### Test Report

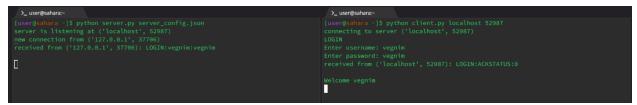
Test 1: Client registers user record and logs in

```
| Luser@sahara- | Super@sahara- | Luser@sahara- | Luser@sahara- | Super@sahara- | Super@sahara
```

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



### Test 3: Client logs in



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



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

```
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\[ \subsetequents \subsetequents \]
\[ \subsetequents
```

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

Another client has already logged in and created a room

```
Luser@sahara-

[user@sahara-]$ python server.py server_config.json
server is listening at ('localhost', 52987)
new connection from ('127.0.8.1', 32862)
new connection from ('127.0.8.1', 32872)
received from ('127.0.8.1', 32872): LOGIN:outsider:a

received from ('127.0.8.1', 32872): CREATE:outsider-room

received from ('127.0.8.1', 32862): LOGIN:vegnim:vegnim
received from ('127.0.8.1', 32862): LOGIN:vegnim:vegnim
received from ('127.0.8.1', 32862): ROOMLIST:PLAYER

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

```
Luser@sahara-
[user@sahara-]s python server.py server_config.json
server is listening at ('localhost', 52987)
new connection 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): LOGIN:outsider2:a

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

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

new connection from ('127.0.0.1', 39924): LOGIN:outsider-room:PLAYER

received from ('127.0.0.1', 51642): LOGIN:outsider-room:PLAYER

new connection from ('127.0.0.1', 51642): LOGIN:outsider-room:PLAYER

Room available to join as PLAYER:

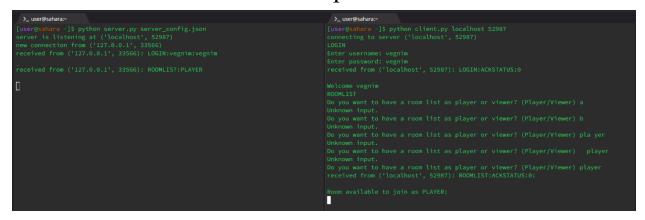
Room available to join as PLAYER:

Room available to join as VIEWER: outsider-room

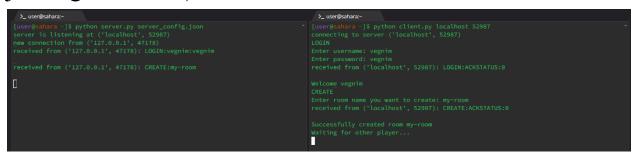
Room available to join as VIEWER: outsider-room

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

Test 8: Client enters invalid input for ROOMLIST



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



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

Another client has already logged in and created a room

```
| Luse@sahara- | Spython server.py server_config.json server is listening at ('localhost', 52987) | Connection from ('127.0.0.1', 38642): LOGIN:outsider:a connection from ('127.0.0.1', 38642): LOGIN:outsider-room | Connection from ('127.0.0.1', 4840): LOGIN:outsider-room | Connection from ('127.0.0.1', 42840): LOGIN:outsider-room:PLAYER | Connection from ('127.0.0.1', 42840): JOIN:outsider-room:PLAYER | Connection fr
```

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

```
| Juse@sahara-|
| [Juser@sahara-|
| [Juser@sahar
```

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

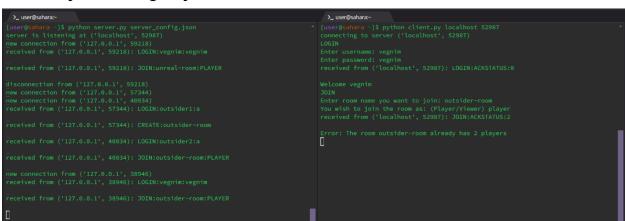
### Test 13: Client creates a room with an already used name

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

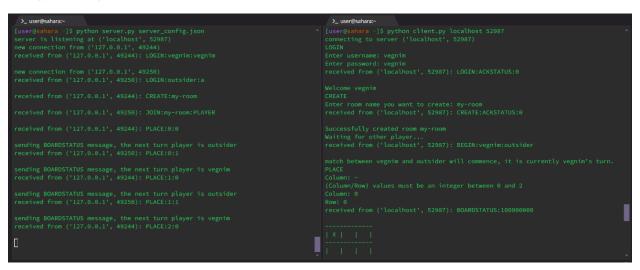
To recreate this scenario conveniently, I have temporarily changed the limit of the number of rooms to 1.

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

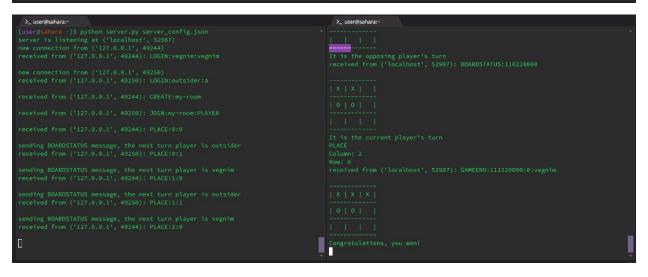
## Test 16: Client joins a room as a player but the room already has 2 players



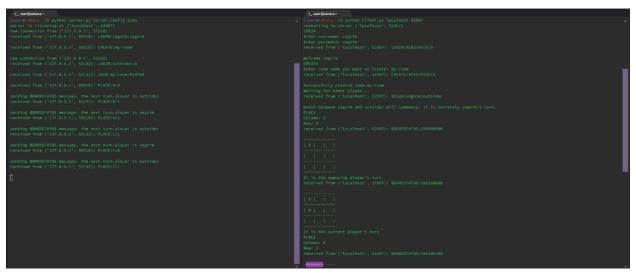
### Test 17: Client creates a room, plays against an opponent, and wins

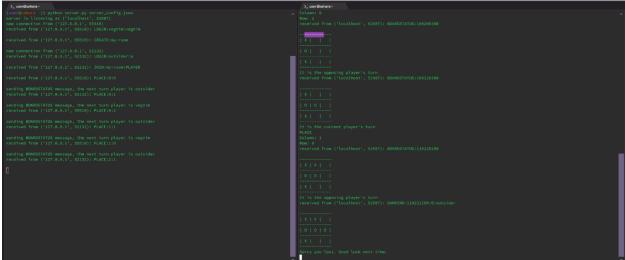


>_ user@sahara;~	>_ user@sahara;~
[user@sahara -]\$ python server.py server_config.json server is listening at ('localhost', 52987) new connection from ('127.0.0.1', 49244) received from ('127.0.0.1', 49244): LOGIN:vegnim:vegnim	
	101 1 1
	<u></u>

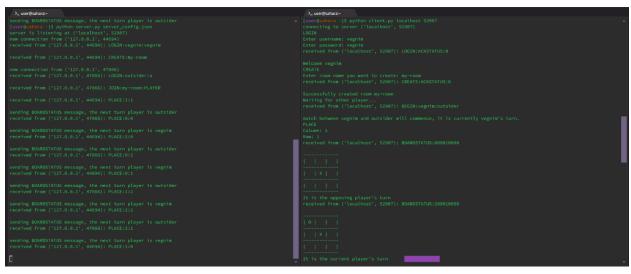


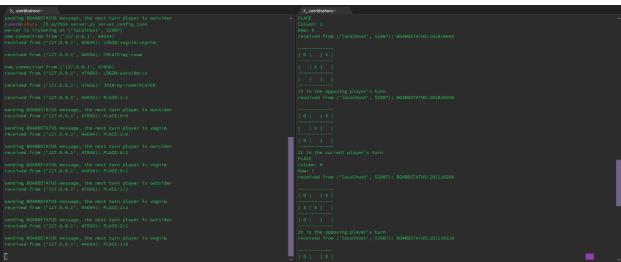
### Test 18: Client creates a room, plays against an opponent, and loses





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



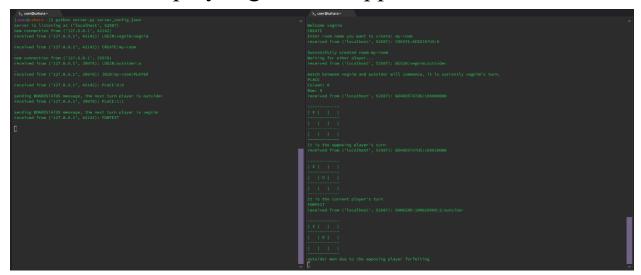


```
| Description |
```

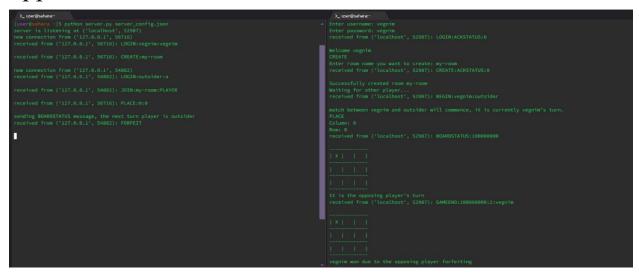
```
Autophature.

| Autophature |
```

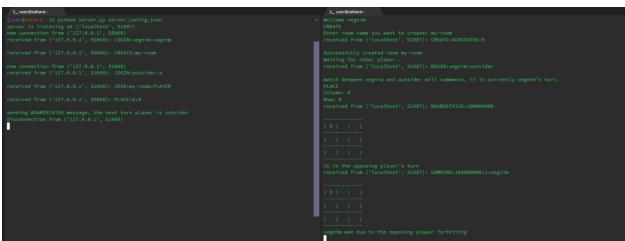
### Test 20: Client plays against an opponent and forfeits



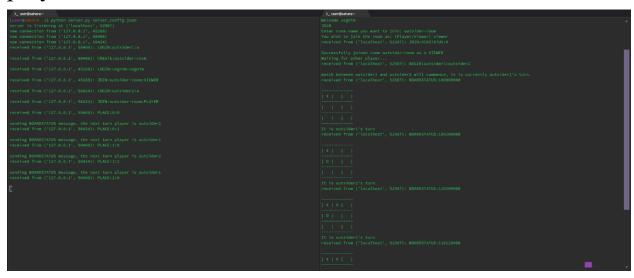
# Test 21: Client plays against an opponent and the opponent forfeits

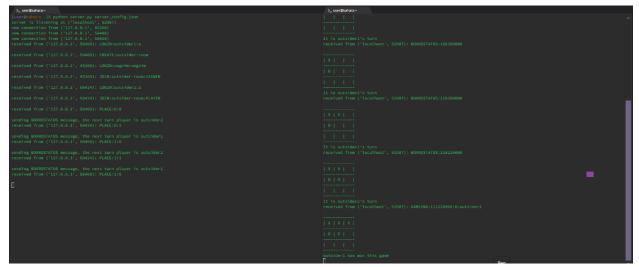


# Test 22: Client plays against an opponent and the opponent disconnects from the server

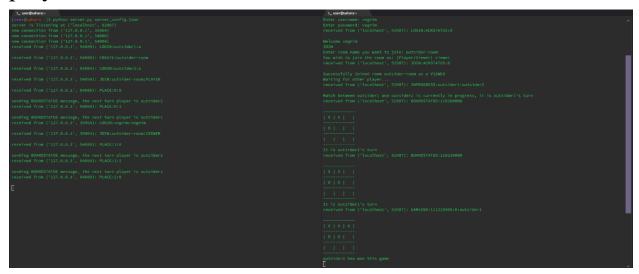


## Test 23: Client views a game from the beginning until one player wins





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

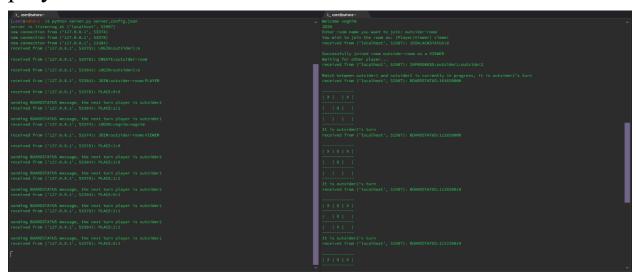


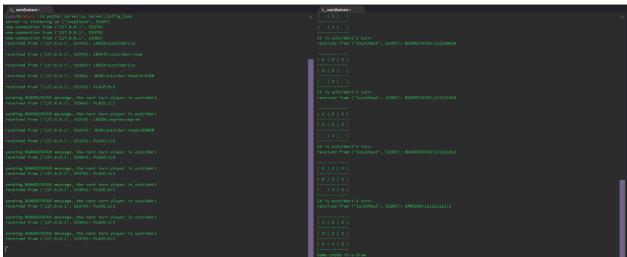
Test 25: Client views a game from the beginning until the players draw

>_ user@sahara:-	)_ useril/rahara:~
[User@sahara -]\$ python server.py server_config.json server is listening at ('localhost', 52987)	101   x
server is distering at ("Localnost", 52997) new connection from ("127.0.8.1", 54864)	1 1 1 1
new connection from ('127.0.0.1', 55790)	<del>                                      </del>
new connection from ('127.0.0.1', 48702) received from ('127.8.8.1', 55790): LOGIN:outsiderl:a	0
the state of the s	It is outsider2's turn
received from ('127.0.0.1', 55790): CREATE:outsider-room	received from ('localhost', 52987): BOARDSTATUS:201110200
received from ('127.0.0.1', 54864): LOGIN:vegnim:vegnim	
received from ('127.8.8.1', 54864): JOIN:outsider-room:VIEWER	0     X
and the state of t	X   X
received from ('127.0.0.1', 48702): LOGIN:outsider2:a	
received from ('127.8.8.1', 48702): JOIN:outsider-room:PLAYER	It is outsidenl's turn
received from ('127.0.0.1', 55790): PLACE:1:1	it is outstoer:'s turn received from ('localhost', 52987): BOARDSTATUS:201112200
sending BOARDSTATUS message, the next turn player is outsider2	
sending conductation sessage, the text cut in player is obtained received from (*127.8.8.1*), 48782): PLACE:0:0	0   x
sending BOARDSTATUS message, the next turn player is outsider1	X   X   0
received from (127.8.8.11, 55788): PLACE:2:8	
sending BOARDSTATUS message, the next turn player is outsider2	0
received from ('127.8.9.1', 48782): PLACE:0:2	It is outsider2's turn
sending BOARDSTATUS message, the next turn player is outsider1	received from ('localhost', 52987): BOARDSTATUS:201112210
received from ('127.8.9.1', 55798): PLACE:8:1	
sending BOARDSTATUS message, the next turn player is outsider2	0     x
received from ('127.8.8.1', '48782): PLACE:2:1	X   X   0
sending BOARDSTATUS message, the next turn player is outsider1	
received from ('127.0.0.1 <sup>1</sup> , 55790): PLACE:1:2	It is outsiderl's turn
sending BOARDSTATUS message, the next turn player is outsider2	It is outstoer:'s turn received from ('localhost', 52987): BOARDSTATUS:221112219
received from ('127.8.8.1', 48782): PLACE:1:8	
sending BOARDSTATUS message, the next turn player is outsider1	10101x1
received from ('127.8.8.1', 48782): PLACE:2:2	X   X   0
	0   X
	<b>—</b>

>_ user@sahara:-	)_ uscr@sahara:
[ose@mbars 18 python server.py server_config_ton server is litering at ('locabet', 52897) inseconnection from (1277.6/2.1), 54860) inseconnection from (1277.6/2.1), 54860) inseconnection from (1277.6/2.1), 54760) inseconnection from (1277.6/2.1), 54760)	It is outsidera's turn received from ("localbost", 52087): BOAKDSTATUS:281112289
received from ('127.8.8.1', 55798): LOGIN:outsider1:a	0    x
received from ('127.0.0.1', 55790): CREATE:outsider-room	[X   X   0
received from ('127.8.8.1', 54864): LOGIN:vegnim:vegnim	10111
received from ('127.0.0.1', 54864): JOIN:outsider-room:VIENER	It is outsider2's turn received from ('localhost', 52987): BOARDSTATUS:201112210
received from ('127.0.0.1', 48702): LOGIN:outsider2:a	
received from ('127.0.0.1', 48702): JOIN:outsider-room:PLAYER	0   x
received from ('127.8.8.1', 55790): PLACE:1:1	X   X   0
sending BOARDSTATUS message, the next turn player is outsider2 received from ('127.0.0.1', 48702): PLACE:0:0	0   X     
sending BOARDSTATUS message, the next turn player is outsider1 received from ('127.8.8.1', 55790): PLACE:2:8	It is outsider!'s turn received from ('locathost', 3208T): BOAMOSTATUS:221112218
sending BOARDSTATUS message, the next turn player is outsider2 received from (*127.8.0.1*, 48702): PLACE:0:2	
sending BOARDSTATUS message, the next turn player is outsider1 received from ("127.6.8.1", 55798): PLACE:0:1	[0 X
sending BOARDSTATUS message, the next turn player is outsider2 received from (*127.8.8.1*, 48702): PLACE:2:1	It is outsider2's turn PLACE 2
sending BOARDSTATUS message, the next turn player is outsider1 received from (*127.8.8.1', 55798): PLAGE:1:2	2 received from ('localhost', S2987): GAMEEND:221112212:1
sending BOARDSTATUS message, the next turn player is outsider2 received from (*127.8.6.1*, 48782): PLACE:1:8	
sending BOARDSTATUS message, the next turn player is outsider1 received from ('127.0.0.1', 48702): PLACE:2:2	[X   X   0
٢	0   X   0
	Game ended in a draw

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





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

```
| D_ completes | D_ c
```

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

)_ user@sahara:-	)_ user@sahara:~
[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:outsider1:a	
received from ('127.0.0.1', 60710): CREATE:outsider-room	Melcome vegnim JOIN
received from ('127.0.0.1', 60724): LOGIN:outsider2:a	
	You wish to join the room as: (Player/Viewer) viewer
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', 69724): PLACE:1:1	
sending BOARDSTATUS message, the next turn player is outsider1	
received from ('127.0.0.1', 56170): LOGIN:vegnim:vegnim	
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	
Г	
	outsider1 won due to the opposing player forfeiting

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

### Test 30: Client who is not in a room but sends gamerelated messages

```
| \to user@sahara:-
| User@sahara:-| S python server.py server_config.json | Server is listening at ('localhost', 52987) | Connecting to server ('localhos
```

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

## 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 ~]$

[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

[
```