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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

- Server :
 alpine-2 : 192.168.122.93 (didapatkan dari inconfig pada alpine)
 alpine-3 : 192.168.122.244 (didapatkan dari inconfig pada alpine)
- Client :
 alpine-1 : 192.168.122.124 (didapatkan dari inconfig pada alpine)

Langkah-langkah pengerjaannya sebagai berikut:

1. Buat server1.py dan server2.py pada folder Pemrograman_Jaringan_E/progjar3/Jawab
2. Ubah IP pada server1.py menjadi IP Address dari alpine-2

```
UDP_IP_ADDRESS = '192.168.122.93'
UDP_PORT = 5003

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
count=0
while True:
    data, addr = serverSock.recvfrom(1024)
    count=count+len(data)
    print(addr, count, len(data), data)
    fp.write(data)
```

3. Ubah IP pada server2.py menjadi IP Address dari alpine-3

```
UDP_IP_ADDRESS = '192.168.122.244'
UDP_PORT = 5003

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
count=0
while True:
    data, addr = serverSock.recvfrom(1024)
    count=count+len(data)
    print(addr, count, len(data), data)
    fp.write(data)
```

4. Lakukan modifikasi pada file-file yang ada pada progjar3.

- library.py

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

def get_url_list():
    urls = dict()
    urls['sasuke'] = 'https://pbs.twimg.com/profile_images/1254525900722331649/4GmVtUhm.jpg'
    urls['luffy&zoro'] = 'https://cdn0-production-images-kly.akamaized.net/ragzA1mweyuc2D3otwdNmiPH7ss=/640x360/smart/filters:quality(7'
    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/jpeg'] = 'jpg'
    tipe['image/gif'] = 'gif'
    tipe['image/jpeg'] = 'jpg'
    tipe['application/zip'] = 'jpg'
    tipe['video/quicktime'] = 'mov'

    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
```

```
        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__':
    k = download_gambar('https://pbs.twimg.com/profile_images/1254525900722331649/4GmVtUhm.jpg')
    print(k)
```

- multi_process_async.py

```
from library import download_gambar, get_url_list, kirim_gambar
import time
import datetime
from multiprocessing import Process, Pool

def kirim_server():
    texec = dict()
    urls = get_url_list()
    status_task = dict()
    temp = 0
    task_pool = Pool(processes=20)
    catat_awal = datetime.datetime.now()
    for k in urls:
        download_gambar(urls[k],k)
        print(f"mendownload {urls[k]}")
        UDP_IP_ADDRESS = "192.168.122.93"
        UDP_IP_ADDRESS2 = "192.168.122.244"
        PORT = 5003
        if temp == 0:
            texec[k] = task_pool.apply_async(func=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] = task_pool.apply_async(func=kirim_gambar, args=(UDP_IP_ADDRESS2,PORT,f"{k}.jpg"))
    for k in urls:
        status_task[k]=texec[k].get(timeout=10)

    catat_akhir = datetime.datetime.now()
    selesai = catat_akhir - catat_awal
    print(f"Waktu TOTAL yang dibutuhkan {selesai} detik {catat_awal} s/d {catat_akhir}")
    print("status TASK")
    print(status_task)
if __name__ == '__main__':
    kirim_server()
```

- 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:
        print(f"mendownload {urls[k]}")
        waktu = time.time()
        UDP_IP_ADDRESS = "192.168.122.93"
        UDP_IP_ADDRESS2 = "192.168.122.244"
        PORT = 5003
        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()
```

- multi_thread_async.py

```
from library import download_gambar, get_url_list, kirim_gambar
import time
import datetime
import concurrent.futures

def kirim_server():
    texec = dict()
    urls = get_url_list()
    status_task = dict()
    temp = 0
    task = concurrent.futures.ThreadPoolExecutor(max_workers=4)
    catat_awal = datetime.datetime.now()
    for k in urls:
        download_gambar(urls[k], k)
        print(f"mendownload {urls[k]}")
        waktu = time.time()
        UDP_IP_ADDRESS = "192.168.122.93"
        UDP_IP_ADDRESS2 = "192.168.122.244"
        PORT = 5003
        if temp == 0:
            texec[k] = task.submit(kirim_gambar, UDP_IP_ADDRESS, PORT, f"{k}.jpg")
            print('Masuk server 1')
            temp = temp+1
        elif temp == 1:
            print('Masuk server 2')
            texec[k] = task.submit(kirim_gambar, UDP_IP_ADDRESS2, PORT, f"{k}.jpg")
    for k in urls:
        status_task[k] = texec[k].result()
    catat_akhir = datetime.datetime.now()
    selesai = catat_akhir - catat_awal
    print(f"Waktu TOTAL yang dibutuhkan {selesai} detik {catat_awal} s/d {catat_akhir}")
    print("hasil task yang dijalankan")
    print(status_task)
if __name__ == '__main__':
    kirim_server()
```

- multi_thread.py

```
from library import download_gambar, get_url_list, kirim_gambar
import time
import datetime
import threading

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()
        UDP_IP_ADDRESS = "192.168.122.93"
        UDP_IP_ADDRESS2 = "192.168.122.244"
        PORT = 5003
        if temp == 0:
            texec[k] = threading.Thread(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] = threading.Thread(target=kirim_gambar, args=(UDP_IP_ADDRESS2, PORT, f"{k}.jpg"))
            texec[k].start()

    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}")
if __name__ == '__main__':
    kirim_server()
```

5. jalankan server1.py pada alpine-2.

```
Rx bytes:0 (0.0 B) Tx bytes:0 (0.0 B)

/ # git clone https://github.com/Rivadhli16/Pemrograman_Jaringan_E.git
Cloning into 'Pemrograman_Jaringan_E'...
remote: Enumerating objects: 398, done.
remote: Counting objects: 100% (50/50), done.
remote: Compressing objects: 100% (43/43), done.
remote: Total 398 (delta 31), reused 12 (delta 7), pack-reused 348
Receiving objects: 100% (398/398), 781.65 KiB | 1.50 MiB/s, done.
Resolving deltas: 100% (191/191), done.
/ # cd Pemrograman_Jaringan_E/progjar3/jawab
/Pemrograman_Jaringan_E/progjar3/jawab # nano server1.py
/Pemrograman_Jaringan_E/progjar3/jawab # python3 server1.py
```

6. Jalankan server2.py pada alpine-3.

```
/ # git clone https://github.com/Rivadhli16/Pemrograman_Jaringan_E.git
Cloning into 'Pemrograman_Jaringan_E'...
remote: Enumerating objects: 398, done.
remote: Counting objects: 100% (50/50), done.
remote: Compressing objects: 100% (43/43), done.
remote: Total 398 (delta 31), reused 12 (delta 7), pack-reused 348
Receiving objects: 100% (398/398), 780.64 KiB | 303.00 KiB/s, done.
Resolving deltas: 100% (194/194), done.
/ # cd Pemrograman_Jaringan_E/progjar3/jawab
/Pemrograman_Jaringan_E/progjar3/jawab # nano server2.py
/Pemrograman_Jaringan_E/progjar3/jawab # python3 server2.py
```

7. install module requests pada alpine-1

```
/ # git clone https://github.com/Rivadhli16/Pemrograman_Jaringan_E.git
Cloning into 'Pemrograman_Jaringan_E'...
remote: Enumerating objects: 398, done.
remote: Counting objects: 100% (50/50), done.
remote: Compressing objects: 100% (43/43), done.
remote: Total 398 (delta 31), reused 12 (delta 7), pack-reused 348
Receiving objects: 100% (398/398), 780.65 KiB | 3.63 MiB/s, done.
Resolving deltas: 100% (196/196), done.
/ # cd Pemrograman_Jaringan_E/progjar3/jawab
/Pemrograman_Jaringan_E/progjar3/jawab # python3 -m pip install requests
Collecting requests
  Downloading requests-2.26.0-py2.py3-none-any.whl (62 kB)
    |#####| 62 kB 314 kB/s
Collecting idna<4,>=2.5
  Downloading idna-3.2-py3-none-any.whl (59 kB)
    |#####| 59 kB 2.9 MB/s
Collecting urllib3<1.27,>=1.21.1
  Downloading urllib3-1.26.6-py2.py3-none-any.whl (138 kB)
    |#####| 138 kB 2.2 MB/s
Collecting certifi>=2017.4.17
  Downloading certifi-2021.5.30-py2.py3-none-any.whl (145 kB)
    |#####| 145 kB 2.8 MB/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.
/Pemrograman_Jaringan_E/progjar3/jawab #
```

8. Jalankan python3 multi_process_async.py pada alpine-1.

```
/Pemrograman Jaringan E/progjar3/jawab # python3 multi_process_async.py
WARNING:root:image/jpeg
WARNING:root:writing sasuke.jpg dalam waktu 0:00:00.280699 2021-07-19 09:00:22.555503 s/d 2021-07-19 09:00:22.836206
mendownload https://pbs.twimg.com/profile_images/1254525900722331649/4GwVtUhm.jpg
192.168.122.93 5003 sasuke.jpg
Masuk server 1
WARNING:root:image/jpeg
WARNING:root:writing luffy&zoro.jpg dalam waktu 0:00:01.314361 2021-07-19 09:00:22.859910 s/d 2021-07-19 09:00:24.174275
mendownload https://cdn0-production-images-kly.akamaized.net/ragZAlmweyuc2D3otwdNm1PH7ss=/640x360/smart/filters:quality(75):strip_icc():format(jpeg)/kly-media-production/m
edias/2879389/original/097927800_1565594145-preview-one-piece-episode-897-0-700x394.jpg
Masuk server 2
192.168.122.244 5003 luffy&zoro.jpg
waktu TOTAL yang dibutuhkan 0:00:02.410590 detik 2021-07-19 09:00:22.555489 s/d 2021-07-19 09:00:24.966079
status TASK
({'sasuke': None, 'luffy&zoro': None})
/Pemrograman Jaringan E/progjar3/jawab #
```

9. Jalankan python3 multi_process.py pada alpine-1.

```
/Pemrograman Jaringan E/progjar3/jawab # python3 multi_process.py
mendownload https://pbs.twimg.com/profile_images/1254525900722331649/4GwVtUhm.jpg
Masuk server 1
mendownload https://cdn0-production-images-kly.akamaized.net/ragZAlmweyuc2D3otwdNm1PH7ss=/640x360/smart/filters:quality(75):strip_icc():format(jpeg)/kly-media-production/m
edias/2879389/original/097927800_1565594145-preview-one-piece-episode-897-0-700x394.jpg
Masuk server 2
192.168.122.93 5003 sasuke.jpg
192.168.122.244 5003 luffy&zoro.jpg
waktu TOTAL yang dibutuhkan 0:00:01.174546 detik 2021-07-19 09:01:25.573376 s/d 2021-07-19 09:01:26.747922
/Pemrograman Jaringan E/progjar3/jawab #
```

10. Jalankan multi_thread_async.py pada alpine-1.

```
/Pemrograman Jaringan E/progjar3/jawab # python3 multi_thread_async.py
WARNING:root:image/jpeg
WARNING:root:writing sasuke.jpg dalam waktu 0:00:00.148370 2021-07-19 09:02:21.880873 s/d 2021-07-19 09:02:22.029247
mendownload https://pbs.twimg.com/profile_images/1254525900722331649/4GwVtUhm.jpg
192.168.122.93 5003 sasuke.jpg
Masuk server 1
WARNING:root:image/jpeg
WARNING:root:writing luffy&zoro.jpg dalam waktu 0:00:00.492985 2021-07-19 09:02:22.032158 s/d 2021-07-19 09:02:22.525148
mendownload https://cdn0-production-images-kly.akamaized.net/ragZAlmweyuc2D3otwdNm1PH7ss=/640x360/smart/filters:quality(75):strip_icc():format(jpeg)/kly-media-production/m
edias/2879389/original/097927800_1565594145-preview-one-piece-episode-897-0-700x394.jpg
Masuk server 2
192.168.122.244 5003 luffy&zoro.jpg
waktu TOTAL yang dibutuhkan 0:00:01.436567 detik 2021-07-19 09:02:21.880861 s/d 2021-07-19 09:02:23.317428
hasil task yang dijalankan
({'sasuke': None, 'luffy&zoro': None})
/Pemrograman Jaringan E/progjar3/jawab #
```

11. Jalankan multi_thread.py pada alpine-1.

```
/Pemrograman Jaringan E/progjar3/jawab # python3 multi_thread.py
WARNING:root:image/jpeg
WARNING:root:writing sasuke.jpg dalam waktu 0:00:00.134784 2021-07-19 09:03:12.693263 s/d 2021-07-19 09:03:12.828056
mendownload https://pbs.twimg.com/profile_images/1254525900722331649/4GwVtUhm.jpg
Masuk server 1
192.168.122.93 5003 sasuke.jpg
WARNING:root:image/jpeg
WARNING:root:writing luffy&zoro.jpg dalam waktu 0:00:00.469967 2021-07-19 09:03:12.831154 s/d 2021-07-19 09:03:13.301126
mendownload https://cdn0-production-images-kly.akamaized.net/ragZAlmweyuc2D3otwdNm1PH7ss=/640x360/smart/filters:quality(75):strip_icc():format(jpeg)/kly-media-production/m
edias/2879389/original/097927800_1565594145-preview-one-piece-episode-897-0-700x394.jpg
Masuk server 2
192.168.122.244 5003 luffy&zoro.jpg
waktu TOTAL yang dibutuhkan 0:00:01.359224 detik 2021-07-19 09:03:12.693258 s/d 2021-07-19 09:03:14.052482
/Pemrograman Jaringan E/progjar3/jawab #
```

12. Hasil pada alpine-2 sebagai Server akan muncul hasil sebagai berikut.

```
('192.168.122.124', 53477) 16417 1 b'\xd8'  
( '192.168.122.124', 53477) 16418 1 b'\xaa'  
( '192.168.122.124', 53477) 16419 1 b'\x96'  
( '192.168.122.124', 53477) 16420 1 b'\x07'  
( '192.168.122.124', 53477) 16421 1 b'\xc0'  
( '192.168.122.124', 53477) 16422 1 b'\xde'  
( '192.168.122.124', 53477) 16423 1 b'\x83'  
( '192.168.122.124', 53477) 16424 1 b'\xb9'  
( '192.168.122.124', 53477) 16425 1 b'J'  
( '192.168.122.124', 53477) 16426 1 b'\x0c'  
( '192.168.122.124', 53477) 16427 1 b'\xed'  
( '192.168.122.124', 53477) 16428 1 b'Q'  
( '192.168.122.124', 53477) 16429 1 b'8'  
( '192.168.122.124', 53477) 16430 1 b'\xc0'  
( '192.168.122.124', 53477) 16431 1 b'q'  
( '192.168.122.124', 53477) 16432 1 b'\x06'  
( '192.168.122.124', 53477) 16433 1 b'\x86'  
( '192.168.122.124', 53477) 16434 1 b'\xc1'  
( '192.168.122.124', 53477) 16435 1 b'%'  
( '192.168.122.124', 53477) 16436 1 b'\x82'  
( '192.168.122.124', 53477) 16437 1 b'\x00'  
( '192.168.122.124', 53477) 16438 1 b'\x0c'  
( '192.168.122.124', 53477) 16439 1 b'G'  
( '192.168.122.124', 53477) 16440 1 b'\xa1'  
( '192.168.122.124', 53477) 16441 1 b'M'  
( '192.168.122.124', 53477) 16442 1 b'\x8b'  
( '192.168.122.124', 53477) 16443 1 b'\x07'  
( '192.168.122.124', 53477) 16444 1 b'\xc0'  
( '192.168.122.124', 53477) 16445 1 b'\x03'  
( '192.168.122.124', 53477) 16446 1 b'\xe4'  
( '192.168.122.124', 53477) 16447 1 b'l'  
( '192.168.122.124', 53477) 16448 1 b'C'  
( '192.168.122.124', 53477) 16449 1 b'a'  
( '192.168.122.124', 53477) 16450 1 b'\x0c'  
( '192.168.122.124', 53477) 16451 1 b'\x9e'  
( '192.168.122.124', 53477) 16452 1 b'\x04'  
( '192.168.122.124', 53477) 16453 1 b'\xfe'  
( '192.168.122.124', 53477) 16454 1 b'@'  
( '192.168.122.124', 53477) 16455 1 b'\x19'
```


13. Hasil pada alpine-3 sebagai Server akan muncul hasil sebagai berikut.

```
('192.168.122.124', 58621) 40909 1 b'\xe8'
('192.168.122.124', 58621) 40910 1 b'\x8b'
('192.168.122.124', 58621) 40911 1 b'\xf5'
('192.168.122.124', 58621) 40912 1 b'\x92'
('192.168.122.124', 58621) 40913 1 b'\x1d'
('192.168.122.124', 58621) 40914 1 b'a'
('192.168.122.124', 58621) 40915 1 b'\x08'
('192.168.122.124', 58621) 40916 1 b'5'
('192.168.122.124', 58621) 40917 1 b'\xfa'
('192.168.122.124', 58621) 40918 1 b'\xb2'
('192.168.122.124', 58621) 40919 1 b'\xc4'
('192.168.122.124', 58621) 40920 1 b'\xaa'
('192.168.122.124', 58621) 40921 1 b'\xe1'
('192.168.122.124', 58621) 40922 1 b'\x8f'
('192.168.122.124', 58621) 40923 1 b'\x93'
('192.168.122.124', 58621) 40924 1 b'\x99'
('192.168.122.124', 58621) 40925 1 b'L'
('192.168.122.124', 58621) 40926 1 b'\xa9'
('192.168.122.124', 58621) 40927 1 b'\xe8'
('192.168.122.124', 58621) 40928 1 b'\x0f'
('192.168.122.124', 58621) 40929 1 b's'
('192.168.122.124', 58621) 40930 1 b'\xb4'
('192.168.122.124', 58621) 40931 1 b'"'"
('192.168.122.124', 58621) 40932 1 b'h'
('192.168.122.124', 58621) 40933 1 b'\x05'
('192.168.122.124', 58621) 40934 1 b'\xc9'
('192.168.122.124', 58621) 40935 1 b'\x0e'
('192.168.122.124', 58621) 40936 1 b'\x8d'
('192.168.122.124', 58621) 40937 1 b'|'
('192.168.122.124', 58621) 40938 1 b'\x19'
('192.168.122.124', 58621) 40939 1 b'Y'
('192.168.122.124', 58621) 40940 1 b'\xa8'
('192.168.122.124', 58621) 40941 1 b'p'
('192.168.122.124', 58621) 40942 1 b'\x1c'
('192.168.122.124', 58621) 40943 1 b '/'
('192.168.122.124', 58621) 40944 1 b'\xa0'
('192.168.122.124', 58621) 40945 1 b '['
('192.168.122.124', 58621) 40946 1 b'7'
```