

## Server listening for Clients

```
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming> cd Network_Programming_Hw/3
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming\Network_Programming_Hw\3> python server.py
2024-05-25 17:11:20,700 - INFO - SSL server listening on 127.0.0.1:65432
```

## Client connecting to Server.

Input for "python client.py" doesn't connect since cert.crt wasn't specified as the certificate we are going to trust.

Input for "python client.py -a cert.crt" connects to server.

```
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming> cd Network_Programming_Hw/3
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming\Network_Programming_Hw\3> python client.py
2024-05-25 17:11:57,371 - ERROR - SSL error: [SSL: CERTIFICATE_VERIFY_FAILED] certificate verify failed: self-signed certificate (_ssl.c:1000)
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming\Network_Programming_Hw\3> python client.py -a cert.crt
2024-05-25 17:12:00,248 - INFO - SSL connection established with server.
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:
```

```
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming> cd Network_Programming_Hw/3
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming\Network_Programming_Hw\3> python server.py
2024-05-25 17:11:20,700 - INFO - SSL server listening on 127.0.0.1:65432
Problems Alt+6 1:57,371 - ERROR - SSL error: [SSL: TLSV1_ALERT_UNKNOWN_CA] tls1 alert unknown ca (_ssl.c:1000)
2024-05-25 17:12:00,249 - INFO - Connected by ('127.0.0.1', 52507)
```

## Another client joining the server.

```
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming\Network_Programming_Hw\3> python client.py -a cert.crt
2024-05-25 17:15:55,479 - INFO - SSL connection established with server.
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:
```

```
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming\Network_Programming_Hw\3> python server.py
2024-05-25 17:11:20,700 - INFO - SSL server listening on 127.0.0.1:65432
2024-05-25 17:11:57,371 - ERROR - SSL error: [SSL: TLSV1_ALERT_UNKNOWN_CA] tls1 alert unknown ca (_ssl.c:1000)
2024-05-25 17:12:00,249 - INFO - Connected by ('127.0.0.1', 52507)
2024-05-25 17:15:55,480 - INFO - Connected by ('127.0.0.1', 52528)
```

If client enters "1" for singleplayer.

- Client failed to guess correct number. After all attempts are used, server prompts client to choose a gamemode again.

```
2024-05-25 17:12:00,248 - INFO - SSL connection established with server.
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:
1
Server: You have a total of 5 attempts. Enter 'exit' to prematurely leave the game. Guess a number between 1 to 10:
k
Server: Invalid input! Choose a number between 1 to 10 or type 'exit' to quit.
11
Server: Choose a number between 1 to 10! Guess again:
1
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
5
Server: Hint: You guessed too small! Guess again:
7
Server: Hint: You guessed too small! Guess again:
8
Server: Sorry, you've used all of your attempts!
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:

```

- Client got the correct number. Server, prompts client to choose a gamemode again.

```
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:
1
Server: You have a total of 5 attempts. Enter 'exit' to prematurely leave the game. Guess a number between 1 to 10:
5
Server: Congratulations, you did it!
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:

```

If client enters "2" for multiplayer.

- If there is only one client and the client fails, server immediately renews game.

```
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:
2
Server: Multi player game started! Each player has 5 attempts. Enter 'exit' to prematurely leave the game. Guess a number between 1 to 10:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Everyone has used all of their attempts without guessing the correct number!
Enter 'exit' to prematurely leave the game.
Starting a new game with a new number. All clients have 5 new attempts!
Guess a number between 1 to 10:

```

If there are more than one clients and all clients fails

- Below is an example of when a client fails and there are remaining clients that haven't used their attempts

```
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:
2
Server: Multi player game started! Each player has 5 attempts. Enter 'exit' to prematurely leave the game. Guess a number between 1 to 10:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Sorry, you've used all of your attempts!
3
Server: Sorry, you've used all of your attempts!

```

- Below is when there were 2 clients and the other used all its attempts, as shown in the previous image, and then below is where the other client used all its attempts as well. ("Everyone has used all of their attempts...")

```
Enter 'exit' to prematurely leave the game.
All clients have 5 new attempts! Guess a number between 1 to 10:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Everyone has used all of their attempts without guessing the correct number!
Enter 'exit' to prematurely leave the game.
Starting a new game with a new number. All clients have 5 new attempts!
Guess a number between 1 to 10:

```

```
Server: Congratulations, someone guessed the correct number! Starting a new game with a new number.
Enter 'exit' to prematurely leave the game.
All clients have 5 new attempts! Guess a number between 1 to 10:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Hint: You guessed too small! Guess again:
2
Server: Sorry, you've used all of your attempts!
3
Server: Sorry, you've used all of your attempts!
Server: Everyone has used all of their attempts without guessing the correct number!
Enter 'exit' to prematurely leave the game.
Starting a new game with a new number. All clients have 5 new attempts!
Guess a number between 1 to 10:

```

- Below is where one client has guessed the number correctly in a multiplayer game. The other clients receive a message that someone else has got the correct guess.

```
Enter 'exit' to prematurely leave the game.
All clients have 5 new attempts! Guess a number between 1 to 10:
3
Server: Hint: You guessed too small! Guess again:
7
Server: Hint: You guessed too small! Guess again:
9
Server: Hint: You guessed too high! Guess again:
8
Server: Congratulations, you did it! Starting a new game with a new number.
Enter 'exit' to prematurely leave the game.
All clients have 5 new attempts! Guess a number between 1 to 10:
█
```

```
Enter 'exit' to prematurely leave the game.
All clients have 5 new attempts! Guess a number between 1 to 10:
2
Server: Hint: You guessed too small! Guess again:
3
Server: Hint: You guessed too small! Guess again:
Server: Congratulations, someone guessed the correct number! Starting a new game with a new number.
Enter 'exit' to prematurely leave the game.
All clients have 5 new attempts! Guess a number between 1 to 10:
█
```

If client enters "exit" in multiplayer

```
Server: Congratulations, someone guessed the correct number! Starting a new game with a new number.
Enter 'exit' to prematurely leave the game.
All clients have 5 new attempts! Guess a number between 1 to 10:
exit
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:
█
```

If client enters "exit" in singleplayer

```
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:
1
Server: You have a total of 5 attempts. Enter 'exit' to prematurely leave the game. Guess a number between 1 to 10:
2
Server: Hint: You guessed too small! Guess again:
4
Server: Hint: You guessed too small! Guess again:
exit
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:
█
```

Logging of the connections and disconnections and infos of games and etc

```
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming\Network_Programming_Hw\3> python server.py
2024-05-25 17:34:22,048 - INFO - SSL server listening on 127.0.0.1:65432
2024-05-25 17:34:25,407 - INFO - Connected by ('127.0.0.1', 52651)
2024-05-25 17:34:25,820 - INFO - Multi player game session started.
2024-05-25 17:35:08,433 - INFO - Connected by ('127.0.0.1', 52666)
2024-05-25 17:35:08,832 - INFO - Multi player game session started.
2024-05-25 17:38:20,327 - INFO - Client chose to exit multiplayer session.
2024-05-25 17:38:20,327 - INFO - Multi player game session ended.
2024-05-25 17:38:35,504 - INFO - Single player game session started.
2024-05-25 17:38:35,979 - INFO - Single player game session ended.
2024-05-25 17:38:37,161 - INFO - Single player game session started.
2024-05-25 17:38:40,202 - INFO - Client chose to exit the single player game.
2024-05-25 17:38:40,203 - INFO - Single player game session ended.
█
```

Logging of client abrupt disconnections

```
2024-05-25 17:40:26,052 - INFO - Unexpected Error: Client disconnected unexpectedly.
2024-05-25 17:40:26,061 - INFO - Multi player game session ended.
2024-05-25 17:40:26,062 - ERROR - Error handling client: EOF occurred in violation of protocol (_ssl.c:2406)
█

2024-05-25 17:40:46,483 - INFO - Single player game session started.
2024-05-25 17:40:49,650 - INFO - Unexpected error: Client disconnected unexpectedly.
2024-05-25 17:40:49,651 - INFO - Single player game session ended.
2024-05-25 17:40:49,651 - ERROR - Error handling client: EOF occurred in violation of protocol (_ssl.c:2406)
█
```

If client enters "exit" in menu

```
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming\Network_Programming_Hw\3> python client.py -a cert.crt
2024-05-25 17:42:00,013 - INFO - SSL connection established with server.
Server: Choose game mode: '1' for single player, '2' for multi player, 'exit' to terminate:
exit
2024-05-25 17:42:01,214 - INFO - Connection closed.
(.venv) PS C:\Users\paran\PycharmProjects\NetworkProgramming\Network_Programming_Hw\3> █

2024-05-25 17:42:00,013 - INFO - Connected by ('127.0.0.1', 52700)
2024-05-25 17:42:01,212 - INFO - Client chose to exit. Closing connection between the client.
█
```

**server.py**

**determine\_response(guess, number)**

Function to return a response based on the relationship between the guess and the number.

**GameServer.\_\_init\_\_(self, host='127.0.0.1', port=65432, zmq\_pub\_port=5557)**

Method to initialize the game server with SSL context, ZeroMQ publisher socket, and various game-related attributes.

**GameServer.start(self)**

Method to start the SSL server, listen for incoming connections, and handle each connection in a new thread.

**GameServer.handle\_client(self, connection)**

Method to handle a client's connection, prompt the client to choose a game mode, and direct them to the appropriate game mode or exit.

**GameServer.single\_player\_game(self, connection)**

Method to handle a single-player game session, allowing the client to guess a number within a specified range and number of attempts.

**GameServer.multi\_player\_game(self, connection)**

Method to handle a multiplayer game session, allowing multiple clients to guess a shared number with their own attempts tracked individually.

**client.py**

**GameClient.\_\_init\_\_(self, server\_host='127.0.0.1', server\_port=65432, zmq\_pub\_port=5557, cafile=None)**

Method to initialize the game client with SSL context, ZeroMQ subscriber socket, and various connection-related attributes.

**GameClient.start(self)**

Method to start the SSL client, connect to the server, and start threads for receiving and sending messages.

**GameClient.listen\_for\_broadcasts(self)**

Method to listen for broadcast messages from the server using ZeroMQ and log them.

**GameClient.receive\_messages(self)**

Method to receive messages from the server, display them, and handle mode selection and game responses.

**GameClient.send\_messages(self)**

Method to send user input messages to the server, handle game interactions, and manage the connection lifecycle.

**GameClient.shutdown\_connection(self)**

Method to shutdown the client connection and clean up resources.