

**Language and Platform:** Python 3.7

## describing the program design

`server.py` includes

- part of Login
- most of commands function(BCM ATU SRS RDM OUT)
- basic web server function

`client.py` includes

- part of Login
- translate users' command into message, and send message to server.py
- TCP send & listen
- UDP send & listen, sending videos from client to client

### Login

- server receives ['LOG', username, password] from client,
  - 1, blocked user? -> 'Blocked'
  - 2, correct username and password -> 'Login success'
- put this user's information into `online_users[user1, user2, ...]`

```
user1: { "TCPsocket": ... , "Logintime": ... , "Ip": ... , "Port": ... , "Room" : }
```

(dictionary in dictionary)

- 3, wrong password - > count failed time, if failed fast in failed\_attempts\_times, then this is a blocked user

### BCM: Broadcast Messages

- server receives [BCM, text, clientname] from client,
- put text in a txt file `messageLog.txt`, and print text out

### ATU: Download Active Users

- print out `online_users`

### OUT: Log out

- remove user from `online_users`

### SRB : Separate Room Service: Create a room

- server receives ['SRB', usr1, usr2,... , hostuser] from client,
- Are other users exist in our credentials.txt or online\_users? Or, are these users already in an existed chat room?
- All clear, create a new room. Append usr123 and host to server's init dict `chat_rooms`, Yoda invite Obiwan and Gandalf into room 505, `chat_rooms={"Yoda, Obiwan, Gandalf": 505}`

### SRM: Separate Room Service: sending message

- Check whether roomID existed and requesting user exist in this room
- Create/read `SR_roomID_messageLog.txt`, put message text in this txt file

### RDM :Separate Room Service: Read Messages

- Command 'b' read `messageLog.txt`, command 's roomID' read `SR_roomID_messageLog.txt`

## P2P communication via UDP

hard to explain in English,  
please see my code in `client.py` and function `UDPListen` `UDPSend` (line 61-95)

## description of how my system works and the application layer message format

### start server & clients login

start server: `python3 server.py 4000 3` in server's terminal

client1 login: `python3 client.py 127.0.0.1 4000 8001`

client2 login: `python3 client.py 127.0.0.1 4000 8002`

### Login Successfully

```
z5318698@weill:~/yoda$ python3 client.py 127.0.0.1 4000 8001
1
Username:yoda
Password:wise@man
Welcome to Toom!
Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):[]

z5318698@weill:~/obiwan$ python3 client.py 127.0.0.1 4000 8002
2
Username:obiwan
Password:(jedimaster)
Welcome to Toom!
Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):[]

z5318698@weill:~/31as$ python3 server.py 4000 3
Server started! Port number: 4000, number of attempts: 3
```

### Fail to Login

obiwan enters wrong thing

```
TU, SRB, SRM, RDM, OUT):OUT
Bye, obiwan!

z5318698@weill:~/obiwan$ python3 client.py 127.0.0.1 4000 8009
Username:obiwan
Password:iamyourfather
Invalid Password. Please try again
Password:obiwan
Invalid Password. Please try again
Password:youshallnotpass
Invalid Password. Your account has been blocked. Please try again later
z5318698@weill:~/obiwan$ python3 client.py 127.0.0.1 4000 8009

obiwan : 1
obiwan : 2
obiwan : 3
obiwan : 1
obiwan : 2
obiwan : 3
[]
```

obiwan enters wrong password too many times, he is blocked.

```
z5318698@weill:~/obiwan$ python3 client.py
127.0.0.1 4000 8009
Username:obiwan
Password:aa
Invalid Password. Please try again
Password:bb
Invalid Password. Please try again
Password:cc
Invalid Password. Your account has been blo
cked. Please try again later
z5318698@weill:~/obiwan$ python3 client.py
127.0.0.1 4000 8009
Username:obiwan
Password:aa
Your account is blocked due to multiple log
in failures. Please try again later
z5318698@weill:~/obiwan$
```

BCM: Broadcast Messages

yoda terminal BCM Morning

<pre>z5318698@weill:~/yoda\$ python3 client.py 127.0.0.1 4000 800 1 Username:yoda Password:wise@!man Welcome to Toom! Enter one of the following commands (BCM, ATU, SRB, SRM, RD M, OUT):BCM Morning Broadcast message, #2 broadcast at 03 Aug 2022 23:25:03. Enter one of the following commands (BCM, ATU, SRB, SRM, RD M, OUT):[]</pre>	<pre>z5318698@weill:~/obiwan\$ python3 client.py 127.0.0.1 4000 800 2 Username:obiwan Password:(jedimaster) Welcome to Toom! Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):[]</pre>	<pre>z5318698@weill:~/31as\$ python3 server.py 4000 3 Server started! Port number: 4000, number of attempts: 3 yoda broadcasted BCM #1 "Hello" at 03 Aug 2022 23:23:32. yoda logout yoda broadcasted BCM #2 "Morning" at 03 Aug 2022 23:25:03. []</pre>
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ATU: Download Active Users

<pre>z5318698@weill:~/yoda\$ python3 client.py 1 27.0.0.1 4000 8008 Username:yoda Password:wise@!man Welcome to Toom! Enter one of the following command s (BCM, ATU, SRB, SRM, RD M, OUT):BCM Hel lo Error. Invalid command! Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):BCM Hello Broadcast message, #1 broadcast at 03 Aug 2022 19:05:00. Enter one of the following com M, OUT):[]</pre>	<pre>Connecting to cse... z5318698@weill:~/obiwan\$ z5318698@weill:~/obiwan\$ python3 client.py 127.0.0.1 4000 800 9 Username:obiwan Password:(jedimaster) Welcome to Toom! Enter one of the following commands (BCM, OUT):ATU yoda, 127.0.0.1, 55810, active since 03 Aug 2022 18:59:49 Enter one of the following comma TU, SRB, SRM, RDM, OUT):[]</pre>	<pre>Connecting to cse... z5318698@weill:~/obiwan\$ python3 server.py 4000 3 Server started! Port number: 4000, number of attempts: 3 yoda broadcasted BCM #1 "Hello" at 03 Aug 2022 19:05:00. obiwan issued ATU command Return messages: yoda, 127.0.0.1, 55810, active since 03 Au g 2022 18:59:49 []</pre>
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OUT: Log out

<pre>M, OUT):BCM Hel lo Error. Invalid command! Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):BCM Hello Broadcast message, #1 broadcast at 03 Aug 2022 19:05:00. Enter one of the following com M, OUT):OUT Bye, yoda! z5318698@weill:~/yoda\$ []</pre>	<pre>Welcome to Toom! Enter one of the following commands (BCM, OUT):ATU yoda, 127.0.0.1, 55810, active since 03 Aug 2022 18:59:49 Enter one of the following comma TU, SRB, SRM, RDM, OUT):OUT Bye, obiwan! z5318698@weill:~/obiwan\$</pre>	<pre>obiwan issued ATU command Return messages: yoda, 127.0.0.1, 55810, active since 03 Au g 2022 18:59:49 yoda logout obiwan logout []</pre>
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## SRS & RDM: Separate Room Service & Read Messages

(match the colour of text and square in screenshot)

yoda's command enter `SRB obiwan`, then in server's terminal shows a new chat room for yoda and obiwan, I set chat room number random, so room number is 256.

obiwan wants to create a chat room with yoda `SRB yoda`, but he fails, because this room already exist

yoda say hi to obiwan by entering `SRM 199 hi`, then server notices yoda's greeting

obiwan read message `RDM sRDM s 1 Jun 2022 16:00:00`

<pre>Connecting to cse... z5318698@weill:~/yoda\$ python3 client.py 1 127.0.0.1 4000 8001 Username:yoda Password:wise@!man Welcome to Toom! Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):SRB obiwan Separate chat room has been created, room ID: 256, users in this room:obiwan,yoda Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):SRM 256 hi Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):</pre>	<pre>Connecting to cse... z5318698@weill:~/obiwan\$ python3 client.py 127.0.0.1 4000 8002 Username:obiwan Password:(jedimaster) Welcome to Toom! Enter one of the following commands (BCM, A TU, SRB, SRM, RDM, OUT):SRB yoda a separate room (ID: 256) already created f or these users Enter one of the following commands (BCM, A TU, SRB, SRM, RDM, OUT):RDM s 1 Jun 2022 16 :00:00 1; 04 Aug 2022 19:12:00; yoda; hi Enter one of the following commands (BCM, A TU, SRB, SRM, RDM, OUT):</pre>	<pre>Connecting to cse... z5318698@weill:~/31as\$ python3 server.py 4 000 3 Server started! Port number: 4000, number of attempts: 3 yoda issued SRB command Return messages: Separate chat room has been created, room ID: 256, users in this room:obiwan,yoda yoda issued a message in separate room 256 : 1; 04 Aug 2022 19:12:00; yoda; hi RDM command issued from obiwan Return messages: 1; 04 Aug 2022 19:12:00; yoda; hi </pre>
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## P2P communication via UDP

yoda's terminal: `ATU`

<pre>z5318698@weill:~/yoda\$ python3 client.py 127.0.0.1 4000 8001 Username:yoda Password:wise@!man Welcome to Toom! Enter one of the following command , SRB, SRM, RDM, OUT):ATU obiwan, 127.0.0.1, 40078, active since 04 Aug 2022 17:36:13 gandalf, 127.0.0.1, 39286, active since 0 4 Aug 2022 17:37:55 Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):</pre>	<pre>z5318698@weill:~/obiwan\$ python3 client.py 127.0.0.1 4000 8002 Username:obiwan Password:(jedimaster) Welcome to Toom! Enter one of the following command SRB, SRM, RDM, OUT):</pre>	<pre>Connecting to cse... z5318698@weill:~/gandalf\$ python3 client.py 127.0.0.1 4000 8003 Username:gandalf Password:youshallnotpass Welcome to Toom! Enter one of the following command s (BCM, ATU, SRB, SRM, RDM, OUT):</pre>	<pre>z5318698@weill:~/31as\$ python3 server.py 4000 3 Server started! Port number: 4000, number of attempts: 3 yoda issued ATU command Return messages: obiwan, 127.0.0.1, 40078, active since 04 Aug 2022 17:36:13 gandalf, 127.0.0.1, 39286, active since 0 4 Aug 2022 17:37:55 </pre>
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video example1.mp4 only in yoda's file, not in obiwan's file

<pre>Music obiwan client.py credentials.txt server.py Pictures Public public_html Slippy Templates test03 test07 test09 Videos yoda client.py credentials.txt example1.mp4 server.py</pre>	<pre>PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER z5318698@weill:~/yoda\$ python3 cl ient.py 127.0.0.1 4000 8001 Username:yoda Password:wise@!man Welcome to Toom! Enter one of the following comman , SRB, SRM, RDM, OUT):ATU obiwan, 127.0.0.1, 40078, active since 04 Aug 2022 17:36:13 gandalf, 127.0.0.1, 39286, active since 04 Aug 2022 17:37:55 Enter one of the following comman ATU, SRB, SRM, RDM, OUT):</pre>	<pre>Connecting to cse... z5318698@weill:~/gandalf\$ python3 client.py 127.0.0.1 4000 8003 Username:gandalf Password:youshallnotpass Welcome to Toom! Enter one of the following command s (BCM, ATU, SRB, SRM, RDM, OUT):</pre>	<pre>z5318698@weill:~/31as\$ python3 se rver.py 4000 3 Server started! Port number: 4000 , number of attempts: 3 yoda issued ATU command Return messages: obiwan, 127.0.0.1, 40078, active since 04 Aug 2022 17:36:13 gandalf, 127.0.0.1, 39286, active since 04 Aug 2022 17:37:55 </pre>
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yoda want to send a video to obiwan via `UPD obiwan example1.mp4`

```
Invalid Password. Please try again
n
Password:yoda
Invalid Password. Please try again
n
Password:wise!man
Welcome to Toom!
Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT)
:ATU
obiwan, 127.0.0.1, 46448, active
since 04 Aug 2022 17:47:00
gandalf, 127.0.0.1, 46450, active
since 04 Aug 2022 17:47:12

Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT)
:UPD obiwan example1.mp4
Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT)
:example1.mp4 has uploaded
█

Connecting to cse...
z5318698@weill:~/obiwan$ python3 client.py 127.0.0.1 4000 8002
Username:obiwan
Password:(jedimaster)
Welcome to Toom!
Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):R
eceived example1.mp4 from yoda
█

Connecting to cse...
z5318698@weill:~/gandalf$ python3 client.py 127.0.0.1 4000 8003
Username:gandalf
Password:youshallnotpass
Welcome to Toom!
Enter one of the following commands (BCM, ATU, SRB, SRM, RDM, OUT):█

Connecting to cse...
z5318698@weill:~/31as$ python3 server.py 4000 3
Server started! Port number: 4000
, number of attempts: 3
yoda : 1
yoda : 2
yoda issued ATU command
Return messages:
obiwan, 127.0.0.1, 46448, active
since 04 Aug 2022 17:47:00
gandalf, 127.0.0.1, 46450, active
since 04 Aug 2022 17:47:12
█
```

obiwan got the video

```
Connecting to cse...
z5318698@weill:~/obiwan$ ls -al
total 220
drwxr-xr-x  2 z5318698 z5318698  4096 Aug  4 17:47 .
drwxr-x--x 45 z5318698 z5318698  4096 Aug  4 17:45 ..
-rw-rw-r--  1 z5318698 z5318698  4858 Aug  3 16:19 client.py
-rw-rw-r--  1 z5318698 z5318698   219 Aug  3 23:27 credentials.txt
-rw-r--r--  1 z5318698 z5318698 185695 Aug  4 17:47 example1.mp4
-rw-rw-r--  1 z5318698 z5318698  11037 Aug  3 19:32 server.py
z5318698@weill:~/obiwan$ █
```

**Describe possible improvements and extensions to your program and indicate how you could realise them.**

I think there could be an exit command for my `server.py`, if I try same server port for running two `server.py`, and sys would tell me 'Address already in use', but I don't know how to implement it. so, there should be some command input for `server.py`, like clear in Linux command or quit() in python.

I think my server command is not good. I hope it could like linux's terminal, enter(or return in mac's keyboard) means newline, not a command line, my enter means command, and it will show `Error: Invalid command`, although it still could work, it's not beautiful.

```
Enter one of the following commands (BCM, A
Error. Invalid command!
Enter one of the following commands (BCM, ATU
, SRB, SRM, RDM, OUT):█
```

My program could not deal with some error input, user should input right command.