Tugas Implementasi Concurrency

OLEH :

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PEMROGRAMAN JARINGAN - E

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S1 TEKNIK INFORMATIKA

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Soal Tugas Implementasi 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 didefinsikan sendiri.dan Buatlah arsitektur jaringan anda sendiri di simulator GNS3

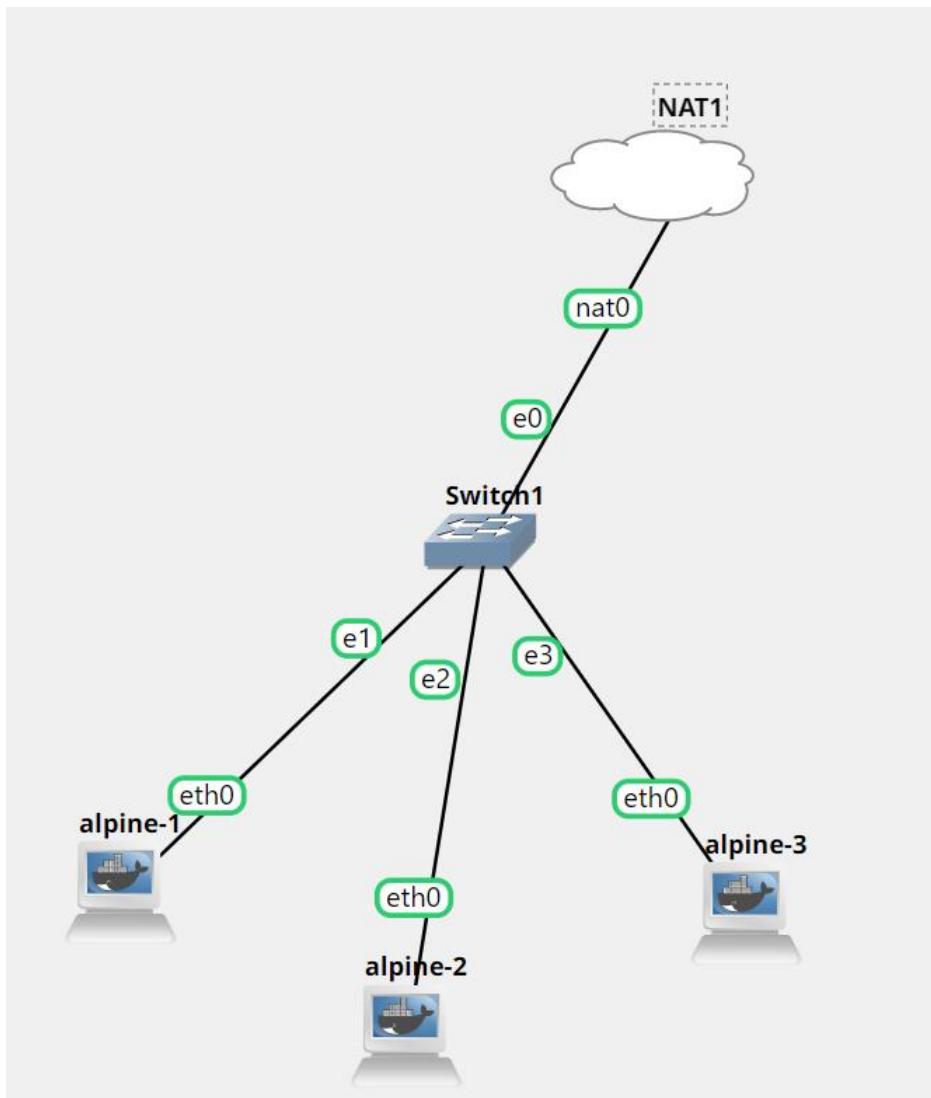buatlah laporan dalam bentuk PDF yang berisikan screenshot dari

1. deskripsi kasus yang dibuat

2. gambar arsitektur jaringan (dalam simulator GNS3)

3. program yang dibuat (1-4)

4. hasil outputnya

Jawaban Tugas Implementasi Concurrency :

- **Deskripsi kasus**
  Pada Project GNS terdapat 3 alpine (2 server, 1 client), dimana client tersebut akan mendownload 2 file gambar (saitama dan Doncic) telebih dahulu, kemudian melakukan pengiriman file kepada 2 server tersebut menggunakan protokol transport UDP. 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 4 program yang berbeda yaitu multi process , multi thread, multi process asynchronous, dan multi thread asynchronous.
- **Project GNS**

Alpine 1 (Client)
Alpine 2 (Server 1)
Alpine 3 (Server 2)

- **Source Code Program**

1. Library.py

```python
import logging
import requests
import socket
import os
import time
import datetime

def get_url_list():
    urls = dict()
    # urls['lagu']='https://ia800108.us.archive.org/11/items/78_west-end-blues_louis-armstrong-and-his-orchestra-spencer-williams_gbia0031927/01%20-%20Mahogany%20Hall%20Stomp%20-%20Louis%20Armstrong%20And%20His%20Orchestra-Restored.mp3'
    urls['saitama']='https://assets.pikiran-rakyat.com/crop/0x0:0x0/x/photo/2021/04/28/3866733493.jpg'
    urls['doncic']='https://www.dbl.id/thumbs/extra-large/uploads/post/2020/01/09/Luka-Doncic.jpg'
    return urls

def download_gambar(url=None,tuliskefile='image'):
    waktu_awal = datetime.datetime.now()
    if (url is None):
        return False
    ff = requests.get(url)
    tipe = dict()
    tipe['image/png']='png'
    tipe['image/jpg']='jpg'
    tipe['image/gif']='gif'
    tipe['image/jpeg']='jpg'
    tipe['application/zip']='jpg'
    tipe['video/quicktime']='mov'
    tipe['audio/mpeg']='mp3'
    # time.sleep(2) #untuk simulasi, diberi tambahan delay 2 detik

    content_type = ff.headers['Content-Type']
    logging.warning(content_type)
    if (content_type in list(tipe.keys())):
        namafile = os.path.basename(url)
        ekstensi = tipe[content_type]
        if (tuliskefile):
            fp = open(f"{tuliskefile}.{ekstensi}","wb")
            fp.write(ff.content)
            fp.close()
        waktu_process = datetime.datetime.now() - waktu_awal
        waktu_akhir =datetime.datetime.now()
        logging.warning(f"writing {tuliskefile}.{ekstensi} dalam waktu {waktu_process} {waktu_awal} s/d {waktu_akhir}")
        return waktu_process
    else:
        return False

def kirim_gambar(IP_ADDRESS, PORT, filename):
    print(IP_ADDRESS, PORT, filename)
    ukuran=os.stat(filename).st_size
    clientSock = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)

    fp=open(filename,'rb')
    k=fp.read()
    terkirim=0
    for x in k:
        k_bytes=bytes([x])
        clientSock.sendto(k_bytes,(IP_ADDRESS,PORT))
        terkirim=terkirim+1

if __name__=='__main__':
    #check fungsi
    k = download_gambar('https://assets.pikiran-rakyat.com/crop/0x0:0x0/x/photo/2021/04/28/3866733493.jpg')
    print(k)
```

2. Server1.py

```python
import socket

UDP_IP_ADDRESS = '192.168.122.67'
UDP_PORT = 911

serverSock = socket.socket(socket.AF_INET,socket.SOCK_DGRAM)
serverSock.bind(((UDP_IP_ADDRESS,UDP_PORT)))
filename='gambarserver1.jpg'
fp = open(filename,'wb+')
ditulis=0
counter=0
while True:
    data, addr = serverSock.recvfrom(1024)
    counter=counter+len(data)
    print(addr, counter,len(data), data)
    fp.write(data)
```

3. Server2.py

```python
# server2.py > ...
import socket

UDP_IP_ADDRESS = '192.168.122.157'
UDP_PORT = 911

serverSock = socket.socket(socket.AF_INET,socket.SOCK_DGRAM)
serverSock.bind(((UDP_IP_ADDRESS,UDP_PORT)))
filename='gambarserver2.jpg'
fp = open(filename,'wb+')
ditulis=0
counter=0
while True:
    data, addr = serverSock.recvfrom(1024)
    counter=counter+len(data)
    print(addr, counter,len(data), data)
    fp.write(data)
```

4. Multiprocess.py

```python
# multi_process.py > ...
from library import download_gambar, get_url_list, kirim_gambar
import time
import datetime
from multiprocessing import Process

def kirim_server():
    texec = dict()
    urls = get_url_list()
    temp = 0
    catat_awal = datetime.datetime.now()
    for k in urls:
        download_gambar(urls[k],k)
        print(f"mendownload {urls[k]}")
        waktu = time.time()
        #bagian ini merupakan bagian yang mengistruksikan eksekusi fungsi download gambar secara multiprocess
        UDP_IP_ADDRESS = "192.168.122.67"
        UDP_IP_ADDRESS2 = "192.168.122.157"
        PORT = 911
        if temp == 0:
            texec[k] = Process(target=kirim_gambar, args=(UDP_IP_ADDRESS,PORT,f"{k}.jpg"))
            print('masuk server 1')
            temp = temp+1
        elif temp == 1:
            print('masuk server 2')
            texec[k] = Process(target=kirim_gambar, args=(UDP_IP_ADDRESS2,PORT,f"{k}.jpg"))
        texec[k].start()

    #setelah menyelesaikan tugasnya, dikembalikan ke main process dengan join
    for k in urls:
        texec[k].join()
    catat_akhir = datetime.datetime.now()
    selesai = catat_akhir - catat_awal
    print(f"Waktu TOTAL yang dibutuhkan {selesai} detik {catat_awal} s/d {catat_akhir}")

#fungsi download_gambar akan dijalankan secara multi process
if __name__=='__main__':
    kirim_server()
```

5. Multiprocess_asyc.py

```
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        temp = 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 = "192.168.122.67"
17           UDP_IP_ADDRESS2 = "192.168.122.157"
18           PORT = 911
19           if temp == 0:
20               texec[k] = task_pool.apply_async(func=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] = 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_server()
```

6. Multithread.py

```python
# 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          #bagian ini merupakan bagian yang mengistruksikan eksekusi fungsi download gambar secara multithread
16          UDP_IP_ADDRESS = "192.168.122.67"
17          UDP_IP_ADDRESS2 = "192.168.122.157"
18          PORT = 911
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  if __name__=='__main__':
38      kirim_server()
```

7. Multithread_asyc.py

```
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       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 = "192.168.122.67"
 18           UDP_IP_ADDRESS2 = "192.168.122.157"
 19           PORT = 911
 20           if temp == 0:
 21               texec[k] = task.submit(kirim_gambar,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.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_server()
```

- **Hasil Program**
1. Multi Process
   Client

```
/ # python3 multiprocesing.py
WARNING:root:image/jpeg
WARNING:root:writing saitama.jpg dalam waktu 0:00:00.180951 2021-06-26 10:20:19.265721 s/d 2021-06-26 10:20:19.446677
mendownload https://assets.pikiran-rakyat.com/crop/0x0:0x0/x/photo/2021/04/28/3866733493.jpg
masuk server 1
192.168.122.67 5050 saitama.jpg
WARNING:root:image/jpeg
WARNING:root:writing doncic.jpg dalam waktu 0:00:02.512767 2021-06-26 10:20:19.457728 s/d 2021-06-26 10:20:21.970499
mendownload https://www.dbl.id/thumbs/extra-large/uploads/post/2020/01/09/Luka-Doncic.jpg
masuk server 2
192.168.122.157 5050 doncic.jpg
Waktu TOTAL yang dibutuhkan 0:00:03.589381 detik 2021-06-26 10:20:19.265717 s/d 2021-06-26 10:20:22.855098
/ # |
```

Server 1


```
('192.168.122.172', 59077) 4322 1 b'\xb8'
('192.168.122.172', 59077) 4323 1 b'\x8e'
('192.168.122.172', 59077) 4324 1 b'\x84'
('192.168.122.172', 59077) 4325 1 b'\x00'
('192.168.122.172', 59077) 4326 1 b']'
('192.168.122.172', 59077) 4327 1 b'\xd6'
('192.168.122.172', 59077) 4328 1 b'\x07'
('192.168.122.172', 59077) 4329 1 b'\xb4'
('192.168.122.172', 59077) 4330 1 b')'
('192.168.122.172', 59077) 4331 1 b'\x86'
('192.168.122.172', 59077) 4332 1 b'j'
('192.168.122.172', 59077) 4333 1 b'\x1b'
('192.168.122.172', 59077) 4334 1 b'd'
('192.168.122.172', 59077) 4335 1 b'\xcb'
('192.168.122.172', 59077) 4336 1 b'l'
('192.168.122.172', 59077) 4337 1 b'4'
('192.168.122.172', 59077) 4338 1 b'\x82'
('192.168.122.172', 59077) 4339 1 b'\xe4'
('192.168.122.172', 59077) 4340 1 b'\x9f'
('192.168.122.172', 59077) 4341 1 b'\xc8'
('192.168.122.172', 59077) 4342 1 b'C'
('192.168.122.172', 59077) 4343 1 b'\xa7'
('192.168.122.172', 59077) 4344 1 b'\x86'
('192.168.122.172', 59077) 4345 1 b'\x06'
('192.168.122.172', 59077) 4346 1 b'\xab'
('192.168.122.172', 59077) 4347 1 b'\xd3'
('192.168.122.172', 59077) 4348 1 b'_'
('192.168.122.172', 59077) 4349 1 b'\x88'
('192.168.122.172', 59077) 4350 1 b'\x85'
```

Server 2


```
('192.168.122.172', 36476) 6631 1 b'\xad'
('192.168.122.172', 36476) 6632 1 b'\xa5'
('192.168.122.172', 36476) 6633 1 b'\xc2'
('192.168.122.172', 36476) 6634 1 b'\xeb'
('192.168.122.172', 36476) 6635 1 b'\x04'
('192.168.122.172', 36476) 6636 1 b'\x8c'
('192.168.122.172', 36476) 6637 1 b'\xf2'
('192.168.122.172', 36476) 6638 1 b'+'
('192.168.122.172', 36476) 6639 1 b'\x0f'
('192.168.122.172', 36476) 6640 1 b'\xbc'
('192.168.122.172', 36476) 6641 1 b'0'
('192.168.122.172', 36476) 6642 1 b'\xd9'
('192.168.122.172', 36476) 6643 1 b'\xfd'
('192.168.122.172', 36476) 6644 1 b'q'
('192.168.122.172', 36476) 6645 1 b'\\'
('192.168.122.172', 36476) 6646 1 b'\xd7'
('192.168.122.172', 36476) 6647 1 b'\x84'
('192.168.122.172', 36476) 6648 1 b'|'
('192.168.122.172', 36476) 6649 1 b'.'
('192.168.122.172', 36476) 6650 1 b'\xf6'
('192.168.122.172', 36476) 6651 1 b'z'
('192.168.122.172', 36476) 6652 1 b'|'
('192.168.122.172', 36476) 6653 1 b'l'
('192.168.122.172', 36476) 6654 1 b'T'
('192.168.122.172', 36476) 6655 1 b'\x07'
('192.168.122.172', 36476) 6656 1 b'\x94'
('192.168.122.172', 36476) 6657 1 b'\x02'
('192.168.122.172', 36476) 6658 1 b'\xac'
('192.168.122.172', 36476) 6659 1 b'F'
```

2. Multi Process Asyc
   Client

```
/ # python3 multiprocesingasyc.py
WARNING:root:image/jpeg
WARNING:root:writing saitama.jpg dalam waktu 0:00:00.162227 2021-06-26 10:34:47.642574 s/d 2021-06-26 10:34:47.804806
mendownload https://assets.pikiran-rakyat.com/crop/0x0:0x0/x/photo/2021/04/28/3866733493.jpg
192.168.122.67 5050 saitama.jpg
masuk server 1
WARNING:root:image/jpeg
WARNING:root:writing doncic.jpg dalam waktu 0:00:03.412288 2021-06-26 10:34:47.815289 s/d 2021-06-26 10:34:51.227581
mendownload https://www.dbl.id/thumbs/extra-large/uploads/post/2020/01/09/Luka-Doncic.jpg
masuk server 2
192.168.122.157 5050 doncic.jpg
Waktu TOTAL yang dibutuhkan 0:00:04.399587 detik 2021-06-26 10:34:47.642562 s/d 2021-06-26 10:34:52.042149
status TASK
{'saitama': None, 'doncic': None}
```

Server 1

```
Alpine 1          ×    Alpine 2          ×    Alpine 3          ×   +  ∨
('192.168.122.172', 56743) 4593 1 b'\x96'
('192.168.122.172', 56743) 4594 1 b'5'
('192.168.122.172', 56743) 4595 1 b'b'
('192.168.122.172', 56743) 4596 1 b'['
('192.168.122.172', 56743) 4597 1 b'\\'
('192.168.122.172', 56743) 4598 1 b'\xcf'
('192.168.122.172', 56743) 4599 1 b'1'
('192.168.122.172', 56743) 4600 1 b'"'
('192.168.122.172', 56743) 4601 1 b'\t'
('192.168.122.172', 56743) 4602 1 b'\xa2'
('192.168.122.172', 56743) 4603 1 b'\x16'
('192.168.122.172', 56743) 4604 1 b'\xd0'
('192.168.122.172', 56743) 4605 1 b'\xda'
('192.168.122.172', 56743) 4606 1 b'\xa0'
('192.168.122.172', 56743) 4607 1 b'&'
('192.168.122.172', 56743) 4608 1 b'\xd2'
('192.168.122.172', 56743) 4609 1 b'\n'
('192.168.122.172', 56743) 4610 1 b'c'
('192.168.122.172', 56743) 4611 1 b'3'
('192.168.122.172', 56743) 4612 1 b'\x8e'
('192.168.122.172', 56743) 4613 1 b'\xb2'
('192.168.122.172', 56743) 4614 1 b'\x9a'
('192.168.122.172', 56743) 4615 1 b'\xa9'
('192.168.122.172', 56743) 4616 1 b'R'
('192.168.122.172', 56743) 4617 1 b'\x88'
('192.168.122.172', 56743) 4618 1 b'\x86'
('192.168.122.172', 56743) 4619 1 b'\xe0'
('192.168.122.172', 56743) 4620 1 b'#'
('192.168.122.172', 56743) 4621 1 b'J'
```

Server 2

```
Alpine 1          ×    Alpine 2          ×    Alpine 3          ×
('192.168.122.172', 57841) 6420 1 b'4'
('192.168.122.172', 57841) 6421 1 b'\xee'
('192.168.122.172', 57841) 6422 1 b'+'
('192.168.122.172', 57841) 6423 1 b'\x12'
('192.168.122.172', 57841) 6424 1 b'u'
('192.168.122.172', 57841) 6425 1 b'\xa0'
('192.168.122.172', 57841) 6426 1 b'q'
('192.168.122.172', 57841) 6427 1 b'H'
('192.168.122.172', 57841) 6428 1 b'\x06'
('192.168.122.172', 57841) 6429 1 b')'
('192.168.122.172', 57841) 6430 1 b'\t'
('192.168.122.172', 57841) 6431 1 b'\xc1'
('192.168.122.172', 57841) 6432 1 b'\x14'
('192.168.122.172', 57841) 6433 1 b'\x0c'
('192.168.122.172', 57841) 6434 1 b'\xbb'
('192.168.122.172', 57841) 6435 1 b'k'
('192.168.122.172', 57841) 6436 1 b'\x07'
('192.168.122.172', 57841) 6437 1 b'\x98'
('192.168.122.172', 57841) 6438 1 b'\xc3'
('192.168.122.172', 57841) 6439 1 b'\x8c'
('192.168.122.172', 57841) 6440 1 b'\xd6'
('192.168.122.172', 57841) 6441 1 b'\xdd'
('192.168.122.172', 57841) 6442 1 b'\x9e'
('192.168.122.172', 57841) 6443 1 b'\x9e'
('192.168.122.172', 57841) 6444 1 b'\xac'
('192.168.122.172', 57841) 6445 1 b'G'
('192.168.122.172', 57841) 6446 1 b'\xcb'
('192.168.122.172', 57841) 6447 1 b'\x93'
('192.168.122.172', 57841) 6448 1 b'X'
```
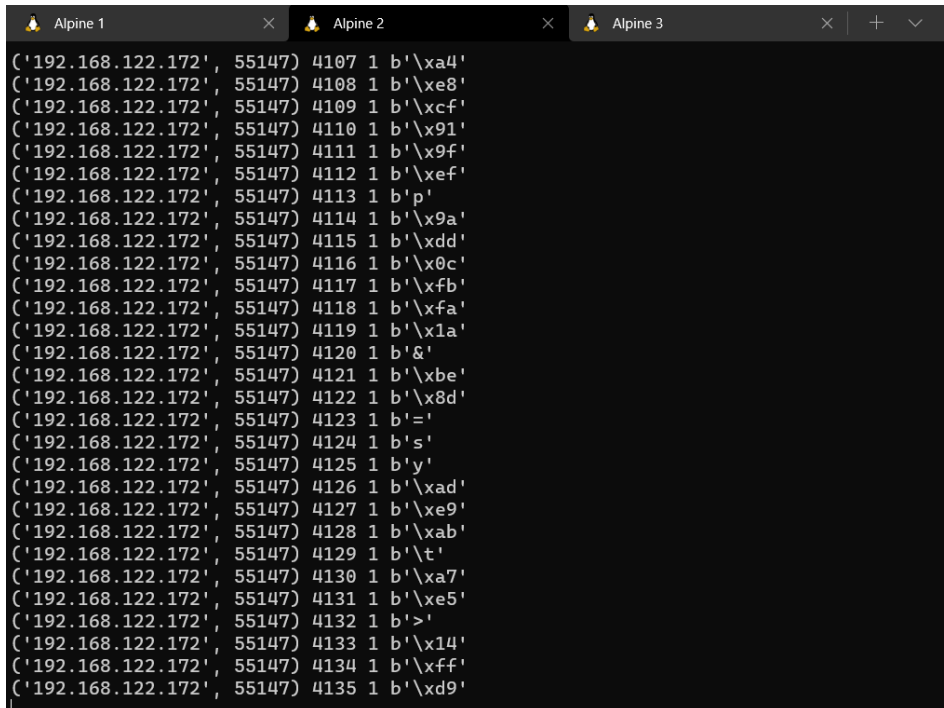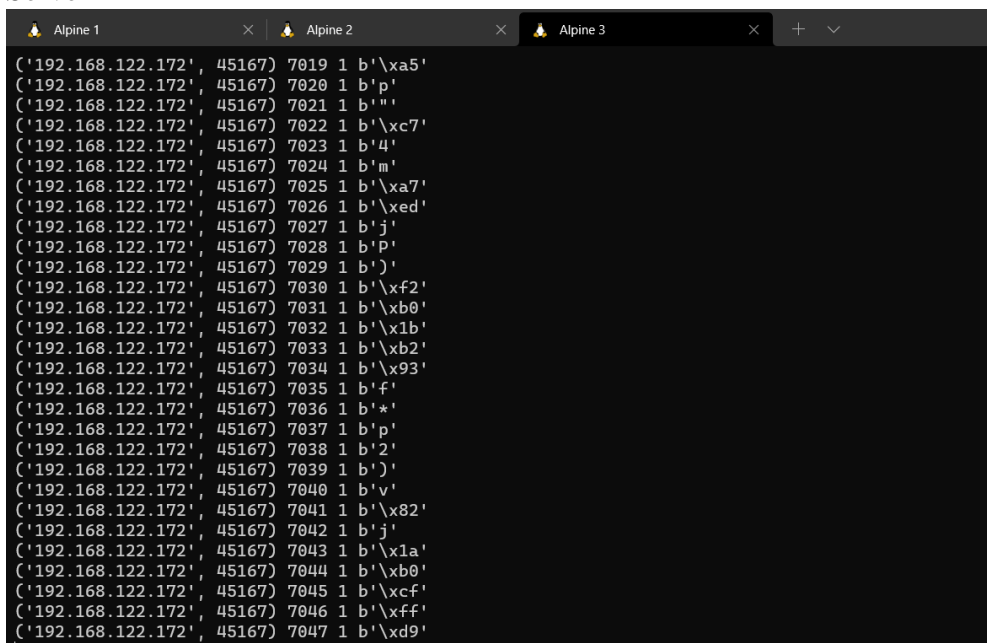
3. Multi Thread
   Client

```
/ # python3 multithread.py
WARNING:root:image/jpeg
WARNING:root:writing saitama.jpg dalam waktu 0:00:00.214030 2021-06-26 10:27:56.620488 s/d 2021-06-26 10:27:56.834522
mendownload https://assets.pikiran-rakyat.com/crop/0x0:0x0/x/photo/2021/04/28/3866733493.jpg
masuk server 1
192.168.122.67 5050 saitama.jpg
WARNING:root:image/jpeg
WARNING:root:writing doncic.jpg dalam waktu 0:00:01.041855 2021-06-26 10:27:56.834761 s/d 2021-06-26 10:27:57.876620
mendownload https://www.dbl.id/thumbs/extra-large/uploads/post/2020/01/09/Luka-Doncic.jpg
masuk server 2
192.168.122.157 5050 doncic.jpg
Waktu TOTAL yang dibutuhkan 0:00:02.096252 detik 2021-06-26 10:27:56.620484 s/d 2021-06-26 10:27:58.716736
```

Server 1

```
Alpine 1        ×   Alpine 2        ×   Alpine 3        ×   +  ∨
('192.168.122.172', 55147) 4107 1 b'\xa4'
('192.168.122.172', 55147) 4108 1 b'\xe8'
('192.168.122.172', 55147) 4109 1 b'\xcf'
('192.168.122.172', 55147) 4110 1 b'\x91'
('192.168.122.172', 55147) 4111 1 b'\x9f'
('192.168.122.172', 55147) 4112 1 b'\xef'
('192.168.122.172', 55147) 4113 1 b'p'
('192.168.122.172', 55147) 4114 1 b'\x9a'
('192.168.122.172', 55147) 4115 1 b'\xdd'
('192.168.122.172', 55147) 4116 1 b'\x0c'
('192.168.122.172', 55147) 4117 1 b'\xfb'
('192.168.122.172', 55147) 4118 1 b'\xfa'
('192.168.122.172', 55147) 4119 1 b'\x1a'
('192.168.122.172', 55147) 4120 1 b'&'
('192.168.122.172', 55147) 4121 1 b'\xbe'
('192.168.122.172', 55147) 4122 1 b'\x8d'
('192.168.122.172', 55147) 4123 1 b'='
('192.168.122.172', 55147) 4124 1 b's'
('192.168.122.172', 55147) 4125 1 b'y'
('192.168.122.172', 55147) 4126 1 b'\xad'
('192.168.122.172', 55147) 4127 1 b'\xe9'
('192.168.122.172', 55147) 4128 1 b'\xab'
('192.168.122.172', 55147) 4129 1 b'\t'
('192.168.122.172', 55147) 4130 1 b'\xa7'
('192.168.122.172', 55147) 4131 1 b'\xe5'
('192.168.122.172', 55147) 4132 1 b'>'
('192.168.122.172', 55147) 4133 1 b'\x14'
('192.168.122.172', 55147) 4134 1 b'\xff'
('192.168.122.172', 55147) 4135 1 b'\xd9'
```

Server 2

```
Alpine 1        ×   Alpine 2        ×   Alpine 3        ×   +  ∨
('192.168.122.172', 45167) 7019 1 b'\xa5'
('192.168.122.172', 45167) 7020 1 b'p'
('192.168.122.172', 45167) 7021 1 b'"'
('192.168.122.172', 45167) 7022 1 b'\xc7'
('192.168.122.172', 45167) 7023 1 b'4'
('192.168.122.172', 45167) 7024 1 b'm'
('192.168.122.172', 45167) 7025 1 b'\xa7'
('192.168.122.172', 45167) 7026 1 b'\xed'
('192.168.122.172', 45167) 7027 1 b'j'
('192.168.122.172', 45167) 7028 1 b'P'
('192.168.122.172', 45167) 7029 1 b')'
('192.168.122.172', 45167) 7030 1 b'\xf2'
('192.168.122.172', 45167) 7031 1 b'\xb0'
('192.168.122.172', 45167) 7032 1 b'\x1b'
('192.168.122.172', 45167) 7033 1 b'\xb2'
('192.168.122.172', 45167) 7034 1 b'\x93'
('192.168.122.172', 45167) 7035 1 b'f'
('192.168.122.172', 45167) 7036 1 b'*'
('192.168.122.172', 45167) 7037 1 b'p'
('192.168.122.172', 45167) 7038 1 b'2'
('192.168.122.172', 45167) 7039 1 b')'
('192.168.122.172', 45167) 7040 1 b'v'
('192.168.122.172', 45167) 7041 1 b'\x82'
('192.168.122.172', 45167) 7042 1 b'j'
('192.168.122.172', 45167) 7043 1 b'\x1a'
('192.168.122.172', 45167) 7044 1 b'\xb0'
('192.168.122.172', 45167) 7045 1 b'\xcf'
('192.168.122.172', 45167) 7046 1 b'\xff'
('192.168.122.172', 45167) 7047 1 b'\xd9'
```

4. Multi Thread Asyc

Client

```
/ # python3 multithreadasyc.py
WARNING:root:image/jpeg
WARNING:root:writing saitama.jpg dalam waktu 0:00:00.206591 2021-06-26 10:39:27.361433 s/d 2021-06-26 10:39:27.568028
mendownload https://assets.pikiran-rakyat.com/crop/0x0:0x0/x/photo/2021/04/28/3866733493.jpg
192.168.122.67 5050 saitama.jpg
masuk server 1
WARNING:root:image/jpeg
WARNING:root:writing doncic.jpg dalam waktu 0:00:02.282627 2021-06-26 10:39:27.568864 s/d 2021-06-26 10:39:29.851495
mendownload https://www.dbl.id/thumbs/extra-large/uploads/post/2020/01/09/Luka-Doncic.jpg
masuk server 2
192.168.122.157 5050 doncic.jpg
Waktu TOTAL yang dibutuhkan 0:00:03.296554 detik 2021-06-26 10:39:27.361429 s/d 2021-06-26 10:39:30.657983
hasil task yang dijalankan
{'saitama': None, 'doncic': None}
```

Server 1

```
    Alpine 1          ×      Alpine 2          ×      Alpine 3          ×    +    ∨
('192.168.122.172', 50451) 4100 1 b'\x9d'
('192.168.122.172', 50451) 4101 1 b' '
('192.168.122.172', 50451) 4102 1 b'z'
('192.168.122.172', 50451) 4103 1 b'\x14'
('192.168.122.172', 50451) 4104 1 b'|'
('192.168.122.172', 50451) 4105 1 b'\xc4'
('192.168.122.172', 50451) 4106 1 b'\xed'
('192.168.122.172', 50451) 4107 1 b'Z'
('192.168.122.172', 50451) 4108 1 b'\x84'
('192.168.122.172', 50451) 4109 1 b'\x1e'
('192.168.122.172', 50451) 4110 1 b'\x8a'
('192.168.122.172', 50451) 4111 1 b'\x1f'
('192.168.122.172', 50451) 4112 1 b'['
('192.168.122.172', 50451) 4113 1 b'\x8e'
('192.168.122.172', 50451) 4114 1 b'\xb3'
('192.168.122.172', 50451) 4115 1 b'\x90'
('192.168.122.172', 50451) 4116 1 b'\xc2'
('192.168.122.172', 50451) 4117 1 b'\x9c'
('192.168.122.172', 50451) 4118 1 b'\xdb'
('192.168.122.172', 50451) 4119 1 b'C'
('192.168.122.172', 50451) 4120 1 b'\xe9'
('192.168.122.172', 50451) 4121 1 b'\x01'
('192.168.122.172', 50451) 4122 1 b'\x82'
('192.168.122.172', 50451) 4123 1 b'\xcb'
('192.168.122.172', 50451) 4124 1 b't'
('192.168.122.172', 50451) 4125 1 b'\x87'
('192.168.122.172', 50451) 4126 1 b'\x8a'
('192.168.122.172', 50451) 4127 1 b'\xa0'
('192.168.122.172', 50451) 4128 1 b'W'
```

Server 2

```
    Alpine 1          ×      Alpine 2          ×      Alpine 3          ×    +
('192.168.122.172', 33691) 6639 1 b','
('192.168.122.172', 33691) 6640 1 b'\xc7'
('192.168.122.172', 33691) 6641 1 b'\xd3'
('192.168.122.172', 33691) 6642 1 b'\xb9'
('192.168.122.172', 33691) 6643 1 b'<'
('192.168.122.172', 33691) 6644 1 b'S'
('192.168.122.172', 33691) 6645 1 b'5'
('192.168.122.172', 33691) 6646 1 b'\x8d'
('192.168.122.172', 33691) 6647 1 b'Q'
('192.168.122.172', 33691) 6648 1 b'\xce'
('192.168.122.172', 33691) 6649 1 b'\x9d'
('192.168.122.172', 33691) 6650 1 b'\xf6'
('192.168.122.172', 33691) 6651 1 b'v'
('192.168.122.172', 33691) 6652 1 b'%'
('192.168.122.172', 33691) 6653 1 b'\xee'
('192.168.122.172', 33691) 6654 1 b'\xa5'
('192.168.122.172', 33691) 6655 1 b'\x19'
('192.168.122.172', 33691) 6656 1 b'\x94'
('192.168.122.172', 33691) 6657 1 b'\x81'
('192.168.122.172', 33691) 6658 1 b'\xd0'
('192.168.122.172', 33691) 6659 1 b'\x9f'
('192.168.122.172', 33691) 6660 1 b'\xe1'
('192.168.122.172', 33691) 6661 1 b'\x03'
('192.168.122.172', 33691) 6662 1 b'\xe9'
('192.168.122.172', 33691) 6663 1 b'W'
('192.168.122.172', 33691) 6664 1 b'n'
('192.168.122.172', 33691) 6665 1 b'\xe7'
('192.168.122.172', 33691) 6666 1 b'\x87'
('192.168.122.172', 33691) 6667 1 b'T'
```