938 Bytes

```

1  from library import download_gambar, get_url_list, kirim_gambar
2  import time
3  import datetime
4
5  def kirim_semua():
6      urls = get_url_list()
7      temp = 0
8
9      catat = datetime.datetime.now()
10     for k in urls:
11         download_gambar(urls[k], k)
12         print(f"mendownload {urls[k]}")
13         waktu_proses = download_gambar(urls[k])
14         print(f"completed {waktu_proses} detik")
15         UDP_IP_ADDRESS = "192.168.122.168"
16         UDP_IP_ADDRESS2 = "192.168.122.194"
17         if temp == 0:
18             kirim_gambar(UDP_IP_ADDRESS, 5050, f"{k}.jpg")
19             print('masuk server 1')
20             temp = temp + 1
21         elif temp == 1:
22             print('masuk server 2')
23             kirim_gambar(UDP_IP_ADDRESS2, 5050, f"{k}.jpg")
24     selesai = datetime.datetime.now() - catat
25     print(f"Waktu TOTAL yang dibutuhkan {selesai} detik")
26
27
28     #fungsi download_gambar akan dijalankan secara berurutan
29
30     if __name__ == '__main__':
31         kirim_semua()

```

4. Hasil Outputnya

Cek IP Alpine-1 (Server 1) -> ifconfig

```

< role      alpine-1  X      alpine-2  X      alpin  >  -  X
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # ifconfig
eth0      Link encap:Ethernet  HWaddr E2:0C:90:FB:F5:57
          inet addr:192.168.122.235  Bcast:192.168.122.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:11677 errors:0 dropped:3 overruns:0 frame:0
          TX packets:15 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:514580 (502.5 KiB)  TX bytes:3774 (3.6 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # 

```

Cek IP Alpine-2 (Client) -> ifconfig

```

< role      alpine-1  X      alpine-2  X      alpin  >  -  X
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # ifconfig
eth0      Link encap:Ethernet  HWaddr E2:91:9B:8A:0B:FB
          inet addr:192.168.122.176  Bcast:192.168.122.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:480 errors:0 dropped:0 overruns:0 frame:0
          TX packets:23769 errors:0 dropped:47511 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:117957 (115.1 KiB)  TX bytes:1028098 (1004.0 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # 

```

Cek IP Alpine-3 (Server 2) -> ifconfig

```

< alpine-1 x alpine-2 x alpine-3 x > - x
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # ifconfig
eth0      Link encap:Ethernet  HWaddr 0E:49:B4:1A:76:2B
          inet addr:192.168.122.107  Bcast:192.168.122.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1820 errors:0 dropped:3 overruns:0 frame:0
          TX packets:15 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:90891 (88.7 KiB)  TX bytes:3774 (3.6 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # 

```

HASIL OUTPUT MULTI PROCESS

Client:

```

< alpine-1 x alpine-2 x alpine-3 x > - x
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # python3 multi_process_udp.py
WARNING:root:image/jpeg
WARNING:root:writing kompas.jpg dalam waktu 0:00:00.225743 2021-04-25 21:42:59.963
063 s/d 2021-04-25 21:43:00.188819
mendownload https://asset.kompas.com/crops/qz_jJxyaZgGboomdCEXsfbSpec=/0x0:998x66
5/740x500/data/photo/2020/03/01/5e5b52f4db896.jpg
masuk server 1
192.168.122.235 5050 kompas.jpg
WARNING:root:image/jpeg
WARNING:root:writing detik.jpg dalam waktu 0:00:01.999076 2021-04-25 21:43:00.1954
40 s/d 2021-04-25 21:43:02.194522
mendownload https://awscdn.detik.net.id/detik2/images/logo.jpg
masuk server 2
192.168.122.107 5050 detik.jpg
Waktu TOTAL yang dibutuhkan 0:00:02.317426 detik 2021-04-25 21:42:59.963059 s/d 20
21-04-25 21:43:02.280485
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # 

```

Server 1:

<	role	alpine-1	×	alpine-2	×	alpine-3	>	—	×
('192.168.122.176',	38061)	blok	10503	panjang :	1 b'F'				
('192.168.122.176',	38061)	blok	10504	panjang :	1 b'a'				
('192.168.122.176',	38061)	blok	10505	panjang :	1 b'>'				
('192.168.122.176',	38061)	blok	10506	panjang :	1 b'\x90'				
('192.168.122.176',	38061)	blok	10507	panjang :	1 b'\x1e'				
('192.168.122.176',	38061)	blok	10508	panjang :	1 b'@'				
('192.168.122.176',	38061)	blok	10509	panjang :	1 b'a'				
('192.168.122.176',	38061)	blok	10510	panjang :	1 b'\x83'				
('192.168.122.176',	38061)	blok	10511	panjang :	1 b'\xbf'				
('192.168.122.176',	38061)	blok	10512	panjang :	1 b's'				
('192.168.122.176',	38061)	blok	10513	panjang :	1 b'N'				
('192.168.122.176',	38061)	blok	10514	panjang :	1 b'\n'				
('192.168.122.176',	38061)	blok	10515	panjang :	1 b'!'				
('192.168.122.176',	38061)	blok	10516	panjang :	1 b't'				
('192.168.122.176',	38061)	blok	10517	panjang :	1 b'G'				
('192.168.122.176',	38061)	blok	10518	panjang :	1 b'D'				
('192.168.122.176',	38061)	blok	10519	panjang :	1 b'R'				
('192.168.122.176',	38061)	blok	10520	panjang :	1 b'\xa2'				
('192.168.122.176',	38061)	blok	10521	panjang :	1 b'B'				
('192.168.122.176',	38061)	blok	10522	panjang :	1 b'\xa3'				
('192.168.122.176',	38061)	blok	10523	panjang :	1 b'\x88'				

Server 2:

<	alpine-1	×	alpine-2	×	alpine-3	×	>	—	×
('192.168.122.176',	47325)	blok	1369	panjang :	1 b'\xef'				
('192.168.122.176',	47325)	blok	1370	panjang :	1 b'\xb7'				
('192.168.122.176',	47325)	blok	1371	panjang :	1 b'\x9e'				
('192.168.122.176',	47325)	blok	1372	panjang :	1 b'\xd1'				
('192.168.122.176',	47325)	blok	1373	panjang :	1 b'\xbc'				
('192.168.122.176',	47325)	blok	1374	panjang :	1 b'\x05'				
('192.168.122.176',	47325)	blok	1375	panjang :	1 b'\xb6'				
('192.168.122.176',	47325)	blok	1376	panjang :	1 b'\xaa'				
('192.168.122.176',	47325)	blok	1377	panjang :	1 b'\xd2'				
('192.168.122.176',	47325)	blok	1378	panjang :	1 b'\x8b'				
('192.168.122.176',	47325)	blok	1379	panjang :	1 b'\x8b'				
('192.168.122.176',	47325)	blok	1380	panjang :	1 b'\xc3'				
('192.168.122.176',	47325)	blok	1381	panjang :	1 b'9'				
('192.168.122.176',	47325)	blok	1382	panjang :	1 b'i'				
('192.168.122.176',	47325)	blok	1383	panjang :	1 b'\xa7'				
('192.168.122.176',	47325)	blok	1384	panjang :	1 b'\x86'				
('192.168.122.176',	47325)	blok	1385	panjang :	1 b'\x11'				
('192.168.122.176',	47325)	blok	1386	panjang :	1 b'\x11'				
('192.168.122.176',	47325)	blok	1387	panjang :	1 b'x'				
('192.168.122.176',	47325)	blok	1388	panjang :	1 b'x'				
('192.168.122.176',	47325)	blok	1389	panjang :	1 b'Q'				

HASIL OUTPUT MULTI PROCESS ASYNC

Client:

```

< alpine-1 X alpine-2 X alpine-3 X > - X
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # python3 multi_process_async_udp.p
Y
WARNING:root:image/jpeg
WARNING:root:writing kompas.jpg dalam waktu 0:00:00.246488 2021-04-25 21:48:17.765
444 s/d 2021-04-25 21:48:18.011937
mendownload https://asset.kompas.com/crops/qz_jJxyaZgGgboomdCEXsfbSpec=/0x0:998x66
5/740x500/data/photo/2020/03/01/5e5b52f4db896.jpg
192.168.122.235 5050 kompas.jpg
masuk server 1
WARNING:root:image/jpeg
WARNING:root:writing detik.jpg dalam waktu 0:00:01.205782 2021-04-25 21:48:18.0340
05 s/d 2021-04-25 21:48:19.239793
mendownload https://awscdn.detik.net.id/detik2/images/logo.jpg
masuk server 2
192.168.122.107 5050 detik.jpg
Waktu TOTAL yang dibutuhkan 0:00:01.565458 detik 2021-04-25 21:48:17.765433 s/d 20
21-04-25 21:48:19.330891
status TASK
{'kompas': None, 'detik': None}
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # 

```

Server 1:

```

< role alpine-1 X alpine-2 X alpine-3 X > - X
('192.168.122.176', 55857) blok 10012 panjang : 1 b'*'
('192.168.122.176', 55857) blok 10013 panjang : 1 b'\x94'
('192.168.122.176', 55857) blok 10014 panjang : 1 b'\x1c'
('192.168.122.176', 55857) blok 10015 panjang : 1 b'@'
('192.168.122.176', 55857) blok 10016 panjang : 1 b'\x0e'
('192.168.122.176', 55857) blok 10017 panjang : 1 b' '
('192.168.122.176', 55857) blok 10018 panjang : 1 b'\x05'
('192.168.122.176', 55857) blok 10019 panjang : 1 b'\xa8'
('192.168.122.176', 55857) blok 10020 panjang : 1 b'\xdb'
('192.168.122.176', 55857) blok 10021 panjang : 1 b'\x88'
('192.168.122.176', 55857) blok 10022 panjang : 1 b'\x0c'
('192.168.122.176', 55857) blok 10023 panjang : 1 b'\xca'
('192.168.122.176', 55857) blok 10024 panjang : 1 b'\x99'
('192.168.122.176', 55857) blok 10025 panjang : 1 b'G'
('192.168.122.176', 55857) blok 10026 panjang : 1 b'\x06'
('192.168.122.176', 55857) blok 10027 panjang : 1 b'c'
('192.168.122.176', 55857) blok 10028 panjang : 1 b'P'
('192.168.122.176', 55857) blok 10029 panjang : 1 b'\x80'
('192.168.122.176', 55857) blok 10030 panjang : 1 b'\x90'
('192.168.122.176', 55857) blok 10031 panjang : 1 b'B'
('192.168.122.176', 55857) blok 10032 panjang : 1 b':'

```

Server 2:

```

< alpine-1 X alpine-2 X alpine-3 X > - X
('192.168.122.176', 36507) blok 1625 panjang : 1 b'\x9c'
('192.168.122.176', 36507) blok 1626 panjang : 1 b'\x99'
('192.168.122.176', 36507) blok 1627 panjang : 1 b'\xde'
('192.168.122.176', 36507) blok 1628 panjang : 1 b'\xe'
('192.168.122.176', 36507) blok 1629 panjang : 1 b'\xd1'
('192.168.122.176', 36507) blok 1630 panjang : 1 b'\xac'
('192.168.122.176', 36507) blok 1631 panjang : 1 b'\x00'
('192.168.122.176', 36507) blok 1632 panjang : 1 b'c'
('192.168.122.176', 36507) blok 1633 panjang : 1 b'O'
('192.168.122.176', 36507) blok 1634 panjang : 1 b'S'
('192.168.122.176', 36507) blok 1635 panjang : 1 b'\x03'
('192.168.122.176', 36507) blok 1636 panjang : 1 b{'
('192.168.122.176', 36507) blok 1637 panjang : 1 b'I'
('192.168.122.176', 36507) blok 1638 panjang : 1 b'K'
('192.168.122.176', 36507) blok 1639 panjang : 1 b'\xb5'
('192.168.122.176', 36507) blok 1640 panjang : 1 b'r'
('192.168.122.176', 36507) blok 1641 panjang : 1 b'\xc4'
('192.168.122.176', 36507) blok 1642 panjang : 1 b'1'
('192.168.122.176', 36507) blok 1643 panjang : 1 b'\xea'
('192.168.122.176', 36507) blok 1644 panjang : 1 b'O'
('192.168.122.176', 36507) blok 1645 panjang : 1 b'|'

```

HASIL OUTPUT MULTI THREAD

Client:

```

< alpine-1 X alpine-2 X alpine-3 X > - X
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # python3 multi_thread_udp.py
WARNING:root:image/jpeg
WARNING:root:writing kompas.jpg dalam waktu 0:00:00.229857 2021-04-25 21:50:59.660
340 s/d 2021-04-25 21:50:59.890202
mendownload https://asset.kompas.com/crops/qz_jXyazGgboomdCEXsfbSpec=/0x0:998x66
5/740x500/data/photo/2020/03/01/5e5b52f4db896.jpg
masuk server 1
192.168.122.235 5050 kompas.jpg
WARNING:root:image/jpeg
WARNING:root:writing detik.jpg dalam waktu 0:00:01.246101 2021-04-25 21:50:59.8937
87 s/d 2021-04-25 21:51:01.139895
mendownload https://awscdn.detik.net.id/detik2/images/logo.jpg
masuk server 2
192.168.122.107 5050 detik.jpg
Waktu TOTAL yang dibutuhkan 0:00:01.568744 detik 2021-04-25 21:50:59.660337 s/d 20
21-04-25 21:51:01.229081
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 #

```


Server 1:

<	role	alpine-1	×	alpine-2	×	alpine-3	>	—	×
('192.168.122.176',	60620)	blok	20280	panjang :	1	b'\x06'			
('192.168.122.176',	60620)	blok	20281	panjang :	1	b'\x04'			
('192.168.122.176',	60620)	blok	20282	panjang :	1	b'\xbe'			
('192.168.122.176',	60620)	blok	20283	panjang :	1	b'\r'			
('192.168.122.176',	60620)	blok	20284	panjang :	1	b'\J'			
('192.168.122.176',	60620)	blok	20285	panjang :	1	b' '			
('192.168.122.176',	60620)	blok	20286	panjang :	1	b'P'			
('192.168.122.176',	60620)	blok	20287	panjang :	1	b'\x99'			
('192.168.122.176',	60620)	blok	20288	panjang :	1	b'\x05'			
('192.168.122.176',	60620)	blok	20289	panjang :	1	b'L'			
('192.168.122.176',	60620)	blok	20290	panjang :	1	b'['			
('192.168.122.176',	60620)	blok	20291	panjang :	1	b'\xcc'			
('192.168.122.176',	60620)	blok	20292	panjang :	1	b'\xb8'			
('192.168.122.176',	60620)	blok	20293	panjang :	1	b'x'			
('192.168.122.176',	60620)	blok	20294	panjang :	1	b'\x8c'			
('192.168.122.176',	60620)	blok	20295	panjang :	1	b'\r'			
('192.168.122.176',	60620)	blok	20296	panjang :	1	b'+'			
('192.168.122.176',	60620)	blok	20297	panjang :	1	b'\xf6'			
('192.168.122.176',	60620)	blok	20298	panjang :	1	b'\xb0'			
('192.168.122.176',	60620)	blok	20299	panjang :	1	b'\"'			
('192.168.122.176',	60620)	blok	20300	panjang :	1	b'\xcf'			

Server 2:

<	alpine-1	×	alpine-2	×	alpine-3	×	>	—	×
('192.168.122.176',	59560)	blok	3239	panjang :	1	b'\x00'			
('192.168.122.176',	59560)	blok	3240	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3241	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3242	panjang :	1	b'\x00'			
('192.168.122.176',	59560)	blok	3243	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3244	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3245	panjang :	1	b'\x00'			
('192.168.122.176',	59560)	blok	3246	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3247	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3248	panjang :	1	b'\x00'			
('192.168.122.176',	59560)	blok	3249	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3250	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3251	panjang :	1	b'\x00'			
('192.168.122.176',	59560)	blok	3252	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3253	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3254	panjang :	1	b'\x00'			
('192.168.122.176',	59560)	blok	3255	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3256	panjang :	1	b'\x88'			
('192.168.122.176',	59560)	blok	3257	panjang :	1	b'\x03'			
('192.168.122.176',	59560)	blok	3258	panjang :	1	b'\xff'			
('192.168.122.176',	59560)	blok	3259	panjang :	1	b'\xd9'			

HASIL OUTPUT MULTI THREAD ASYNC

Client:

```

< alpine-1 X alpine-2 X alpine-3 X > - X
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # python3 multi_thread_async_udp.py
WARNING:root:image/jpeg
WARNING:root:writing kompas.jpg dalam waktu 0:00:00.226037 2021-04-25 21:55:16.975
399 s/d 2021-04-25 21:55:17.201441
mendownload https://asset.kompas.com/crops/qz_jJxyaZgGgboomdCEXsfbSpec=/0x0:998x66
5/740x500/data/photo/2020/03/01/5e5b52f4db896.jpg
192.168.122.235 5050 kompas.jpg
masuk server 1
WARNING:root:image/jpeg
WARNING:root:writing detik.jpg dalam waktu 0:00:01.856081 2021-04-25 21:55:17.2026
23 s/d 2021-04-25 21:55:19.058709
mendownload https://awscdn.detik.net.id/detik2/images/logo.jpg
masuk server 2
192.168.122.107 5050 detik.jpg
Waktu TOTAL yang dibutuhkan 0:00:02.142397 detik 2021-04-25 21:55:16.975395 s/d 20
21-04-25 21:55:19.117792
hasil task yang dijalankan
{'kompas': None, 'detik': None}
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 #

```

Server 1:

```

< role alpine-1 X alpine-2 X alpine-3 X > - X
('192.168.122.176', 34590) blok 31249 panjang : 1 b'd'
('192.168.122.176', 34590) blok 31250 panjang : 1 b'\xa7'
('192.168.122.176', 34590) blok 31251 panjang : 1 b'\xe3'
('192.168.122.176', 34590) blok 31252 panjang : 1 b'='
('192.168.122.176', 34590) blok 31253 panjang : 1 b'\x8c'
('192.168.122.176', 34590) blok 31254 panjang : 1 b'\xde'
('192.168.122.176', 34590) blok 31255 panjang : 1 b'v'
('192.168.122.176', 34590) blok 31256 panjang : 1 b'\xc7'
('192.168.122.176', 34590) blok 31257 panjang : 1 b'b'
('192.168.122.176', 34590) blok 31258 panjang : 1 b'\x10'
('192.168.122.176', 34590) blok 31259 panjang : 1 b'0'
('192.168.122.176', 34590) blok 31260 panjang : 1 b''
('192.168.122.176', 34590) blok 31261 panjang : 1 b'\x97'
('192.168.122.176', 34590) blok 31262 panjang : 1 b'\xd0'
('192.168.122.176', 34590) blok 31263 panjang : 1 b'#'
('192.168.122.176', 34590) blok 31264 panjang : 1 b','
('192.168.122.176', 34590) blok 31265 panjang : 1 b'\xc9'
('192.168.122.176', 34590) blok 31266 panjang : 1 b'\x98'
('192.168.122.176', 34590) blok 31267 panjang : 1 b'4'
('192.168.122.176', 34590) blok 31268 panjang : 1 b'\xce'
('192.168.122.176', 34590) blok 31269 panjang : 1 b'\x94'

```

Server 2:

```

< alpine-1 X alpine-2 X alpine-3 X > - X
('192.168.122.176', 33997) blok 4854 panjang : 1 b'\xed'
('192.168.122.176', 33997) blok 4855 panjang : 1 b'p'
('192.168.122.176', 33997) blok 4856 panjang : 1 b'\xb1'
('192.168.122.176', 33997) blok 4857 panjang : 1 b'\xfa'
('192.168.122.176', 33997) blok 4858 panjang : 1 b'\x8e'
('192.168.122.176', 33997) blok 4859 panjang : 1 b'j'
('192.168.122.176', 33997) blok 4860 panjang : 1 b'\xc6'
('192.168.122.176', 33997) blok 4861 panjang : 1 b'\x9a'
('192.168.122.176', 33997) blok 4862 panjang : 1 b'\xf7'
('192.168.122.176', 33997) blok 4863 panjang : 1 b'L'
('192.168.122.176', 33997) blok 4864 panjang : 1 b'\xf7'
('192.168.122.176', 33997) blok 4865 panjang : 1 b'\x10'
('192.168.122.176', 33997) blok 4866 panjang : 1 b'j'
('192.168.122.176', 33997) blok 4867 panjang : 1 b')'
('192.168.122.176', 33997) blok 4868 panjang : 1 b'v'
('192.168.122.176', 33997) blok 4869 panjang : 1 b'\xc3'
('192.168.122.176', 33997) blok 4870 panjang : 1 b'\x05'
('192.168.122.176', 33997) blok 4871 panjang : 1 b'\t'
('192.168.122.176', 33997) blok 4872 panjang : 1 b' '
('192.168.122.176', 33997) blok 4873 panjang : 1 b'X'
('192.168.122.176', 33997) blok 4874 panjang : 1 b'\x15'

```

HASIL OUTPUT SINGLE THREAD

Client:

```

< alpine-1 X alpine-2 X alpine-3 X > - X
WARNING:root:writing kompas.jpg dalam waktu 0:00:00.192091 2021-04-25 21:57:01.556
437 s/d 2021-04-25 21:57:01.748534
mendownload https://asset.kompas.com/crops/qz_jJxyaZgGgboomdCEXsfbSpec=/0x0:998x66
5/740x500/data/photo/2020/03/01/5e5b52f4db896.jpg
WARNING:root:image/jpeg
WARNING:root:writing image.jpg dalam waktu 0:00:00.173272 2021-04-25 21:57:01.7508
06 s/d 2021-04-25 21:57:01.924086
completed 0:00:00.173272 detik
192.168.122.168 5050 kompas.jpg
masuk server 1
WARNING:root:image/jpeg
WARNING:root:writing detik.jpg dalam waktu 0:00:00.212165 2021-04-25 21:57:02.0674
75 s/d 2021-04-25 21:57:02.279650
mendownload https://awscdn.detik.net.id/detik2/images/logo.jpg
WARNING:root:image/jpeg
WARNING:root:writing image.jpg dalam waktu 0:00:00.210476 2021-04-25 21:57:02.2820
45 s/d 2021-04-25 21:57:02.492527
completed 0:00:00.210476 detik
masuk server 2
192.168.122.194 5050 detik.jpg
Waktu TOTAL yang dibutuhkan 0:00:00.950257 detik
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 #

```

Server 1:

<	role	alpine-1	×	alpine-2	×	alpine-3	>	—	×
('192.168.122.176', 34590)		blok	31249	panjang : 1 b'd'					
('192.168.122.176', 34590)		blok	31250	panjang : 1 b'\xa7'					
('192.168.122.176', 34590)		blok	31251	panjang : 1 b'\xe3'					
('192.168.122.176', 34590)		blok	31252	panjang : 1 b'='					
('192.168.122.176', 34590)		blok	31253	panjang : 1 b'\x8c'					
('192.168.122.176', 34590)		blok	31254	panjang : 1 b'\xde'					
('192.168.122.176', 34590)		blok	31255	panjang : 1 b'v'					
('192.168.122.176', 34590)		blok	31256	panjang : 1 b'\xc7'					
('192.168.122.176', 34590)		blok	31257	panjang : 1 b'b'					
('192.168.122.176', 34590)		blok	31258	panjang : 1 b'\x10'					
('192.168.122.176', 34590)		blok	31259	panjang : 1 b'0'					
('192.168.122.176', 34590)		blok	31260	panjang : 1 b'''					
('192.168.122.176', 34590)		blok	31261	panjang : 1 b'\x97'					
('192.168.122.176', 34590)		blok	31262	panjang : 1 b'\xd0'					
('192.168.122.176', 34590)		blok	31263	panjang : 1 b'#'					
('192.168.122.176', 34590)		blok	31264	panjang : 1 b','					
('192.168.122.176', 34590)		blok	31265	panjang : 1 b'\xc9'					
('192.168.122.176', 34590)		blok	31266	panjang : 1 b'\x98'					
('192.168.122.176', 34590)		blok	31267	panjang : 1 b'4'					
('192.168.122.176', 34590)		blok	31268	panjang : 1 b'\xce'					
('192.168.122.176', 34590)		blok	31269	panjang : 1 b'\x94'					

Server 2:

<	alpine-1	×	alpine-2	×	alpine-3	×	>	—	×
('192.168.122.176', 33997)		blok	4854	panjang : 1 b'\xed'					
('192.168.122.176', 33997)		blok	4855	panjang : 1 b'p'					
('192.168.122.176', 33997)		blok	4856	panjang : 1 b'\xb1'					
('192.168.122.176', 33997)		blok	4857	panjang : 1 b'\xfa'					
('192.168.122.176', 33997)		blok	4858	panjang : 1 b'\x8e'					
('192.168.122.176', 33997)		blok	4859	panjang : 1 b'j'					
('192.168.122.176', 33997)		blok	4860	panjang : 1 b'\xc6'					
('192.168.122.176', 33997)		blok	4861	panjang : 1 b'\x9a'					
('192.168.122.176', 33997)		blok	4862	panjang : 1 b'\xf7'					
('192.168.122.176', 33997)		blok	4863	panjang : 1 b'L'					
('192.168.122.176', 33997)		blok	4864	panjang : 1 b'\xf7'					
('192.168.122.176', 33997)		blok	4865	panjang : 1 b'\x10'					
('192.168.122.176', 33997)		blok	4866	panjang : 1 b'j'					
('192.168.122.176', 33997)		blok	4867	panjang : 1 b')'					
('192.168.122.176', 33997)		blok	4868	panjang : 1 b'v'					
('192.168.122.176', 33997)		blok	4869	panjang : 1 b'\xc3'					
('192.168.122.176', 33997)		blok	4870	panjang : 1 b'\x05'					
('192.168.122.176', 33997)		blok	4871	panjang : 1 b'\t'					
('192.168.122.176', 33997)		blok	4872	panjang : 1 b' '					
('192.168.122.176', 33997)		blok	4873	panjang : 1 b'X'					
('192.168.122.176', 33997)		blok	4874	panjang : 1 b'\x15'					

HASIL

```

< console      alpine-1  X      alpine-2  X
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # ls
__pycache__      multi_process_udp.py
detik.jpg        multi_thread_async_udp.py
image.jpg        multi_thread_udp.py
kompas.jpg       server1.py
library.py       server2.py
multi_process_async_udp.py  single_thread_udp.py
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 #

```

```

< console      alpine-1  X      alpine-2  X      >  -  X
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # ls
library.py      server1.jpg
multi_process_async_udp.py  server1.py
multi_process_udp.py      server2.py
multi_thread_async_udp.py  single_thread_udp.py
multi_thread_udp.py
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 #

```

```

<      alpine-1  X      alpine-2  X      alpine-3  X      >
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 # ls
detik.jpg      multi_thread_udp.py
kompas.jpg      server1.py
library.py      server2.jpg
multi_process_async_udp.py  server2.py
multi_process_udp.py      single_thread_udp.py
multi_thread_async_udp.py
/home/Pemrograman_Jaringan_D/progjar3/Tugas3 #

```