

Tugas Implementasi Kasus Menggunakan Concurrency



OLEH :

Anggara Yuda Pratama - 05111840000008

PEMROGRAMAN JARINGAN - E

DOSEN PENGAMPU :

Royyana Muslim Ijtihadie, S.Kom.,M.Kom., Ph.D.

S1 TEKNIK INFORMATIKA

FAKULTAS TEKNOLOGI ELEKTRO DAN INFORMATIKA CERDAS

INSTITUT TEKNOLOGI SEPULUH NOPEMBER SURABAYA

2020

Tugas Implementasi Kasus menggunakan concurrency

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

Deskripsi Kasus

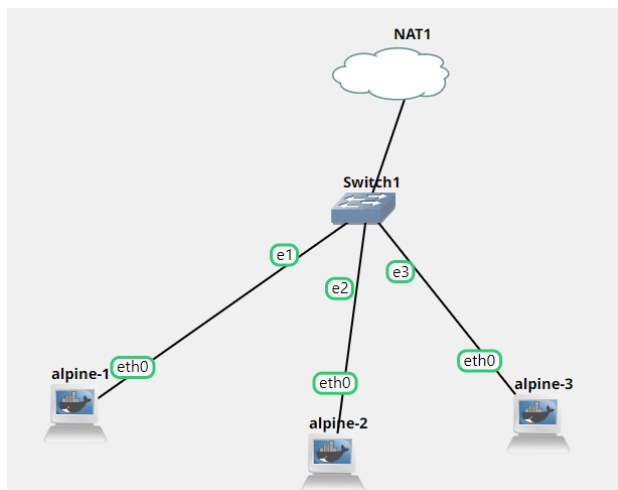
Pada kasus kali ini client akan mendownload 2 file gambar terlebih dahulu dengan project yang memiliki 1 client dan 2 server. Kemudian file yang sudah diunduh dikirim ke 2 server menggunakan protokol transport UDP yang nantinya masing – masing server mendapatkan 1 file gambar. Pengiriman dari kedua server dilakukan dengan 4 program berbeda yang sudah ditugaskan, yaitu multi process, multi thread, multi process asynchronous, dan multi thread asynchronous. IP address untuk masing – masing alpine sebagai berikut:

Alpine 1 (Server) : 192.168.122.205

Alpine 2 (Server) : 192.168.122.31

Alpine 3 (Client) : 192.168.122.227

Gambar Arsitektur Jaringan



Program yang Dibuat

Multi_process.py

```
Answer > multi_process.py > kirim_file
1 from library import download_gambar, kirim_gambar, get_url_list
2 import time
3 import datetime
4 from multiprocessing import Process
5
6 def kirim_file():
7     texec = dict()
8     urls = get_url_list()
9     a = 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 = "192.168.122.205"
17        UDP_IP_ADDRESS2 = "192.168.122.31"
18        PORT = 88
19        if a == 0:
20            texec[k] = Process(target=kirim_gambar, args=(UDP_IP_ADDRESS,PORT,f"{k}.jpg"))
21            print('masuk server 1')
22            a = a+1
23        elif a == 1:
24            print('masuk server 2')
25            texec[k] = Process(target=kirim_gambar, args=(UDP_IP_ADDRESS2,PORT,f"{k}.jpg"))
26            texec[k].start()
27
28    #setelah menyelesaikan tugasnya, dikembalikan ke main process dengan join
29    for k in urls:
30        texec[k].join()
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
35    #fungsi download_gambar akan dijalankan secara multi process
36    if __name__ == '__main__':
37        kirim_file()
```

Multi_thread.py

```
Answer > 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_file():
7     texec = dict()
8     urls = get_url_list()
9     a = 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 = "192.168.122.205"
17        UDP_IP_ADDRESS2 = "192.168.122.31"
18        PORT = 88
19        if a == 0:
20            texec[k] = threading.Thread(target=kirim_gambar, args=(UDP_IP_ADDRESS, PORT, f"{k}.jpg"))
21            print('--Server 1--')
22            a = a + 1
23        elif a == 1:
24            print('--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    if __name__ == '__main__':
38        kirim_file()
```

Multi_process_asynchronous.py

```
Answer > 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_file():
7     texec = dict()
8     urls = get_url_list()
9     a = 0
10    status_task = dict()
11    task_pool = Pool(processes=15) #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 = "192.168.122.205"
17        UDP_IP_ADDRESS2 = "192.168.122.31"
18        PORT = 88
19        if a == 0:
20            texec[k] = task_pool.apply_async(func=kirim_gambar, args=(UDP_IP_ADDRESS, PORT, f"{k}.jpg"))
21            print('--Server 1--')
22            a = a + 1
23        elif a == 1:
24            print('--Server 2--')
25            texec[k] = task_pool.apply_async(func=kirim_gambar, args=(UDP_IP_ADDRESS2, PORT, f"{k}.jpg"))
26
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
37    #fungsi download_gambar akan dijalankan secara multi process
38    if __name__ == '__main__':
39        kirim_file()
```

Multi_thread_asynchronous.py

```
Answer > 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_file():
7     texec = dict()
8     urls = get_url_list()
9     a = 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 = "192.168.122.205"
18        UDP_IP_ADDRESS2 = "192.168.122.31"
19        PORT = 88
20        if a == 0:
21            texec[k] = task.submit(kirim_gambar,UDP_IP_ADDRESS, PORT, f"{k}.jpg")
22            print('--Server 1--')
23            a = a + 1
24        elif a == 1:
25            print('--Server 2--')
26            texec[k] = task.submit(kirim_gambar,UDP_IP_ADDRESS2, PORT, f"{k}.jpg")
27
28    #setelah menyelesaikan tugasnya, dikembalikan ke main thread dengan memanggil result
29    for k in urls:
30        status_task[k]=texec[k].result()
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("hasil task yang dijalankan")
36    print(status_task)
37
38    #fungsi download_gambar akan dijalankan secara multithreading
39    if __name__ == '__main__':
40        kirim_file()
```

Hasil Output

1. Multi Process

Server 1 (Alpine 1)

```
alpine 1 x alpine 2 x alpine 3 - □ ×
('192.168.122.227', 55149) block 3701 long data : 1 b'\x82'
('192.168.122.227', 55149) block 3702 long data : 1 b'?'
('192.168.122.227', 55149) block 3703 long data : 1 b'J'
('192.168.122.227', 55149) block 3704 long data : 1 b'\x1d'
('192.168.122.227', 55149) block 3705 long data : 1 b'+'
('192.168.122.227', 55149) block 3706 long data : 1 b'\x0e'
('192.168.122.227', 55149) block 3707 long data : 1 b'6'
('192.168.122.227', 55149) block 3708 long data : 1 b'\xfa'
('192.168.122.227', 55149) block 3709 long data : 1 b'\xa8'
('192.168.122.227', 55149) block 3710 long data : 1 b'\xd3'
('192.168.122.227', 55149) block 3711 long data : 1 b'\xf2'
('192.168.122.227', 55149) block 3712 long data : 1 b'8'
('192.168.122.227', 55149) block 3713 long data : 1 b'6'
('192.168.122.227', 55149) block 3714 long data : 1 b'\xe1'
('192.168.122.227', 55149) block 3715 long data : 1 b'\x92'
('192.168.122.227', 55149) block 3716 long data : 1 b'd'
('192.168.122.227', 55149) block 3717 long data : 1 b'\xa4'
('192.168.122.227', 55149) block 3718 long data : 1 b'u'
('192.168.122.227', 55149) block 3719 long data : 1 b'\x0b'
('192.168.122.227', 55149) block 3720 long data : 1 b'\x14'
('192.168.122.227', 55149) block 3721 long data : 1 b'\xc7'
('192.168.122.227', 55149) block 3722 long data : 1 b'\xb1'
('192.168.122.227', 55149) block 3723 long data : 1 b'\x95'
('192.168.122.227', 55149) block 3724 long data : 1 b'\x89'
('192.168.122.227', 55149) block 3725 long data : 1 b'l'
('192.168.122.227', 55149) block 3726 long data : 1 b'^'
('192.168.122.227', 55149) block 3727 long data : 1 b'\xd7'
('192.168.122.227', 55149) block 3728 long data : 1 b'\xff'
('192.168.122.227', 55149) block 3729 long data : 1 b'\xd9'
```

Server 2 (Alpine 2)

```
alpine 1 x alpine 2 x alpine 3 - □ ×
('192.168.122.227', 52950) block 3994 long data : 1 b' '
('192.168.122.227', 52950) block 3995 long data : 1 b' '
('192.168.122.227', 52950) block 3996 long data : 1 b' '
('192.168.122.227', 52950) block 3997 long data : 1 b' '
('192.168.122.227', 52950) block 3998 long data : 1 b' '
('192.168.122.227', 52950) block 3999 long data : 1 b' '
('192.168.122.227', 52950) block 4000 long data : 1 b' '
('192.168.122.227', 52950) block 4001 long data : 1 b' '
('192.168.122.227', 52950) block 4002 long data : 1 b' '
('192.168.122.227', 52950) block 4003 long data : 1 b' '
('192.168.122.227', 52950) block 4004 long data : 1 b' '
('192.168.122.227', 52950) block 4005 long data : 1 b' '
('192.168.122.227', 52950) block 4006 long data : 1 b' '
('192.168.122.227', 52950) block 4007 long data : 1 b' '
('192.168.122.227', 52950) block 4008 long data : 1 b' '
('192.168.122.227', 52950) block 4009 long data : 1 b' '
('192.168.122.227', 52950) block 4010 long data : 1 b' '
('192.168.122.227', 52950) block 4011 long data : 1 b' '
('192.168.122.227', 52950) block 4012 long data : 1 b' '
('192.168.122.227', 52950) block 4013 long data : 1 b' '
('192.168.122.227', 52950) block 4014 long data : 1 b' '
('192.168.122.227', 52950) block 4015 long data : 1 b' '
('192.168.122.227', 52950) block 4016 long data : 1 b' '
('192.168.122.227', 52950) block 4017 long data : 1 b' '
('192.168.122.227', 52950) block 4018 long data : 1 b' '
('192.168.122.227', 52950) block 4019 long data : 1 b' '
('192.168.122.227', 52950) block 4020 long data : 1 b' '
('192.168.122.227', 52950) block 4021 long data : 1 b' '
('192.168.122.227', 52950) block 4022 long data : 1 b' '
```

Client

```
alpine 1  alpine 2  alpine 3
/home # nano library.py
/home # nano multi_process.py
/home # python3 multi_process.py
WARNING:root:image/jpeg
WARNING:root:writing niki.jpg dalam waktu 0:00:02.663601 2021-07-16 07:23:14.809662 s/d 2021-07-16 07:23:17.473269
mendownload https://images.bisnis-cdn.com/thumb/posts/2020/09/10/1289694/screenshot_20200910-091215_instagram_copy_800x500.jpg?w=744&h=465
--Server 1--
192.168.122.205 88 niki.jpg
WARNING:root:image/jpeg
WARNING:root:writing bonek.jpg dalam waktu 0:00:00.934445 2021-07-16 07:23:17.481413 s/d 2021-07-16 07:23:18.415863
mendownload https://pbs.twimg.com/profile_images/1399902340895842306/BiQEKdL6.jpg
--Server 2--
192.168.122.31 88 bonek.jpg
Waktu TOTAL yang dibutuhkan 0:00:04.280534 detik 2021-07-16 07:23:14.809657 s/d 2021-07-16 07:23:19.090191
/home # ls
__pycache__      bonek.jpg      library.py      multi_process.py  niki.jpg
/home # |
```

2. Multi Thread

Server 1 (Alpine 1)

```
alpine 1  alpine 2  alpine 3
('192.168.122.227', 45331) block 4010 long data : 1 b'v'
('192.168.122.227', 45331) block 4011 long data : 1 b'\xc2'
('192.168.122.227', 45331) block 4012 long data : 1 b'\xe1'
('192.168.122.227', 45331) block 4013 long data : 1 b'_'
('192.168.122.227', 45331) block 4014 long data : 1 b'\t'
('192.168.122.227', 45331) block 4015 long data : 1 b'\x85'
('192.168.122.227', 45331) block 4016 long data : 1 b'\x11'
('192.168.122.227', 45331) block 4017 long data : 1 b'\x85'
('192.168.122.227', 45331) block 4018 long data : 1 b'3'
('192.168.122.227', 45331) block 4019 long data : 1 b'\x17'
('192.168.122.227', 45331) block 4020 long data : 1 b'\xa8'
('192.168.122.227', 45331) block 4021 long data : 1 b'\xec'
('192.168.122.227', 45331) block 4022 long data : 1 b'\xd8'
('192.168.122.227', 45331) block 4023 long data : 1 b'\x94'
('192.168.122.227', 45331) block 4024 long data : 1 b'\xe0'
('192.168.122.227', 45331) block 4025 long data : 1 b'\xdd'
('192.168.122.227', 45331) block 4026 long data : 1 b'^'
('192.168.122.227', 45331) block 4027 long data : 1 b'a'
('192.168.122.227', 45331) block 4028 long data : 1 b'\x16'
('192.168.122.227', 45331) block 4029 long data : 1 b'\xd8'
('192.168.122.227', 45331) block 4030 long data : 1 b'\xca'
('192.168.122.227', 45331) block 4031 long data : 1 b'\x01'
('192.168.122.227', 45331) block 4032 long data : 1 b'\xb5'
('192.168.122.227', 45331) block 4033 long data : 1 b'2'
('192.168.122.227', 45331) block 4034 long data : 1 b'\x98'
('192.168.122.227', 45331) block 4035 long data : 1 b'\x97'
('192.168.122.227', 45331) block 4036 long data : 1 b'N'
('192.168.122.227', 45331) block 4037 long data : 1 b'\x81'
('192.168.122.227', 45331) block 4038 long data : 1 b'V'
```

Server 2 (Alpine 2)

```
alpine 1 x alpine 2 x alpine 3 x + v
('192.168.122.227', 48666) block 5364 long data : 1 b '
('192.168.122.227', 48666) block 5365 long data : 1 b '
('192.168.122.227', 48666) block 5366 long data : 1 b '
('192.168.122.227', 48666) block 5367 long data : 1 b '
('192.168.122.227', 48666) block 5368 long data : 1 b '
('192.168.122.227', 48666) block 5369 long data : 1 b '
('192.168.122.227', 48666) block 5370 long data : 1 b '
('192.168.122.227', 48666) block 5371 long data : 1 b '
('192.168.122.227', 48666) block 5372 long data : 1 b '
('192.168.122.227', 48666) block 5373 long data : 1 b '
('192.168.122.227', 48666) block 5374 long data : 1 b '
('192.168.122.227', 48666) block 5375 long data : 1 b '
('192.168.122.227', 48666) block 5376 long data : 1 b '
('192.168.122.227', 48666) block 5377 long data : 1 b '
('192.168.122.227', 48666) block 5378 long data : 1 b '
('192.168.122.227', 48666) block 5379 long data : 1 b '
('192.168.122.227', 48666) block 5380 long data : 1 b '
('192.168.122.227', 48666) block 5381 long data : 1 b '
('192.168.122.227', 48666) block 5382 long data : 1 b '
('192.168.122.227', 48666) block 5383 long data : 1 b '
('192.168.122.227', 48666) block 5384 long data : 1 b '
('192.168.122.227', 48666) block 5385 long data : 1 b '
('192.168.122.227', 48666) block 5386 long data : 1 b '
('192.168.122.227', 48666) block 5387 long data : 1 b '
('192.168.122.227', 48666) block 5388 long data : 1 b '
('192.168.122.227', 48666) block 5389 long data : 1 b '
('192.168.122.227', 48666) block 5390 long data : 1 b '
('192.168.122.227', 48666) block 5391 long data : 1 b '
('192.168.122.227', 48666) block 5392 long data : 1 b '

```

Client

```
alpine 1 x alpine 2 x alpine 3 x + v
/home # nano multi_thread.py
/home # python3 multi_thread.py
WARNING:root:image/jpeg
WARNING:root:writing niki.jpg dalam waktu 0:00:01.164686 2021-07-16 07:42:37.430879 s/d 2021-07-16 07:42:38.595569
mendownload https://images.bisnis-cdn.com/thumb/posts/2020/09/10/1289694/screenshot_20200910-091215_instagram_copy_800x500.jpg?w=744&h=465
--Server 1--
192.168.122.205 88 niki.jpg
WARNING:root:image/jpeg
WARNING:root:writing bonek.jpg dalam waktu 0:00:01.723673 2021-07-16 07:42:38.598213 s/d 2021-07-16 07:42:40.321891
mendownload https://pbs.twimg.com/profile_images/1399902340895842306/BiQEKdL6.jpg
--Server 2--
192.168.122.31 88 bonek.jpg
Waktu TOTAL yang dibutuhkan 0:00:03.430842 detik 2021-07-16 07:42:37.430875 s/d 2021-07-16 07:42:40.861717
/home # ls
__pycache__      library.py        multi_process_async.py  niki.jpg
bonek.jpg         multi_process.py  multi_thread.py
/home # |

```

3. Multi Process Asynchronous

Server 1 (Alpine 1)

```
alpine 1 x alpine 2 x alpine 3 x + v - □ x
('192.168.122.227', 57925) block 11037 long data : 1 b'\xec'
('192.168.122.227', 57925) block 11038 long data : 1 b'e'
('192.168.122.227', 57925) block 11039 long data : 1 b'w'
('192.168.122.227', 57925) block 11040 long data : 1 b'\x82'
('192.168.122.227', 57925) block 11041 long data : 1 b'['
('192.168.122.227', 57925) block 11042 long data : 1 b'\x17'
('192.168.122.227', 57925) block 11043 long data : 1 b'm'
('192.168.122.227', 57925) block 11044 long data : 1 b'\x0f'
('192.168.122.227', 57925) block 11045 long data : 1 b'\x97'
('192.168.122.227', 57925) block 11046 long data : 1 b'\x10'
('192.168.122.227', 57925) block 11047 long data : 1 b'\xd1'
('192.168.122.227', 57925) block 11048 long data : 1 b'w'
('192.168.122.227', 57925) block 11049 long data : 1 b'\xe5'
('192.168.122.227', 57925) block 11050 long data : 1 b'\xee'
('192.168.122.227', 57925) block 11051 long data : 1 b'-'
('192.168.122.227', 57925) block 11052 long data : 1 b'\x92'
('192.168.122.227', 57925) block 11053 long data : 1 b'\xdf'
('192.168.122.227', 57925) block 11054 long data : 1 b'\xc1'
('192.168.122.227', 57925) block 11055 long data : 1 b'\xdf'
('192.168.122.227', 57925) block 11056 long data : 1 b'\x14'
('192.168.122.227', 57925) block 11057 long data : 1 b'\xc7'
('192.168.122.227', 57925) block 11058 long data : 1 b'\xb1'
('192.168.122.227', 57925) block 11059 long data : 1 b'\x95'
('192.168.122.227', 57925) block 11060 long data : 1 b'\x89'
('192.168.122.227', 57925) block 11061 long data : 1 b'l'
('192.168.122.227', 57925) block 11062 long data : 1 b'^'
('192.168.122.227', 57925) block 11063 long data : 1 b'\xd7'
('192.168.122.227', 57925) block 11064 long data : 1 b'\xff'
('192.168.122.227', 57925) block 11065 long data : 1 b'\xd9'
```

Server 2 (Alpine 2)

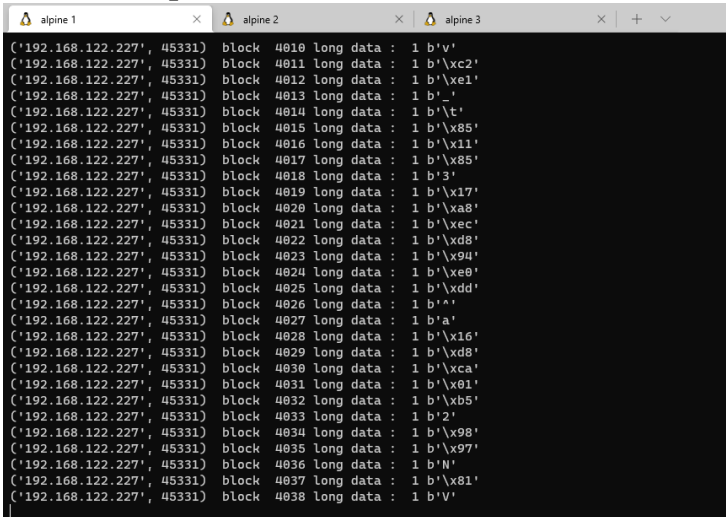
```
alpine 1 x alpine 2 x alpine 3 x + v - □ x
('192.168.122.227', 40053) block 11141 long data : 1 b' '
('192.168.122.227', 40053) block 11142 long data : 1 b' '
('192.168.122.227', 40053) block 11143 long data : 1 b' '
('192.168.122.227', 40053) block 11144 long data : 1 b' '
('192.168.122.227', 40053) block 11145 long data : 1 b' '
('192.168.122.227', 40053) block 11146 long data : 1 b' '
('192.168.122.227', 40053) block 11147 long data : 1 b' '
('192.168.122.227', 40053) block 11148 long data : 1 b' '
('192.168.122.227', 40053) block 11149 long data : 1 b' '
('192.168.122.227', 40053) block 11150 long data : 1 b' '
('192.168.122.227', 40053) block 11151 long data : 1 b' '
('192.168.122.227', 40053) block 11152 long data : 1 b' '
('192.168.122.227', 40053) block 11153 long data : 1 b' '
('192.168.122.227', 40053) block 11154 long data : 1 b' '
('192.168.122.227', 40053) block 11155 long data : 1 b' '
('192.168.122.227', 40053) block 11156 long data : 1 b' '
('192.168.122.227', 40053) block 11157 long data : 1 b' '
('192.168.122.227', 40053) block 11158 long data : 1 b' '
('192.168.122.227', 40053) block 11159 long data : 1 b' '
('192.168.122.227', 40053) block 11160 long data : 1 b' '
('192.168.122.227', 40053) block 11161 long data : 1 b' '
('192.168.122.227', 40053) block 11162 long data : 1 b' '
('192.168.122.227', 40053) block 11163 long data : 1 b' '
('192.168.122.227', 40053) block 11164 long data : 1 b' '
('192.168.122.227', 40053) block 11165 long data : 1 b' '
('192.168.122.227', 40053) block 11166 long data : 1 b' '
('192.168.122.227', 40053) block 11167 long data : 1 b' '
('192.168.122.227', 40053) block 11168 long data : 1 b' '
('192.168.122.227', 40053) block 11169 long data : 1 b' '
```


Client

```
/home # nano multi_process_async.py
/home # python3 multi_process_async.py
WARNING:root:image/jpeg
WARNING:root:writing niki.jpg dalam waktu 0:00:00.147587 2021-07-16 07:24:22.403320 s/d 2021-07-16 07:24:22.550912
mendownload https://images.bisnis-cdn.com/thumb/posts/2020/09/10/1289694/screenshot_20200910-091215_instagram_copy_800x5
00.jpg?w=744&h=465
192.168.122.205 88 niki.jpg
--Server 1--
WARNING:root:image/jpeg
WARNING:root:writing bonek.jpg dalam waktu 0:00:00.852562 2021-07-16 07:24:22.574230 s/d 2021-07-16 07:24:23.426798
mendownload https://pbs.twimg.com/profile_images/1399902340895842306/BiQEkdL6.jpg
--Server 2--
192.168.122.31 88 bonek.jpg
Waktu TOTAL yang dibutuhkan 0:00:01.778074 detik 2021-07-16 07:24:22.403311 s/d 2021-07-16 07:24:24.181385
status TASK
{'niki': None, 'bonek': None}
/home #
```

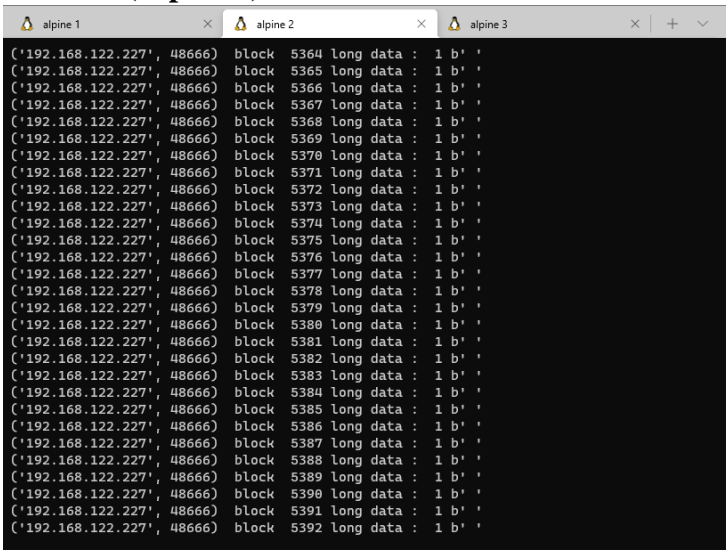
4. Multi Thread Asynchronous

Server 1 (Alpine 1)



```
alpine 1 x alpine 2 x alpine 3 + v
('192.168.122.227', 45331) block 4010 long data : 1 b'v'
('192.168.122.227', 45331) block 4011 long data : 1 b'\xc2'
('192.168.122.227', 45331) block 4012 long data : 1 b'\xe1'
('192.168.122.227', 45331) block 4013 long data : 1 b' '
('192.168.122.227', 45331) block 4014 long data : 1 b'\t'
('192.168.122.227', 45331) block 4015 long data : 1 b'\x85'
('192.168.122.227', 45331) block 4016 long data : 1 b'\x11'
('192.168.122.227', 45331) block 4017 long data : 1 b'\x85'
('192.168.122.227', 45331) block 4018 long data : 1 b'3'
('192.168.122.227', 45331) block 4019 long data : 1 b'\x17'
('192.168.122.227', 45331) block 4020 long data : 1 b'\xa8'
('192.168.122.227', 45331) block 4021 long data : 1 b'\xec'
('192.168.122.227', 45331) block 4022 long data : 1 b'\xd8'
('192.168.122.227', 45331) block 4023 long data : 1 b'\x94'
('192.168.122.227', 45331) block 4024 long data : 1 b'\xe0'
('192.168.122.227', 45331) block 4025 long data : 1 b'\xdd'
('192.168.122.227', 45331) block 4026 long data : 1 b'+'
('192.168.122.227', 45331) block 4027 long data : 1 b'a'
('192.168.122.227', 45331) block 4028 long data : 1 b'\x16'
('192.168.122.227', 45331) block 4029 long data : 1 b'\xd8'
('192.168.122.227', 45331) block 4030 long data : 1 b'\xca'
('192.168.122.227', 45331) block 4031 long data : 1 b'\x01'
('192.168.122.227', 45331) block 4032 long data : 1 b'\xb5'
('192.168.122.227', 45331) block 4033 long data : 1 b'2'
('192.168.122.227', 45331) block 4034 long data : 1 b'\x98'
('192.168.122.227', 45331) block 4035 long data : 1 b'\x97'
('192.168.122.227', 45331) block 4036 long data : 1 b'N'
('192.168.122.227', 45331) block 4037 long data : 1 b'\x81'
('192.168.122.227', 45331) block 4038 long data : 1 b'V'
```

Server 2 (Alpine 2)



```
alpine 1 x alpine 2 x alpine 3 + v
('192.168.122.227', 48666) block 5364 long data : 1 b' '
('192.168.122.227', 48666) block 5365 long data : 1 b' '
('192.168.122.227', 48666) block 5366 long data : 1 b' '
('192.168.122.227', 48666) block 5367 long data : 1 b' '
('192.168.122.227', 48666) block 5368 long data : 1 b' '
('192.168.122.227', 48666) block 5369 long data : 1 b' '
('192.168.122.227', 48666) block 5370 long data : 1 b' '
('192.168.122.227', 48666) block 5371 long data : 1 b' '
('192.168.122.227', 48666) block 5372 long data : 1 b' '
('192.168.122.227', 48666) block 5373 long data : 1 b' '
('192.168.122.227', 48666) block 5374 long data : 1 b' '
('192.168.122.227', 48666) block 5375 long data : 1 b' '
('192.168.122.227', 48666) block 5376 long data : 1 b' '
('192.168.122.227', 48666) block 5377 long data : 1 b' '
('192.168.122.227', 48666) block 5378 long data : 1 b' '
('192.168.122.227', 48666) block 5379 long data : 1 b' '
('192.168.122.227', 48666) block 5380 long data : 1 b' '
('192.168.122.227', 48666) block 5381 long data : 1 b' '
('192.168.122.227', 48666) block 5382 long data : 1 b' '
('192.168.122.227', 48666) block 5383 long data : 1 b' '
('192.168.122.227', 48666) block 5384 long data : 1 b' '
('192.168.122.227', 48666) block 5385 long data : 1 b' '
('192.168.122.227', 48666) block 5386 long data : 1 b' '
('192.168.122.227', 48666) block 5387 long data : 1 b' '
('192.168.122.227', 48666) block 5388 long data : 1 b' '
('192.168.122.227', 48666) block 5389 long data : 1 b' '
('192.168.122.227', 48666) block 5390 long data : 1 b' '
('192.168.122.227', 48666) block 5391 long data : 1 b' '
('192.168.122.227', 48666) block 5392 long data : 1 b' '
```

Client

```
/home # nano multi_thread_async.py
/home # python3 multi_thread_async.py
WARNING:root:image/jpeg
WARNING:root:writing niki.jpg dalam waktu 0:00:00.427630 2021-07-16 07:53:02.202628 s/d 2021-07-16 07:53:02.630264
mendownload https://images.bisnis-cdn.com/thumb/posts/2020/09/10/1289694/screenshot_20200910-091215_instagram_copy_800x500.jpg?w=744&h=465
192.168.122.205 88 niki.jpg
--Server 1--
WARNING:root:image/jpeg
WARNING:root:writing bonek.jpg dalam waktu 0:00:02.136815 2021-07-16 07:53:02.635540 s/d 2021-07-16 07:53:04.772361
mendownload https://pbs.twimg.com/profile_images/1399902340895842306/BiQEKdL6.jpg
--Server 2--
192.168.122.31 88 bonek.jpg
Waktu TOTAL yang dibutuhkan 0:00:03.351331 detik 2021-07-16 07:53:02.202623 s/d 2021-07-16 07:53:05.553954
hasil task yang dijalankan
{'niki': None, 'bonek': None}
/home # |
```