

# Test Report

## Test 1: Client registers user record and logs in

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
server is listening at ('localhost', 52987)  
new connection from ('127.0.0.1', 42398)  
received from ('127.0.0.1', 42398): REGISTER:vegnim:vegnim  
  
received from ('127.0.0.1', 42398): LOGIN:vegnim:vegnim  
  
[  
  
>_ user@sahara:~  
[user@sahara ~]$ python client.py localhost 52987  
connecting to server ('localhost', 52987)  
REGISTER  
Enter username: vegnim  
Enter password: vegnim  
received from ('localhost', 52987): REGISTER:ACKSTATUS:0  
  
Successfully created user account vegnim  
LOGIN  
Enter username: vegnim  
Enter password: vegnim  
received from ('localhost', 52987): LOGIN:ACKSTATUS:0  
  
Welcome vegnim  
[
```

## Test 2: Client registers a user record with a username already in use

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
server is listening at ('localhost', 52987)  
new connection from ('127.0.0.1', 35038)  
received from ('127.0.0.1', 35038): REGISTER:vegnim:a  
  
[  
  
>_ user@sahara:~  
[user@sahara ~]$ python client.py localhost 52987  
connecting to server ('localhost', 52987)  
REGISTER  
Enter username: vegnim  
Enter password: a  
received from ('localhost', 52987): REGISTER:ACKSTATUS:1  
  
Error: User vegnim already exists  
[
```

## Test 3: Client logs in

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
server is listening at ('localhost', 52987)  
new connection from ('127.0.0.1', 37786)  
received from ('127.0.0.1', 37786): LOGIN:vegnim:vegnim  
  
[  
  
>_ user@sahara:~  
[user@sahara ~]$ python client.py localhost 52987  
connecting to server ('localhost', 52987)  
LOGIN  
Enter username: vegnim  
Enter password: vegnim  
received from ('localhost', 52987): LOGIN:ACKSTATUS:0  
  
Welcome vegnim  
[
```

## Test 4: Client attempts to log in with a non-existent username

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
server is listening at ('localhost', 52987)  
new connection from ('127.0.0.1', 54748)  
received from ('127.0.0.1', 54748): LOGIN:unreal-username:a  
  
[  
  
>_ user@sahara:~  
[user@sahara ~]$ python client.py localhost 52987  
connecting to server ('localhost', 52987)  
LOGIN  
Enter username: unreal-username  
Enter password: a  
received from ('localhost', 52987): LOGIN:ACKSTATUS:1  
  
Error: User unreal-username not found  
[
```

## Test 5: Client attempts to log in with incorrect password

```
>_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 46924)
received from ('127.0.0.1', 46924): LOGIN:vegnim:a

>_ user@sahara:~
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: a
received from ('localhost', 52987): LOGIN:ACKSTATUS:2
Error: Wrong password for user vegnim
```

## Test 6: Client logs in and views the available room list as a player

Another client has already logged in and created a room

```
>_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 32862)
new connection from ('127.0.0.1', 32872)
received from ('127.0.0.1', 32872): LOGIN:outsider:a

received from ('127.0.0.1', 32872): CREATE:outsider-room

received from ('127.0.0.1', 32862): LOGIN:vegnim:vegnim

received from ('127.0.0.1', 32862): ROOMLIST:PLAYER

>_ user@sahara:~
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
ROOMLIST
Do you want to have a room list as player or viewer? (Player/Viewer) player
received from ('localhost', 52987): ROOMLIST:ACKSTATUS:0:outsider-room

Room available to join as PLAYER: outsider-room
```

## Test 7: Client logs in and views the available room list as both a player and a viewer

Two other clients have logged in and were having a match

```
>_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 41320)
received from ('127.0.0.1', 41320): LOGIN:outsider1:a

received from ('127.0.0.1', 41320): CREATE:outsider-room

new connection from ('127.0.0.1', 39924)
received from ('127.0.0.1', 39924): LOGIN:outsider2:a

received from ('127.0.0.1', 39924): JOIN:outsider-room:PLAYER

new connection from ('127.0.0.1', 51642)
received from ('127.0.0.1', 51642): LOGIN:vegnim:vegnim

received from ('127.0.0.1', 51642): ROOMLIST:PLAYER

received from ('127.0.0.1', 51642): ROOMLIST:VIEWER

>_ user@sahara:~
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
ROOMLIST
Do you want to have a room list as player or viewer? (Player/Viewer) player
received from ('localhost', 52987): ROOMLIST:ACKSTATUS:0:outsider-room

Room available to join as PLAYER:

ROOMLIST
Do you want to have a room list as player or viewer? (Player/Viewer) viewer
received from ('localhost', 52987): ROOMLIST:ACKSTATUS:0:outsider-room

Room available to join as VIEWER: outsider-room
```

## Test 8: Client enters invalid input for ROOMLIST

```
>_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 33566)
received from ('127.0.0.1', 33566): LOGIN:vegnim:vegnim
received from ('127.0.0.1', 33566): ROOMLIST:PLAYER
█

>_ user@sahara:~
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
ROOMLIST
Do you want to have a room list as player or viewer? (Player/Viewer) a
Unknown input.
Do you want to have a room list as player or viewer? (Player/Viewer) b
Unknown input.
Do you want to have a room list as player or viewer? (Player/Viewer) pla yer
Unknown input.
Do you want to have a room list as player or viewer? (Player/Viewer)  player
Unknown input.
Do you want to have a room list as player or viewer? (Player/Viewer) player
received from ('localhost', 52987): ROOMLIST:ACKSTATUS:0

Room available to join as PLAYER:
█
```

## Test 9: Client logs in and creates a room (implicitly joining the room)

```
>_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 47178)
received from ('127.0.0.1', 47178): LOGIN:vegnim:vegnim
received from ('127.0.0.1', 47178): CREATE:my-room
█

>_ user@sahara:~
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
CREATE
Enter room name you want to create: my-room
received from ('localhost', 52987): CREATE:ACKSTATUS:0

Successfully created room my-room
Waiting for other player...
█
```

## Test 10: Client logs in and joins an existing room as a player

Another client has already logged in and created a room

```
>_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 38642)
received from ('127.0.0.1', 38642): LOGIN:outsider:a
received from ('127.0.0.1', 38642): CREATE:outsider-room

new connection from ('127.0.0.1', 42840)
received from ('127.0.0.1', 42840): LOGIN:vegnim:vegnim
received from ('127.0.0.1', 42840): JOIN:outsider-room:PLAYER
█

>_ user@sahara:~
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
JOIN
Enter room name you want to join: outsider-room
You wish to join the room as: (Player/Viewer) player
received from ('localhost', 52987): JOIN:ACKSTATUS:0

Successfully joined room outsider-room as a PLAYER
Waiting for other player...
received from ('localhost', 52987): BEGIN:outsider:vegnim

match between outsider and vegnim will commence, it is currently outsider's turn.
█
```

### Test 11: Client logs in and joins an existing room as a viewer (room has 1 player)

```
>_user@sahara:-
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 53512)
received from ('127.0.0.1', 53512): LOGIN:outsider:a

Received from ('127.0.0.1', 53512): CREATE:outsider-room

new connection from ('127.0.0.1', 41526)
received from ('127.0.0.1', 41526): LOGIN:vegnim:vegnim

received from ('127.0.0.1', 41526): JOIN:outsider-room:VIEWER

new connection from ('127.0.0.1', 55394)
received from ('127.0.0.1', 55394): LOGIN:outsider1:a

received from ('127.0.0.1', 55394): JOIN:outsider-room:PLAYER

[

>_user@sahara:-
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
JOIN
Enter room name you want to join: outsider-room
You wish to join the room as: (Player/Viewer) viewer
received from ('localhost', 52987): JOIN:ACKSTATUS:0

Successfully joined room outsider-room as a VIEWER
Waiting for other player...
received from ('localhost', 52987): BEGIN:outsider:outsider1

match between outsider and outsider1 will commence, it is currently outsider's turn.

[
```

## Test 12: Client creates a room with invalid name

```

>_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 36642)
received from ('127.0.0.1', 36642): LOGIN:vegmim:vegmim

received from ('127.0.0.1', 36642): CREATE:!@#$%^&*(


```

### Test 13: Client creates a room with an already used name

```
_ user@sahara:-
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 46254)
new connection from ('127.0.0.1', 47040)
received from ('127.0.0.1', 47040): LOGIN:outsider:a

received from ('127.0.0.1', 47040): CREATE:my-room

received from ('127.0.0.1', 46254): LOGIN:vegnim:vegnim

received from ('127.0.0.1', 46254): CREATE:my-room

_

_ user@sahara:-
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
CREATE
Enter room name you want to create: my-room
received from ('localhost', 52987): CREATE:ACKSTATUS:2

Error: Room my-room already exists

_
```

### Test 14: Client creates a room, but the number of rooms has reached the limit

To recreate this scenario conveniently, I have temporarily changed the limit of the number of rooms to 1.

```

┌_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 48318)
new connection from ('127.0.0.1', 48334)
received from ('127.0.0.1', 48318): LOGIN:outsider:a
...
received from ('127.0.0.1', 48318): CREATE:room1
...
received from ('127.0.0.1', 48334): LOGIN:vegnim:vegnim
...
received from ('127.0.0.1', 48334): CREATE:my-room
└_

┌_ user@sahara:~
┌_ user@sahara:~
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
CREATE
Enter room name you want to create: my-room
received from ('localhost', 52987): CREATE:ACKSTATUS:3

Error: Server already contains a maximum of 256 rooms
└_

```

## Test 15: Client joins a non-existent room

```

┌_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 59218)
received from ('127.0.0.1', 59218): LOGIN:vegnim:vegnim
...
received from ('127.0.0.1', 59218): JOIN:unreal-room:PLAYER
└_

┌_ user@sahara:~
┌_ user@sahara:~
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
JOIN
Enter room name you want to join: unreal-room
You wish to join the room as: (Player/Viewer) player
received from ('localhost', 52987): JOIN:ACKSTATUS:1

Error: No room named unreal-room
└_

```

## Test 16: Client joins a room as a player but the room already has 2 players

```

┌_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 59218)
received from ('127.0.0.1', 59218): LOGIN:vegnim:vegnim
...
received from ('127.0.0.1', 59218): JOIN:unreal-room:PLAYER
disconnection from ('127.0.0.1', 59218)
new connection from ('127.0.0.1', 57344)
new connection from ('127.0.0.1', 40034)
received from ('127.0.0.1', 57344): LOGIN:outsider1:a
...
received from ('127.0.0.1', 57344): CREATE:outsider-room
...
received from ('127.0.0.1', 40034): LOGIN:outsider2:a
...
received from ('127.0.0.1', 40034): JOIN:outsider-room:PLAYER
new connection from ('127.0.0.1', 38946)
received from ('127.0.0.1', 38946): LOGIN:vegnim:vegnim
received from ('127.0.0.1', 38946): JOIN:outsider-room:PLAYER
└_

┌_ user@sahara:~
┌_ user@sahara:~
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
JOIN
Enter room name you want to join: outsider-room
You wish to join the room as: (Player/Viewer) player
received from ('localhost', 52987): JOIN:ACKSTATUS:2

Error: The room outsider-room already has 2 players
└_

```

## Test 17: Client creates a room, plays against an opponent, and wins

```
>_ user@sahara:~
[user@sahara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 49244)
received from ('127.0.0.1', 49244): LOGIN:vegnim:vegnim

new connection from ('127.0.0.1', 49250)
received from ('127.0.0.1', 49250): LOGIN:outsider:a

received from ('127.0.0.1', 49244): CREATE:my-room

received from ('127.0.0.1', 49250): JOIN:my-room:PLAYER

received from ('127.0.0.1', 49244): PLACE:0:0

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 49250): PLACE:0:1

sending BOARDSTATUS message, the next turn player is vegnim
received from ('127.0.0.1', 49244): PLACE:1:0

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 49250): PLACE:1:1

sending BOARDSTATUS message, the next turn player is vegnim
received from ('127.0.0.1', 49244): PLACE:2:0

>_ user@sahara:~
[user@sahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
CREATE
Enter room name you want to create: my-room
received from ('localhost', 52987): CREATE:ACKSTATUS:0

Successfully created room my-room
Waiting for other player...
received from ('localhost', 52987): BEGIN:vegnim:outsider

match between vegnim and outsider will commence, it is currently vegnim's turn.
PLACE
Column: -
(Column/Row) values must be an integer between 0 and 2
Column: 0
Row: 0
received from ('localhost', 52987): BOARDSTATUS:100000000

-----
| X | | |
-----
| | | |
-----

It is the opposing player's turn
received from ('localhost', 52987): BOARDSTATUS:100200000

-----
| X | | |
-----
| 0 | | |
-----
| | | |
-----

It is the current player's turn
PLACE
Column: 1
Row: 0
received from ('localhost', 52987): BOARDSTATUS:110200000

-----
| X | X | |
-----
| 0 | | |
-----
| | | |
-----

It is the opposing player's turn
received from ('localhost', 52987): BOARDSTATUS:110220000

-----
| X | X | |
-----
| 0 | 0 | |
-----
| | | |
-----

It is the current player's turn
PLACE
Column: 2
Row: 0
received from ('localhost', 52987): GAMEEND:111220000:0:vegnim

-----
| X | X | X |
-----
| 0 | 0 | |
-----
| | | |
-----

Congratulations, you won!
```

# Test 18: Client creates a room, plays against an opponent, and loses

```
>_ user@bahara-
[user@bahara ~]$ python server.py server.config.json
server is listening at ('localhost', 52987)
now connection from ('127.0.0.1', 55518)
received from ('127.0.0.1', 55518): LOGIN:vegnie:vegnie
received from ('127.0.0.1', 55518): CREATE:my-room

now connection from ('127.0.0.1', 52132)
received from ('127.0.0.1', 52132): LOGIN:outsider:a
received from ('127.0.0.1', 52132): JOIN:my-room:PLAYER

received from ('127.0.0.1', 55518): PLACE:0:0
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 52132): PLACE:0:1
sending BOARDSTATUS message, the next turn player is vegnie
received from ('127.0.0.1', 55518): PLACE:0:2
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 52132): PLACE:1:1
sending BOARDSTATUS message, the next turn player is vegnie
received from ('127.0.0.1', 55518): PLACE:1:0
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 52132): PLACE:2:1
[]

>_ user@bahara-
[user@bahara ~]$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnie
Enter password: vegnie
received from ('localhost', 52987): LOGIN:ACKSTATUS:0
Welcome vegnie
CREATE
Enter room name you want to create: my-room
received from ('localhost', 52987): CREATE:ACKSTATUS:0
Successfully created room my-room
Waiting for other player...
received from ('localhost', 52987): BEGIN:vegnie:outsider
match between vegnie and outsider will commence, it is currently vegnie's turn.
PLACE
Column: 0
Row: 0
received from ('localhost', 52987): BOARDSTATUS:180000000
-----
|X| | |
-----
| | | |
-----
| | | |
-----
| | | |
-----
It is the opposing player's turn
received from ('localhost', 52987): BOARDSTATUS:180200000
-----
|X| | |
-----
|O| | |
-----
| | | |
-----
It is the current player's turn
PLACE
Column: 0
Row: 2
received from ('localhost', 52987): BOARDSTATUS:180200100
-----
|X| | |
-----
|O| | |
-----
|X| | |
-----
It is the current player's turn
PLACE
Column: 1
Row: 0
received from ('localhost', 52987): BOARDSTATUS:180220100
-----
|X|X| |
-----
|O|O| |
-----
|X| | |
-----
It is the opposing player's turn
received from ('localhost', 52987): GAMEEND:110222100:0:outsider
-----
|X|X| |
-----
|O|O|O|
-----
|X| | |
-----
Sorry you lost. Good luck next time.
```



### Test 19: Client plays against an opponent and draws

```
> .\server.py
sending BOARDSTATUS message, the next turn player is outsider
[user@shura ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 44694)
received from ('127.0.0.1', 44694): LOGIN:vegnin:vegnin
received from ('127.0.0.1', 44694): CREATE:my-room
new connection from ('127.0.0.1', 47866)
received from ('127.0.0.1', 47866): LOGIN:outsider:is
received from ('127.0.0.1', 47866): JOIN:my-room:PLAYER
received from ('127.0.0.1', 44694): PLACE:1:1
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:0:0
sending BOARDSTATUS message, the next turn player is vegnin
received from ('127.0.0.1', 44694): PLACE:2:0
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:0:2
sending BOARDSTATUS message, the next turn player is vegnin
received from ('127.0.0.1', 44694): PLACE:0:1
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:1:2
sending BOARDSTATUS message, the next turn player is vegnin
received from ('127.0.0.1', 44694): PLACE:2:2
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:2:1
sending BOARDSTATUS message, the next turn player is vegnin
received from ('127.0.0.1', 44694): PLACE:1:0
It is the current player's turn
```

```

~/sshare-
sending BOARDSTATUS message, the next turn player is outsider
[user@kulara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 44094)
received from ('127.0.0.1', 44094): LOGIN:vegnia:vegnia

received from ('127.0.0.1', 44094): CREATE:my-room

new connection from ('127.0.0.1', 47866)
received from ('127.0.0.1', 47866): LOGIN:outsider:is

received from ('127.0.0.1', 47866): JOIN:my-room:PLAYER

received from ('127.0.0.1', 44094): PLACE:1:1

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:0:0

sending BOARDSTATUS message, the next turn player is vegnia
received from ('127.0.0.1', 44094): PLACE:2:0

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:0:2

sending BOARDSTATUS message, the next turn player is vegnia
received from ('127.0.0.1', 44094): PLACE:0:1

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:1:2

sending BOARDSTATUS message, the next turn player is vegnia
received from ('127.0.0.1', 44094): PLACE:2:2

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:2:1

sending BOARDSTATUS message, the next turn player is vegnia
received from ('127.0.0.1', 44094): PLACE:1:0

```

```
> .\user@kubara-
sending BOARDSTATUS message, the next turn player is outsider
[user@kubara ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 44694)
received from ('127.0.0.1', 44694): LOGIN:vegnia:vegnia

received from ('127.0.0.1', 44694): CREATE:my-room

new connection from ('127.0.0.1', 47866)
received from ('127.0.0.1', 47866): LOGIN:outsideris

received from ('127.0.0.1', 47866): JOIN:my-room:PLAYER

received from ('127.0.0.1', 44694): PLACE:1:1

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:0:0

sending BOARDSTATUS message, the next turn player is vegnia
received from ('127.0.0.1', 44694): PLACE:2:0

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:0:2

sending BOARDSTATUS message, the next turn player is vegnia
received from ('127.0.0.1', 44694): PLACE:0:1

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:1:2

sending BOARDSTATUS message, the next turn player is vegnia
received from ('127.0.0.1', 44694): PLACE:2:2

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:2:1

sending BOARDSTATUS message, the next turn player is vegnia
received from ('127.0.0.1', 44694): PLACE:1:0
```



```
>_ user@sahara-
sending BOARDSTATUS message, the next turn player is outsider
[user@sahara: ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 44694): LOGIN:vegnie:vegnie
received from ('127.0.0.1', 44694): LOGIN:vegnie:vegnie
received from ('127.0.0.1', 44694): CREATE:my-room
new connection from ('127.0.0.1', 47866)
received from ('127.0.0.1', 47866): LOGIN:outsideria
received from ('127.0.0.1', 47866): JOIN:my-room:PLAYER
received from ('127.0.0.1', 44694): PLACE:1:1
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:0:0
sending BOARDSTATUS message, the next turn player is vegnie
received from ('127.0.0.1', 44694): PLACE:2:0
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:0:2
sending BOARDSTATUS message, the next turn player is vegnie
received from ('127.0.0.1', 44694): PLACE:0:1
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:1:2
sending BOARDSTATUS message, the next turn player is vegnie
received from ('127.0.0.1', 44694): PLACE:2:2
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 47866): PLACE:2:1
sending BOARDSTATUS message, the next turn player is vegnie
received from ('127.0.0.1', 44694): PLACE:1:0

>_ user@sahara-
| 0 | 0 | |
-----
It is the current player's turn
PLACE
Column: 2
Row: 2
received from ('localhost', 52987): BOARDSTATUS:20110221
| 0 | | X |
-----
| X | X | |
-----
| 0 | 0 | X |
-----
It is the opposing player's turn
received from ('localhost', 52987): BOARDSTATUS:201112221
| 0 | | X |
-----
| X | X | 0 |
-----
| 0 | 0 | X |
-----
It is the current player's turn
PLACE
Column: 1
Row: 0
received from ('localhost', 52987): GAMEEND:211112221:1
| 0 | X | X |
-----
| X | X | 0 |
-----
| 0 | 0 | X |
-----
Game ended in a draw
```

## Test 20: Client plays against an opponent and forfeits

```
>_ user@sahara-
[user@sahara: ~]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 42142): LOGIN:vegnie:vegnie
received from ('127.0.0.1', 42142): LOGIN:vegnie:vegnie
received from ('127.0.0.1', 42142): CREATE:my-room
new connection from ('127.0.0.1', 39978)
received from ('127.0.0.1', 39978): LOGIN:outsideria
received from ('127.0.0.1', 39978): JOIN:my-room:PLAYER
received from ('127.0.0.1', 42142): PLACE:0:0
sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 39978): PLACE:1:1
sending BOARDSTATUS message, the next turn player is vegnie
received from ('127.0.0.1', 42142): FORFEIT

>_ user@sahara-
Welcome vegnie
CREATE
Enter room name you want to create: my-room
received from ('localhost', 52987): CREATE:ACKSTATUS:0
Successfully created room my-room
Waiting for other player...
received from ('localhost', 52987): BEGIN:vegnie:outsider
match between vegnie and outsider will commence, it is currently vegnie's turn.
PLACE
Column: 0
Row: 0
received from ('localhost', 52987): BOARDSTATUS:100000000
| X | | |
-----
| | | |
-----
| | | |
-----
It is the opposing player's turn
received from ('localhost', 52987): BOARDSTATUS:100020000
| X | | |
-----
| | 0 | |
-----
| | | |
-----
It is the current player's turn
FORFEIT
received from ('localhost', 52987): GAMEEND:100020000:2:outsider
| X | | |
-----
| | 0 | |
-----
| | | |
-----
outsider won due to the opposing player forfeiting
```

## Test 21: Client plays against an opponent and the opponent forfeits

```
>_ user@sahara:~$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 56716)
received from ('127.0.0.1', 56716): LOGIN:vegnim:vegnim

received from ('127.0.0.1', 56716): CREATE:my-room

new connection from ('127.0.0.1', 54882)
received from ('127.0.0.1', 54882): LOGIN:outsider:a

received from ('127.0.0.1', 54882): JOIN:my-room:PLAYER

received from ('127.0.0.1', 56716): PLACE:0:0

sending BOARDSTATUS message, the next turn player is outsider
received from ('127.0.0.1', 54882): FORFEIT
```

```
>_ user@sahara:~$ python server.py server_config.json
Enter username: vegnim
Enter password: vegnim
received from ('localhost', 52987): LOGIN:ACKSTATUS:0

Welcome vegnim
CREATE
Enter room name you want to create: my-room
received from ('localhost', 52987): CREATE:ACKSTATUS:0

Successfully created room my-room
Waiting for other player...
received from ('localhost', 52987): BEGIN:vegnim:outsider

match between vegnim and outsider will commence, it is currently vegnim's turn.
PLACE
Column: 0
Row: 0
received from ('localhost', 52987): BOARDSTATUS:1000000000

-----
| X | | |
-----
| | | |
-----
| | | |
-----
It is the opposing player's turn
received from ('localhost', 52987): GAMEEND:100000000:2:vegnim

-----
| X | | |
-----
| | | |
-----
| | | |
-----
vegnim won due to the opposing player forfeiting
```

## Test 22: Client plays against an opponent and the opponent disconnects from the server

```
>_ user@sahara:~$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 55060)
received from ('127.0.0.1', 55060): LOGIN:vegnim:vegnim

received from ('127.0.0.1', 55060): CREATE:my-room

new connection from ('127.0.0.1', 51060)
received from ('127.0.0.1', 51060): LOGIN:outsider:a

received from ('127.0.0.1', 51060): JOIN:my-room:PLAYER

received from ('127.0.0.1', 55060): PLACE:0:0

sending BOARDSTATUS message, the next turn player is outsider
disconnection from ('127.0.0.1', 51060)
```

```
>_ user@sahara:~$ python server.py server_config.json
Welcome vegnim
CREATE
Enter room name you want to create: my-room
received from ('localhost', 52987): CREATE:ACKSTATUS:0

Successfully created room my-room
Waiting for other player...
received from ('localhost', 52987): BEGIN:vegnim:outsider

match between vegnim and outsider will commence, it is currently vegnim's turn.
PLACE
Column: 0
Row: 0
received from ('localhost', 52987): BOARDSTATUS:1000000000

-----
| X | | |
-----
| | | |
-----
| | | |
-----
It is the opposing player's turn
received from ('localhost', 52987): GAMEEND:100000000:2:vegnim

-----
| X | | |
-----
| | | |
-----
| | | |
-----
vegnim won due to the opposing player forfeiting
```

# Test 23: Client views a game from the beginning until one player wins

```
>_ user@bahara:~$ python server.py server.config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 45268)
new connection from ('127.0.0.1', 58488)
new connection from ('127.0.0.1', 58424)
received from ('127.0.0.1', 58488): LOGIN:outsider1:a
received from ('127.0.0.1', 58488): CREATE:outsider-room
received from ('127.0.0.1', 45268): LOGIN:vegnin:vegnin
received from ('127.0.0.1', 45268): JOIN:outsider-room:VIEWER
received from ('127.0.0.1', 58424): LOGIN:outsider2:a
received from ('127.0.0.1', 58424): JOIN:outsider-room:PLAYER
received from ('127.0.0.1', 58488): PLACE:0:0
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 58424): PLACE:0:1
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 58488): PLACE:1:0
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 58424): PLACE:1:1
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 58488): PLACE:2:0
[]

>_ user@bahara:~$ python server.py server.config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 45268)
new connection from ('127.0.0.1', 58488)
new connection from ('127.0.0.1', 58424)
received from ('127.0.0.1', 58488): LOGIN:outsider1:a
received from ('127.0.0.1', 58488): CREATE:outsider-room
received from ('127.0.0.1', 45268): LOGIN:vegnin:vegnin
received from ('127.0.0.1', 45268): JOIN:outsider-room:VIEWER
received from ('127.0.0.1', 58424): LOGIN:outsider2:a
received from ('127.0.0.1', 58424): JOIN:outsider-room:PLAYER
received from ('127.0.0.1', 58488): PLACE:0:0
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 58424): PLACE:0:1
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 58488): PLACE:1:0
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 58424): PLACE:1:1
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 58488): PLACE:2:0
[]

Welcome vegnin
JOIN
Enter room name you want to join: outsider-room
You wish to join the room as (Player/Viewer) viewer
received from ('localhost', 52987): JOIN:ACK:1AUS0:0
Successfully joined room outsider-room as a VIEWER
Waiting for other player...
received from ('localhost', 52987): BEGIN:outsider1:outsider2
match between outsider1 and outsider2 will commence, it is currently outsider1's turn.
received from ('localhost', 52987): BOARDSTATUS:100000000
-----
| X | | |
| | | |
| | | |
| | | |
-----
It is outsider1's turn
received from ('localhost', 52987): BOARDSTATUS:100200000
-----
| X | | |
| 0 | | |
| | | |
| | | |
-----
It is outsider2's turn
received from ('localhost', 52987): BOARDSTATUS:110200000
-----
| X | X | |
| 0 | | |
| | | |
| | | |
-----
It is outsider1's turn
received from ('localhost', 52987): BOARDSTATUS:110220000
-----
| X | X | |
| 0 | 0 | |
| | | |
| | | |
-----
It is outsider2's turn
received from ('localhost', 52987): GAMEEND:113220000:0:outsider1
outsider1 has won this game
-----
```

## Test 24: Client starts viewing a game mid-match until one player wins

```
> _ user@ubuntu:~$ python server.py server_config.json
server is listening at ('localhost', 52087)
new connection from ('127.0.0.1', 35964)
new connection from ('127.0.0.1', 54080)
new connection from ('127.0.0.1', 54094)
received from ('127.0.0.1', 54080): LOGIN:outsider1:a
received from ('127.0.0.1', 54080): CREATE:outsider-room
received from ('127.0.0.1', 54094): LOGIN:outsider2:a
received from ('127.0.0.1', 54094): JOIN:outsider-room:PLAYER
received from ('127.0.0.1', 54080): PLACE:0:0
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 54094): PLACE:0:1
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 35964): LOGIN:vegnin:vegnin
received from ('127.0.0.1', 35964): JOIN:outsider-room:VIEWER
received from ('127.0.0.1', 54080): PLACE:1:0
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 54094): PLACE:1:1
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 54080): PLACE:2:0
[

> _ user@ubuntu:~$ python server.py server_config.json
Enter username: vegnin
Enter password: vegnin
received from ('localhost', 52087): LOGIN:ACKSTATUS:0
Welcome vegnin
JOIN
Enter room name you want to join: outsider-room
You wish to join the room as: (Player/Viewer) viewer
received from ('localhost', 52087): JOIN:ACKSTATUS:0
Successfully joined room outsider-room as a VIEWER
Waiting for other player...
received from ('localhost', 52087): INPROGRESS:outsider1:outsider2
Match between outsider1 and outsider2 is currently in progress, it is outsider1's turn
received from ('localhost', 52087): BOARDSTATUS:11020000
-----
| X | X | |
|---|---|
| 0 | 1 | |
|---|---|
| 1 | 1 | |
|---|---|
It is outsider2's turn
received from ('localhost', 52087): BOARDSTATUS:11020000
-----
| X | X | |
|---|---|
| 0 | 0 | |
|---|---|
| 1 | 1 | |
|---|---|
It is outsider1's turn
received from ('localhost', 52087): GAMEEND:111220000:0:outsider1
outsider1 has won this game
[
```

## Test 25: Client views a game from the beginning until the players draw

```
> _ user@ubuntu:~$ python server.py server_config.json
server is listening at ('localhost', 52087)
new connection from ('127.0.0.1', 34064)
new connection from ('127.0.0.1', 55790)
new connection from ('127.0.0.1', 48702)
received from ('127.0.0.1', 55790): LOGIN:outsider1:a
received from ('127.0.0.1', 55790): CREATE:outsider-room
received from ('127.0.0.1', 54084): LOGIN:vegnin:vegnin
received from ('127.0.0.1', 54084): JOIN:outsider-room:VIEWER
received from ('127.0.0.1', 48702): LOGIN:outsider2:a
received from ('127.0.0.1', 48702): JOIN:outsider-room:PLAYER
received from ('127.0.0.1', 55790): PLACE:1:1
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 48702): PLACE:0:0
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 55790): PLACE:2:0
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 48702): PLACE:0:2
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 55790): PLACE:0:1
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 48702): PLACE:2:1
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 55790): PLACE:1:2
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 48702): PLACE:1:0
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 48702): PLACE:2:2
[

> _ user@ubuntu:~$ python server.py server_config.json
Welcome vegnin
JOIN
Enter room name you want to join: outsider-room
You wish to join the room as: (Player/Viewer) viewer
received from ('localhost', 52087): JOIN:ACKSTATUS:0
Successfully joined room outsider-room as a VIEWER
Waiting for other player...
received from ('localhost', 52087): BEGIN:outsider1:outsider2
match between outsider1 and outsider2 will commence, it is currently outsider1's turn.
received from ('localhost', 52087): BOARDSTATUS:000010000
-----
| 1 | 1 | |
|---|---|
| 1 | X | |
|---|---|
| 1 | 1 | |
|---|---|
It is outsider1's turn
received from ('localhost', 52087): BOARDSTATUS:200010000
-----
| 0 | 1 | |
|---|---|
| 1 | X | |
|---|---|
| 1 | 1 | |
|---|---|
It is outsider2's turn
received from ('localhost', 52087): BOARDSTATUS:201010000
-----
| 0 | 1 | X |
|---|---|
| 1 | X | |
|---|---|
| 1 | 1 | |
|---|---|
It is outsider1's turn
received from ('localhost', 52087): BOARDSTATUS:201010200
-----
| 0 | 1 | X |
|---|---|
[
```

0 | x |  


---

```

[
| 0 | x | 0 |
-----
Game ended in a draw

```

# Test 26: Client starts viewing a game mid-match until the players draw

```
> user@bahar:~$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 53374)
new connection from ('127.0.0.1', 53378)
new connection from ('127.0.0.1', 53384)
received from ('127.0.0.1', 53378): LOGIN[outsider1]
received from ('127.0.0.1', 53378): CREATE[outsider-room]
received from ('127.0.0.1', 53384): LOGIN[outsider2]
received from ('127.0.0.1', 53384): JOIN[outsider-room:PLAYER]
received from ('127.0.0.1', 53378): PLACE[0:0]
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 53384): PLACE[1:1]
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 53374): LOGIN[vegnin]
received from ('127.0.0.1', 53374): JOIN[outsider-room:VIEWER]
received from ('127.0.0.1', 53378): PLACE[2:0]
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 53384): PLACE[1:0]
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 53378): PLACE[1:2]
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 53384): PLACE[0:1]
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 53378): PLACE[2:1]
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 53384): PLACE[2:2]
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 53378): PLACE[0:2]
```

```
> user@bahar:~$ python server.py server_config.json
Welcome vegnin
2018
Enter room name you want to join: outsider-room
You wish to join the room as: (Player/viewer) viewer
received from ('localhost', 52987): JOIN[ACK]STATUS
Successfully joined room outsider-room as a VIEWER
Waiting for other player...
received from ('localhost', 52987): INPROGRESS[outsider1:outsider2]
Match between outsider1 and outsider2 is currently in progress, it is outsider1's turn
received from ('localhost', 52987): BOARDSTATUS:121820000

| X | | X |
| | 0 | |
|-----|
| | | |
|-----|
It is outsider2's turn
received from ('localhost', 52987): BOARDSTATUS:121820000

| X | 0 | X |
| | 0 | |
|-----|
| | | |
|-----|
It is outsider1's turn
received from ('localhost', 52987): BOARDSTATUS:121820010

| X | 0 | X |
| | 0 | |
|-----|
| | X | |
|-----|
It is outsider2's turn
received from ('localhost', 52987): BOARDSTATUS:121220010

| X | 0 | X |
|-----|
```

```
> user@bahar:~$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 53374)
new connection from ('127.0.0.1', 53378)
new connection from ('127.0.0.1', 53384)
received from ('127.0.0.1', 53378): LOGIN[outsider1]
received from ('127.0.0.1', 53378): CREATE[outsider-room]
received from ('127.0.0.1', 53384): LOGIN[outsider2]
received from ('127.0.0.1', 53384): JOIN[outsider-room:PLAYER]
received from ('127.0.0.1', 53378): PLACE[0:0]
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 53384): PLACE[1:1]
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 53374): LOGIN[vegnin]
received from ('127.0.0.1', 53374): JOIN[outsider-room:VIEWER]
received from ('127.0.0.1', 53378): PLACE[2:0]
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 53384): PLACE[1:0]
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 53378): PLACE[1:2]
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 53384): PLACE[0:1]
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 53378): PLACE[2:1]
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 53384): PLACE[2:2]
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 53378): PLACE[0:2]
```

```
> user@bahar:~$ python server.py server_config.json
| | 0 | |
| | X | |
|-----|
It is outsider2's turn
received from ('localhost', 52987): BOARDSTATUS:121221010

| X | 0 | X |
| 0 | 0 | |
|-----|
| | X | |
|-----|
It is outsider1's turn
received from ('localhost', 52987): BOARDSTATUS:121221010

| X | 0 | X |
| 0 | 0 | X |
|-----|
| | X | |
|-----|
It is outsider2's turn
received from ('localhost', 52987): BOARDSTATUS:121221012

| X | 0 | X |
| 0 | 0 | X |
|-----|
| | X | 0 |
|-----|
It is outsider1's turn
received from ('localhost', 52987): GAMEEND:121221112:1

| X | X | 0 |
|-----|
Game ended in a draw
```

## Test 27: Client views a game from the beginning until a player forfeits or disconnects from the server

```
>_ user@sahara:~$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 56186)
new connection from ('127.0.0.1', 56186)
received from ('127.0.0.1', 56186): LOGIN
received from ('127.0.0.1', 56186): LOGIN:outsider1a
received from ('127.0.0.1', 56186): CREATE:outsider-room
received from ('127.0.0.1', 38186): LOGIN:vegnia:vegnia
received from ('127.0.0.1', 38186): JOIN:outsider-room:VIEWER
received from ('127.0.0.1', 56186): LOGIN:outsider2a
received from ('127.0.0.1', 56186): JOIN:outsider-room:PLAYER
received from ('127.0.0.1', 56186): PLACE:0:0
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 56186): FORFEIT

>_ user@sahara:~$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnia
Enter password: vegnia
received from ('localhost', 52987): LOGIN:ACKSTATUS:0
Welcome vegnia
JOIN
Enter room name you want to join: outsider-room
You wish to join the room as: (Player/Viewer) viewer
received from ('localhost', 52987): JOIN:ACKSTATUS:0
Successfully joined room outsider-room as a VIEWER
Waiting for other player...
received from ('localhost', 52987): BEGIN:outsider1:outsider2
match between outsider1 and outsider2 will commence, it is currently outsider1's turn.
received from ('localhost', 52987): BOARDSTATUS:1000000000
-----
| X | | |
| | | |
| | | |
| | | |
-----
It is outsider1's turn
received from ('localhost', 52987): GAMEEND:100000000:2:outsider1
-----
| X | | |
| | | |
| | | |
| | | |
-----
outsider1 won due to the opposing player forfeiting
```

## Test 28: Client starts viewing a game mid-match until a player forfeits or disconnects from the server

```
>_ user@sahara:~$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 56170)
new connection from ('127.0.0.1', 60710)
new connection from ('127.0.0.1', 60724)
received from ('127.0.0.1', 60710): LOGIN:outsider1a
received from ('127.0.0.1', 60710): CREATE:outsider-room
received from ('127.0.0.1', 60724): LOGIN:outsider2a
received from ('127.0.0.1', 60724): JOIN:outsider-room:PLAYER
received from ('127.0.0.1', 60710): PLACE:0:0
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 60724): PLACE:1:1
sending BOARDSTATUS message, the next turn player is outsider1
received from ('127.0.0.1', 56170): LOGIN:vegnia:vegnia
received from ('127.0.0.1', 56170): JOIN:outsider-room:VIEWER
received from ('127.0.0.1', 60710): PLACE:1:0
sending BOARDSTATUS message, the next turn player is outsider2
received from ('127.0.0.1', 60724): FORFEIT

>_ user@sahara:~$ python client.py localhost 52987
connecting to server ('localhost', 52987)
LOGIN
Enter username: vegnia
Enter password: vegnia
received from ('localhost', 52987): LOGIN:ACKSTATUS:0
Welcome vegnia
JOIN
Enter room name you want to join: outsider-room
You wish to join the room as: (Player/Viewer) viewer
received from ('localhost', 52987): JOIN:ACKSTATUS:0
Successfully joined room outsider-room as a VIEWER
Waiting for other player...
received from ('localhost', 52987): INPROGRESS:outsider1:outsider2
Match between outsider1 and outsider2 is currently in progress, it is outsider1's turn
received from ('localhost', 52987): BOARDSTATUS:110020000
-----
| X | X | |
| | | |
| | 0 | |
| | | |
-----
It is outsider2's turn
received from ('localhost', 52987): GAMEEND:110020000:2:outsider1
-----
| X | X | |
| | 0 | |
| | | |
| | | |
-----
outsider1 won due to the opposing player forfeiting
```

## Test 29: Client has not logged in but sends authentication-required messages

```
>_ user@sahara:~$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.0.1', 59030)
received from ('127.0.0.1', 59030): ROOMLIST:PLAYER

>_ user@sahara:~$ python client.py localhost 52987
connecting to server ('localhost', 52987)
ROOMLIST
Do you want to have a room list as player or viewer? (Player/Viewer) player
received from ('localhost', 52987): BADAUTH
Error: You must be logged in to perform this action
```



## Test 30: Client who is not in a room but sends game-related messages

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
server is listening at ('localhost', 52987)  
new connection from ('127.0.0.1', 58204)  
received from ('127.0.0.1', 58204): LOGIN:vegnim:vegnim  
received from ('127.0.0.1', 58204): FORFEIT  
█  
  
>_ user@sahara:~  
[user@sahara ~]$ python client.py localhost 52987  
connecting to server ('localhost', 52987)  
LOGIN  
Enter username: vegnim  
Enter password: vegnim  
received from ('localhost', 52987): LOGIN:ACKSTATUS:0  
Welcome vegnim  
FORFEIT  
Unknown command: FORFEIT  
received from ('localhost', 52987): NOROOM  
You are currently not in a room  
█
```

## Test 31: Client enter invalid input for PLACE command

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
server is listening at ('localhost', 52987)  
new connection from ('127.0.0.1', 46710)  
new connection from ('127.0.0.1', 46710)  
received from ('127.0.0.1', 46710): LOGIN:vegnim:vegnim  
received from ('127.0.0.1', 46710): CREATE:my-room  
received from ('127.0.0.1', 46710): LOGIN:outsider:a  
received from ('127.0.0.1', 46710): JOIN:my-room:PLAYER  
█  
  
>_ user@sahara:~  
[user@sahara ~]$ python client.py localhost 52987  
connecting to server ('localhost', 52987)  
LOGIN  
Enter username: vegnim  
Enter password: vegnim  
received from ('localhost', 52987): LOGIN:ACKSTATUS:0  
Welcome vegnim  
CREATE  
Enter room name you want to create: my-room  
received from ('localhost', 52987): CREATE:ACKSTATUS:0  
Successfully created room my-room  
Waiting for other player...  
received from ('localhost', 52987): BEGIN:vegnim:outsider  
match between vegnim and outsider will commence, it is currently vegnim's turn.  
PLACE  
Column: a  
(Column/Row) values must be an integer between 0 and 2  
Column: -1  
Row: 2  
(Column/Row) values must be an integer between 0 and 2  
Column: 3  
Row: 2  
(Column/Row) values must be an integer between 0 and 2  
Column: █
```

## Test 32: Launch server program with incorrect number of arguments

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py  
Error: Expecting 1 argument: <server config path>.  
[user@sahara ~]$ python server.py server_config.json server_config.json  
Error: Expecting 1 argument: <server config path>.  
[user@sahara ~]$ █
```

Test 33: Launch server program with non-existent server config path

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py unreal_path  
Error: <server config path> doesn't exist.  
[user@sahara ~]$
```

Test 34: Launch server program, server config file is not in a valid JSON format

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
Error: <server config path> is not in a valid JSON format.  
[user@sahara ~]$
```

Test 35: Launch server program, missing essential key(s) in server config file

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
Error: <server config path> missing key(s): port, userDatabase  
[user@sahara ~]$
```

Test 36: Launch server program, but port number is out of designed range

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
Error: port number out of range  
[user@sahara ~]$
```

Test 37: Launch server program with non-existent user database path

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
Error: <user database path> doesn't exist.  
[user@sahara ~]$
```

Test 38: Launch server program, but user database file is not in valid JSON format

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
Error: <user database path> is not in a valid JSON format.  
[user@sahara ~]$
```

Test 39: Launch server program, but the user database file is not a JSON array

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
Error: <user database path> is not a JSON array.  
[user@sahara ~]$
```

Test 40: Launch server program, but the user database contains an invalid user record

```
>_ user@sahara:~  
[user@sahara ~]$ python server.py server_config.json  
Error: <user database path> contains invalid user record formats.  
[user@sahara ~]$
```

Test 41: Launch client program with incorrect number of arguments

```
>_ user@sahara:~  
[user@sahara ~]$ python client.py  
Error: Expecting 2 arguments: <server address> <port>  
[user@sahara ~]$ python client.py a b c  
Error: Expecting 2 arguments: <server address> <port>  
[user@sahara ~]$
```

Test 42: Launch client program but the client is unable to connect to the given address

```
>_ user@sahara:~  
[user@sahara ~]$ python client.py localhost 52987  
connecting to server ('localhost', 52987)  
Error: cannot connect to server at <server address> and <port>.  
[user@sahara ~]$
```

Test 43: Client enters an unknown command to the client program

```
>_ user@sahara:~  
[user@sahara ~]$ python client.py localhost 52987  
connecting to server ('localhost', 52987)  
UNREAL-COMMAND  
Unknown command: UNREAL-COMMAND  
█
```