

2019 Computer Network Homework

Step1:

```
~/Desktop/CSE/107-2/CN/2019電腦網路期末專案/client git p master ↵ cat step_1
#!/bin/bash
./client_1 127.0.0.1 9992 -f 1.mp4 &
./client_1 127.0.0.1 9992 -f 2.mp4 &
./client_1 127.0.0.1 9992 -f 3.mp4 &
./client_1 127.0.0.1 9992 -f 4.mp4 &
```

(四個 client)

```
~/Desktop/CSE/107-2/CN/2019電腦網路期末專案/client git p master ↵ ./step_1
Send a packet(SYN) to 127.0.0.1 : 9992
Receive a packet(SYN) from 127.0.0.1 : 12331
    Receive a packet (seq_num = 2925, ack_num = 1871)
Send a packet(ACK) to 127.0.0.1 : 12331
=====Complete the three-way handshake=====
Receive 2.mp4 from 127.0.0.1 : 12331
    Receive a packet (seq_num = 1, ack_num = 1)
    Receive a packet (seq_num = 2, ack_num = 2)
    Receive a packet (seq_num = 4, ack_num = 3)
Receive a packet(SYN) from 127.0.0.1 : 12332
    Receive a packet (seq_num = 2925, ack_num = 1871)
    Receive a packet (seq_num = 8, ack_num = 4)
Send a packet(ACK) to 127.0.0.1 : 12332
=====Complete the three-way handshake=====
    Receive a packet (seq_num = 16, ack_num = 5)
    Receive a packet (seq_num = 32, ack_num = 6)
    Receive a packet (seq_num = 64, ack_num = 7)
Receive 1.mp4 from 127.0.0.1 : 12332
    Receive a packet (seq_num = 128, ack_num = 8)
    Receive a packet (seq_num = 256, ack_num = 9)
```

(Client 端)

```
~/Desktop/CSE/107-2/CN/2019電腦網路期末專案/server git p master ↵ ./server_1 9992
=====Parameter=====
The RTT delay = 150 ms
The threshold = 1024 bytes
The MSS = 1024 bytes
The buffer size = 10240 bytes
Server's IP is 192.168.0.2
Server is listening on port 9992
=====
Listening for client.....
=====Start the three-way handshake=====
Receive a packet(SYN) from 127.0.0.1 : 54451
    Receive a packet (seq_num = 9552, ack_num = 0)
=====
Listening for client.....
=====Start the three-way handshake=====
Send a packet(SYN/ACK) to 127.0.0.1 : 54451
Receive a packet(SYN) from 127.0.0.1 : 61910
    Receive a packet (seq_num = 9553, ack_num = 3413)
=====Complete the three-way handshake=====
Start to sent 2.mp4 to 127.0.0.1 : 61910, the file size of 44608 bytes.
cwnd = 1, rwnd = 10240, threshold = 1024
    Send a packet at : 1 byte
    Receive a packet (seq_num = 1, ack_num = 2)
cwnd = 2, rwnd = 10240, threshold = 1024
```

(Server 端)

Step2:

```
bool generate_loss(){  
    if(rand() % 10000 == 0) return true;  
    return false;  
}
```

```
//add 0.01% packet loss  
if(!generate_loss()){  
    send_packet(sockfd, data_packet, data_len);  
    printf("\tSend a packet at : %d byte\n", send_offset);  
}else{  
    printf("\tSend a packet at : %d byte **loss\n", send_offset);  
}
```

(加上 0.01% 之 loss)

```
~/Desktop/CSE/107-2/CN/2019電腦網路期末專案/client git p master ①? ./client_2 127.0.0.1 9992 -f 2.mp4  
Send a packet(SYN) to 127.0.0.1 : 9992  
Receive a packet(SYN) from 127.0.0.1 : 12331  
    Receive a packet (seq_num = 2882, ack_num = 3304)  
Send a packet(ACK) to 127.0.0.1 : 12331  
=====Complete the three-way handshake=====  
Receive 2.mp4 from 127.0.0.1 : 12331  
    Receive a packet (seq_num = 1, ack_num = 1)  
    Receive a packet (seq_num = 2, ack_num = 2)  
    Receive a packet (seq_num = 4, ack_num = 3)  
    Receive a packet (seq_num = 8, ack_num = 4)  
    Receive a packet (seq_num = 16, ack_num = 5)  
    Receive a packet (seq_num = 32, ack_num = 6)  
***** Timeout !! *****  
***** Timeout !! *****  
    Receive a packet (seq_num = 64, ack_num = 7)  
    Receive a packet (seq_num = 128, ack_num = 8)  
    Receive a packet (seq_num = 256, ack_num = 9)  
    Receive a packet (seq_num = 512, ack_num = 10)  
    Receive a packet (seq_num = 1024, ack_num = 11)  
    Receive a packet (seq_num = 2048, ack_num = 12)  
    Receive a packet (seq_num = 3072, ack_num = 13)  
    Receive a packet (seq_num = 4096, ack_num = 14)  
    Receive a packet (seq_num = 5120, ack_num = 15)
```

(Client 端)

```
Receive a packet(SYN) from 127.0.0.1 : 65226
    Receive a packet (seq_num = 3304, ack_num = 2883)
=====Complete the three-way handshake=====
Start to sent 2.mp4 to 127.0.0.1 : 65226, the file size of 44608 bytes.
cwnd = 1, rwnd = 10240, threshold = 1024
    Send a packet at : 1 byte
    Receive a packet (seq_num = 1, ack_num = 2)
cwnd = 2, rwnd = 10240, threshold = 1024
    Send a packet at : 2 byte
    Receive a packet (seq_num = 2, ack_num = 4)
cwnd = 4, rwnd = 10240, threshold = 1024
    Send a packet at : 4 byte
    Receive a packet (seq_num = 3, ack_num = 8)
cwnd = 8, rwnd = 10240, threshold = 1024
    Send a packet at : 8 byte
    Receive a packet (seq_num = 4, ack_num = 16)
cwnd = 16, rwnd = 10240, threshold = 1024
    Send a packet at : 16 byte
    Receive a packet (seq_num = 5, ack_num = 32)
cwnd = 32, rwnd = 10240, threshold = 1024
    Send a packet at : 32 byte
    Receive a packet (seq_num = 6, ack_num = 64)
cwnd = 64, rwnd = 10240, threshold = 1024
    Send a packet at : 64 byte **loss
    Receive a packet (seq_num = 6, ack_num = 64)
```

(Server 端)

Step3:

..末專案/client (zsh)

```
Send a packet(SYN) to 127.0.0.1 : 9992
Receive a packet(SYN) from 127.0.0.1 : 12331
    Receive a packet (seq_num = 9580, ack_num = 3195)
Send a packet(ACK) to 127.0.0.1 : 12331
=====Complete the three-way handshake=====
Receive 2.mp4 from 127.0.0.1 : 12331
    Receive a packet (seq_num = 1, ack_num = 1)
    Receive a packet (seq_num = 2, ack_num = 1)
    Receive a packet (seq_num = 4, ack_num = 2)
    Receive a packet (seq_num = 8, ack_num = 2)
    Receive a packet (seq_num = 16, ack_num = 3)
    Receive a packet (seq_num = 32, ack_num = 3)
    Receive a packet (seq_num = 64, ack_num = 4)
    Receive a packet (seq_num = 128, ack_num = 4)
    Receive a packet (seq_num = 256, ack_num = 5)
    Receive a packet (seq_num = 512, ack_num = 5)
    Receive a packet (seq_num = 1024, ack_num = 6)
    Receive a packet (seq_num = 2048, ack_num = 6)
    Receive a packet (seq_num = 3072, ack_num = 7)
***** Timeout ! ! *****
    Receive a packet (seq_num = 4096, ack_num = 8)
    Receive a packet (seq_num = 5120, ack_num = 9)
    Receive a packet (seq_num = 6144, ack_num = 10)
    Receive a packet (seq_num = 7168, ack_num = 11)
    Receive a packet (seq_num = 8192, ack_num = 12)
    Receive a packet (seq_num = 9216, ack_num = 13)
    Receive a packet (seq_num = 10240, ack_num = 14)
    Receive a packet (seq_num = 11264, ack_num = 15)
    Receive a packet (seq_num = 12288, ack_num = 16)
    Receive a packet (seq_num = 13312, ack_num = 17)
    Receive a packet (seq_num = 14336, ack_num = 18)
    Receive a packet (seq_num = 15360, ack_num = 19)
    Receive a packet (seq_num = 16384, ack_num = 20)
    Receive a packet (seq_num = 17408, ack_num = 21)
    Receive a packet (seq_num = 18432, ack_num = 22)
    Receive a packet (seq_num = 19456, ack_num = 23)
    Receive a packet (seq_num = 20480, ack_num = 24)
    Receive a packet (seq_num = 21504, ack_num = 25)
    Receive a packet (seq_num = 22528, ack_num = 26)
    Receive a packet (seq_num = 23552, ack_num = 27)
    Receive a packet (seq_num = 24576, ack_num = 28)
    Receive a packet (seq_num = 25600, ack_num = 29)
    Receive a packet (seq_num = 26624, ack_num = 30)
    Receive a packet (seq_num = 27648, ack_num = 31)
    Receive a packet (seq_num = 28672, ack_num = 32)
    Receive a packet (seq_num = 29696, ack_num = 33)
    Receive a packet (seq_num = 30720, ack_num = 34)
    Receive a packet (seq_num = 31744, ack_num = 35)
    Receive a packet (seq_num = 32768, ack_num = 36)
    Receive a packet (seq_num = 33792, ack_num = 37)
    Receive a packet (seq_num = 34816, ack_num = 38)
```

(Client 端)

```
*****Slow start*****  
Start to sent 2.mp4 to 127.0.0.1 : 65179, the file size of 44608 bytes.  
cwnd = 1, rwnd = 32768, threshold = 8192  
    Send a packet at : 1 byte  
cwnd = 2, rwnd = 32768, threshold = 8192  
    Send a packet at : 2 byte  
    Receive a packet (seq_num = 1, ack_num = 4)  
cwnd = 4, rwnd = 32765, threshold = 8192  
    Send a packet at : 4 byte  
cwnd = 8, rwnd = 32765, threshold = 8192  
    Send a packet at : 8 byte  
    Receive a packet (seq_num = 2, ack_num = 16)  
cwnd = 16, rwnd = 32753, threshold = 8192  
    Send a packet at : 16 byte  
cwnd = 32, rwnd = 32753, threshold = 8192  
    Send a packet at : 32 byte  
    Receive a packet (seq_num = 3, ack_num = 64)  
cwnd = 64, rwnd = 32705, threshold = 8192  
    Send a packet at : 64 byte  
cwnd = 128, rwnd = 32705, threshold = 8192  
    Send a packet at : 128 byte  
    Receive a packet (seq_num = 4, ack_num = 256)  
cwnd = 256, rwnd = 32513, threshold = 8192  
    Send a packet at : 256 byte  
cwnd = 512, rwnd = 32513, threshold = 8192  
    Send a packet at : 512 byte  
    Receive a packet (seq_num = 5, ack_num = 1024)  
cwnd = 1024, rwnd = 31745, threshold = 8192  
    Send a packet at : 1024 byte  
cwnd = 2048, rwnd = 31745, threshold = 8192  
    Send a packet at : 2048 byte  
    Send a packet at : 3072 byte  
    Receive a packet (seq_num = 6, ack_num = 3072)  
    Receive a packet (seq_num = 7, ack_num = 4096)  
cwnd = 4096, rwnd = 28673, threshold = 8192  
    Send a packet at : 4096 byte  
    Send a packet at : 5120 byte  
    Send a packet at : 6144 byte  
    Send a packet at : 7168 byte  
    Receive a packet (seq_num = 9, ack_num = 6144)  
    Receive a packet (seq_num = 11, ack_num = 8192)  
cwnd = 8192, rwnd = 24577, threshold = 8192  
    Send a packet at : 8192 byte  
    Send a packet at : 9216 byte  
    Send a packet at : 10240 byte  
    Send a packet at : 11264 byte  
    Send a packet at : 12288 byte  
    Send a packet at : 13312 byte  
    Send a packet at : 14336 byte  
    Send a packet at : 15360 byte  
    Receive a packet (seq_num = 13, ack_num = 10240)
```

(Server 端)

Step4:

..未專案/client (zsh)

```
Send a packet(SYN) to 127.0.0.1 : 9992
Receive a packet(SYN) from 127.0.0.1 : 12331
    Receive a packet (seq_num = 9580, ack_num = 3195)
Send a packet(ACK) to 127.0.0.1 : 12331
=====Complete the three-way handshake=====
Receive 2.mp4 from 127.0.0.1 : 12331
    Receive a packet (seq_num = 1, ack_num = 1)
    Receive a packet (seq_num = 2, ack_num = 1)
    Receive a packet (seq_num = 4, ack_num = 2)
    Receive a packet (seq_num = 8, ack_num = 2)
    Receive a packet (seq_num = 16, ack_num = 3)
    Receive a packet (seq_num = 32, ack_num = 3)
    Receive a packet (seq_num = 64, ack_num = 4)
    Receive a packet (seq_num = 128, ack_num = 4)
    Receive a packet (seq_num = 256, ack_num = 5)
    Receive a packet (seq_num = 512, ack_num = 5)
    Receive a packet (seq_num = 1024, ack_num = 6)
    Receive a packet (seq_num = 2048, ack_num = 6)
    Receive a packet (seq_num = 3072, ack_num = 7)
***** Timeout ! *****
    Receive a packet (seq_num = 4096, ack_num = 8)
    Receive a packet (seq_num = 5120, ack_num = 9)
    Receive a packet (seq_num = 6144, ack_num = 10)
    Receive a packet (seq_num = 7168, ack_num = 11)
    Receive a packet (seq_num = 8192, ack_num = 12)
    Receive a packet (seq_num = 9216, ack_num = 13)
    Receive a packet (seq_num = 10240, ack_num = 14)
    Receive a packet (seq_num = 11264, ack_num = 15)
    Receive a packet (seq_num = 12288, ack_num = 16)
    Receive a packet (seq_num = 13312, ack_num = 17)
    Receive a packet (seq_num = 14336, ack_num = 18)
    Receive a packet (seq_num = 15360, ack_num = 19)
    Receive a packet (seq_num = 16384, ack_num = 20)
    Receive a packet (seq_num = 17408, ack_num = 21)
    Receive a packet (seq_num = 18432, ack_num = 22)
    Receive a packet (seq_num = 19456, ack_num = 23)
    Receive a packet (seq_num = 20480, ack_num = 24)
    Receive a packet (seq_num = 21504, ack_num = 25)
    Receive a packet (seq_num = 22528, ack_num = 26)
    Receive a packet (seq_num = 23552, ack_num = 27)
    Receive a packet (seq_num = 24576, ack_num = 28)
    Receive a packet (seq_num = 25600, ack_num = 29)
    Receive a packet (seq_num = 26624, ack_num = 30)
    Receive a packet (seq_num = 27648, ack_num = 31)
    Receive a packet (seq_num = 28672, ack_num = 32)
    Receive a packet (seq_num = 29696, ack_num = 33)
    Receive a packet (seq_num = 30720, ack_num = 34)
    Receive a packet (seq_num = 31744, ack_num = 35)
    Receive a packet (seq_num = 32768, ack_num = 36)
    Receive a packet (seq_num = 33792, ack_num = 37)
    Receive a packet (seq_num = 34816, ack_num = 38)
```

(Client 端)

```
=====Complete the three-way handshake=====
*****Slow start*****
Start to sent 2.mp4 to 127.0.0.1 : 58201, the file size of 44608 bytes.
cwnd = 1, rwnd = 32768, threshold = 8192
    Send a packet at : 1 byte
cwnd = 2, rwnd = 32768, threshold = 8192
    Send a packet at : 2 byte
    Receive a packet (seq_num = 1, ack_num = 4)
cwnd = 4, rwnd = 32765, threshold = 8192
    Send a packet at : 4 byte
cwnd = 8, rwnd = 32765, threshold = 8192
    Send a packet at : 8 byte
    Receive a packet (seq_num = 2, ack_num = 16)
cwnd = 16, rwnd = 32753, threshold = 8192
    Send a packet at : 16 byte
cwnd = 32, rwnd = 32753, threshold = 8192
    Send a packet at : 32 byte
    Receive a packet (seq_num = 3, ack_num = 64)
cwnd = 64, rwnd = 32705, threshold = 8192
    Send a packet at : 64 byte
cwnd = 128, rwnd = 32705, threshold = 8192
    Send a packet at : 128 byte
    Receive a packet (seq_num = 4, ack_num = 256)
cwnd = 256, rwnd = 32513, threshold = 8192
    Send a packet at : 256 byte
cwnd = 512, rwnd = 32513, threshold = 8192
    Send a packet at : 512 byte
    Receive a packet (seq_num = 5, ack_num = 1024)
```

(Server 端 Slow Start)

```
*****Congestion avoidance*****
cwnd = 8192, rwnd = 16385, threshold = 8192
    Send a packet at : 16384 byte
    Send a packet at : 17408 byte
    Send a packet at : 18432 byte
    Send a packet at : 19456 byte
    Send a packet at : 20480 byte
    Send a packet at : 21504 byte
    Send a packet at : 22528 byte
    Send a packet at : 23552 byte
    Receive a packet (seq_num = 21, ack_num = 18432)
    Receive a packet (seq_num = 23, ack_num = 20480)
    Receive a packet (seq_num = 25, ack_num = 22528)
    Receive a packet (seq_num = 27, ack_num = 24576)
cwnd = 8192, rwnd = 8193, threshold = 8192
    Send a packet at : 24576 byte
    Send a packet at : 25600 byte
    Send a packet at : 26624 byte
    Send a packet at : 27648 byte
    Send a packet at : 28672 byte
    Send a packet at : 29696 byte
    Send a packet at : 30720 byte
    Send a packet at : 31744 byte
    Receive a packet (seq_num = 29, ack_num = 26624)
    Receive a packet (seq_num = 31, ack_num = 28672)
```

(Server 端 Congestion Avoidance)

Step5:

```
Receive a packet (seq_num = 2048, ack_num = 12)
Receive a packet (seq_num = 3072, ack_num = 13)
Receive a packet (seq_num = 5120, ack_num = 15)
Receive a packet (seq_num = 6144, ack_num = 16)
Receive a packet (seq_num = 7168, ack_num = 17)
Receive a packet (seq_num = 4096, ack_num = 18)
Receive a packet (seq_num = 4097, ack_num = 19)
```

(Client 端)

```
cwnd = 4096, rwnd = 28673, threshold = 8192
    Send a packet at : 4096 byte
***Data loss at byte : 4096
    Send a packet at : 5120 byte
    Send a packet at : 6144 byte
    Send a packet at : 7168 byte
    Receive a packet (seq_num = 15, ack_num = 4096)
    Receive a packet (seq_num = 16, ack_num = 4096)
    Receive a packet (seq_num = 17, ack_num = 4096)
Received three duplicated ACKs.
*****Fast retransmit*****
*****Slow start*****
cwnd = 1, rwnd = 28673, threshold = 2048
    Send a packet at : 4096 byte
    Receive a packet (seq_num = 18, ack_num = 4097)
cwnd = 2, rwnd = 28672, threshold = 2048
    Send a packet at : 4097 byte
    Receive a packet (seq_num = 19, ack_num = 4099)
```

(Server 端)

Step6:

```
Receive a packet (seq_num = 2048, ack_num = 12)
Receive a packet (seq_num = 3072, ack_num = 13)
Receive a packet (seq_num = 5120, ack_num = 15)
Receive a packet (seq_num = 6144, ack_num = 16)
Receive a packet (seq_num = 7168, ack_num = 17)
Receive a packet (seq_num = 4096, ack_num = 18)
Receive a packet (seq_num = 5120, ack_num = 19)
Receive a packet (seq_num = 6144, ack_num = 20)
```

(Client 端)

```
cwnd = 4096, rwnd = 28673, threshold = 8192
    Send a packet at : 4096 byte
***Data loss at byte : 4096
    Send a packet at : 5120 byte
    Send a packet at : 6144 byte
    Send a packet at : 7168 byte
    Receive a packet (seq_num = 15, ack_num = 4096)
    Receive a packet (seq_num = 16, ack_num = 4096)
    Receive a packet (seq_num = 17, ack_num = 4096)
Received three duplicated ACKs.
*****Fast recovery*****
*****Congestion avoidance*****
cwnd = 2048, rwnd = 28673, threshold = 2048
    Send a packet at : 4096 byte
    Send a packet at : 5120 byte
    Receive a packet (seq_num = 18, ack_num = 5120)
    Receive a packet (seq_num = 19, ack_num = 6144)
cwnd = 3072, rwnd = 26625, threshold = 2048
    Send a packet at : 6144 byte
    Send a packet at : 7168 byte
    Send a packet at : 8192 byte
    Receive a packet (seq_num = 20, ack_num = 7168)
    Receive a packet (seq_num = 21, ack_num = 8192)
    Receive a packet (seq_num = 22, ack_num = 9216)
```

(Server 端)

Step7:

```
..... a packet (seq_num = 18, ack_num = 17,
Receive a packet (seq_num = 8192, ack_num = 18)
Receive a packet (seq_num = 9216, ack_num = 19)
SACK Block : 10240 to 11264
    Receive a packet (seq_num = 11264, ack_num = 21)
SACK Block : 12288 to 13312
    Receive a packet (seq_num = 13312, ack_num = 23)
SACK Block : 14336 to 15360
    Receive a packet (seq_num = 15360, ack_num = 25)
    Receive a packet (seq_num = 10240, ack_num = 26)
    Receive a packet (seq_num = 11264, ack_num = 27)
    Receive a packet (seq_num = 12288, ack_num = 28)
    Receive a packet (seq_num = 13312, ack_num = 29)
    Receive a packet (seq_num = 14336, ack_num = 29)
    Receive a packet (seq_num = 15360, ack_num = 30)
    Receive a packet (seq_num = 16384, ack_num = 31)
    Receive a packet (seq_num = 17408, ack_num = 32)
    Receive a packet (seq_num = 18432, ack_num = 33)
    Receive a packet (seq_num = 19456, ack_num = 34)
    Receive a packet (seq_num = 20480, ack_num = 35)
    Receive a packet (seq_num = 21504, ack_num = 36)
```

(Client 端)

```
cwnd = 8192, rwnd = 24577, threshold = 8192
    Send a packet at : 8192 byte
    Send a packet at : 9216 byte
    Send a packet at : 10240 byte
***Data loss at byte : 10240
    Send a packet at : 11264 byte
    Send a packet at : 12288 byte
***Data loss at byte : 12288
    Send a packet at : 13312 byte
    Send a packet at : 14336 byte
***Data loss at byte : 14336
    Send a packet at : 15360 byte
    Receive a packet (seq_num = 18, ack_num = 9216)
    Receive a packet (seq_num = 19, ack_num = 10240)
    Receive a packet (seq_num = 21, ack_num = 10240)
    Receive a packet (seq_num = 23, ack_num = 10240)
    Receive a packet (seq_num = 25, ack_num = 10240)
Received three duplicated ACKs.
*****Fast recovery*****
*****Congestion avoidance*****
cwnd = 4096, rwnd = 22529, threshold = 4096
    Send a packet at : 10240 byte
    Send a packet at : 11264 byte
    Send a packet at : 12288 byte
    Send a packet at : 13312 byte
    Receive a packet (seq_num = 26, ack_num = 12288)
    Receive a packet (seq_num = 27, ack_num = 12288)
    Receive a packet (seq_num = 28, ack_num = 14336)
cwnd = 4096, rwnd = 18433, threshold = 4096
    Send a packet at : 14336 byte
    Send a packet at : 15360 byte
    Send a packet at : 16384 byte
    Send a packet at : 17408 byte
    Receive a packet (seq_num = 29, ack_num = 14336)
    Receive a packet (seq_num = 29, ack_num = 15360)
    Receive a packet (seq_num = 30, ack_num = 16384)
    Receive a packet (seq_num = 31, ack_num = 17408)
```

(Server 端)

Step8:

```
~/Desktop/CSE/107-2/CN/2019電腦網路期末專案/client ➜ git ⌂ master ⌂ cat step_8
./client_8 127.0.0.1 9992 10000 -f 1.mp4 &
./client_8 127.0.0.1 9992 10001 -f 2.mp4 &
./client_8 127.0.0.1 9992 10002 -f 3.mp4 &
./client_8 127.0.0.1 9992 10003 -f 4.mp4 &
./client_8 127.0.0.1 9992 10004 -f 1.mp4 &
./client_8 127.0.0.1 9992 10005 -f 2.mp4 &
./client_8 127.0.0.1 9992 10006 -f 3.mp4 &
./client_8 127.0.0.1 9992 10007 -f 4.mp4 &
./client_8 127.0.0.1 9992 10008 -f 1.mp4 &
./client_8 127.0.0.1 9992 10009 -f 2.mp4 &
./client_8 127.0.0.1 9992 10010 -f 3.mp4 &
./client_8 127.0.0.1 9992 10011 -f 4.mp4 &
./client_8 127.0.0.1 9992 10012 -f 1.mp4 &
./client_8 127.0.0.1 9992 10013 -f 2.mp4 &
./client_8 127.0.0.1 9992 10014 -f 3.mp4 &
./client_8 127.0.0.1 9992 10015 -f 4.mp4 &
./client_8 127.0.0.1 9992 10016 -f 1.mp4 &
./client_8 127.0.0.1 9992 10017 -f 2.mp4 &
./client_8 127.0.0.1 9992 10018 -f 3.mp4 &
./client_8 127.0.0.1 9992 10019 -f 4.mp4 &
./client_8 127.0.0.1 9992 10020 -f 1.mp4 &
./client_8 127.0.0.1 9992 10021 -f 2.mp4 &
./client_8 127.0.0.1 9992 10022 -f 3.mp4 &
./client_8 127.0.0.1 9992 10023 -f 4.mp4 &
```

(20 Clients)