

# Intro. to Network Programming 2022 Fall

## Homework 2 – Game 1A2B

### General

You will need to implement multiplayer 1A2B game server and your server should be implemented in C/C++

We will provide you docker image, you should ensure your code can run in the given image

We will run **bash build.sh** to compile your code, and your server executable code pathname should be **build/server**

*For student who store data in sqlite3, note that each testcase is run independently (No data at the start of each testcase) in this assignment, so you need to cleanup server's data if you store them in sqldb.*

### Timeline

Submission Deadline **11/29**

Late Submission Deadline 12/20

### Submission

Example format HW2\_109550xxx.zip

To check the zip format is correct and your output of sample testcases, you can run **python3 demo.py -s HW2\_109550xxx.zip**

**Submission that with wrong zip format will start the score from 60**

### Requirement

Your server should be able to handle at least **10** clients

Client commands are listed in the table

Command format	Description	Result	
register <username> <email> <user password>	Register with username, email and password.  <username> and <email> must  be unique, <password> has no  limitation.  Fail(1) username or email is used  Please note that you have to send this request and receive the response with	Success	Register  Successfully
		Fail(1)	Username or Email  is already used

	UDP		
login <username> <password>	Login account	Success	Welcome,  <username>
	One client can only logged in as one account		
	Fail(1) Username not found	Fail(1)	Username does not exist
	Fail(2) You already logged in another account		
	Fail(3) Account is already logged in	Fail(2)	You already logged in as <username>
	Fail(4) Password is incorrect		
	Please note that you have to send this request and receive the response with <b>TCP</b>	Fail(3)	Someone already logged in as <username>
		Fail(4)	Wrong password
logout	Logout account	Success	Goodbye,  <username>
	Fail(1) User not logged in		
	Fail(2) User is in game room	Fail(1)	You are not logged in
	Please note that you have to send this request and receive the response with <b>TCP</b>	Fail(2)	You are already in game room <game room id>, please leave game room
create public room <game room id>	Create game room that is public to everyone	Success	You create public game room <game
	Fail(1) User not logged in		

	Fail(2) User is in game room already		room id>
	Fail(3) Game room id is exist already  <b>Game room ID should be unsigned 32 bit integer</b>	Fail(1)	You are not logged in
	Please note that you have to send this request and receive the response with <b>TCP</b>	Fail(2)	You are already in game room <game room id>, please leave game room
		Fail(3)	Game room ID is used, choose another one
create private room <game_room_id> <invitation code>	Create game room that is private to everyone  <b>Game room ID and Invitation code should be unsigned 32 bit integer</b>	Success	You create private game room <game room id>
	Fail(1) User not logged in		
	Fail(2) User is in game room already	Fail(1)	You are not logged in
	Fail(3) Game room id is exist already  Please note that you have to send this request and receive the response with <b>TCP</b>	Fail(2)	You are already in game room <game room id>, please leave game room
		Fail(3)	Game room ID is used, choose another one
list rooms	List all the game room status in <b>ascending</b> order of game room ID  You need the handle three properties of the game room	No game room	List Game Rooms No Rooms

	<ol style="list-style-type: none"> <li>1. Public / Private</li> <li>2. Game room ID</li> <li>3. Waiting for player / Started Game</li> </ol> <p>Your response should start with <b>List Game Rooms</b>, and add a number to each lines</p> <p>Please note that you have to send this request and receive the response with <b>UDP</b></p>	At least one game room	<p><b>Example</b></p> <p>List Game Rooms</p> <ol style="list-style-type: none"> <li>1. (Public) Game Room 1 has started playing</li> <li>2. (Public) Game Room 2 is open for players</li> <li>3. (Private) Game room 3 is open for players</li> </ol>
list users	<p>List all the user status in <b>alphabetically</b> order of Username</p> <p>You need the handle three properties of the user status</p> <ol style="list-style-type: none"> <li>1. User name</li> <li>2. User email</li> <li>3. Online / Offline</li> </ol> <p>Your response should start with <b>List Users</b>, and add a number to each lines</p> <p>Please note that you have to send this request and receive the response with <b>UDP</b></p>	No user registered	<p>List Users</p> <p>No Users</p>
		At least one user registered	<p><b>Example</b></p> <p>List Users</p> <ol style="list-style-type: none"> <li>1. Alice&lt;alice@gmail.com&gt; Online</li> <li>2. Bob&lt;bob@gmail.com&gt; Online</li> <li>3. Cindy&lt;cindy@gmail.com&gt; Online</li> <li>4. David&lt;david@gmail.com&gt; Offline</li> <li>5. Emmy&lt;emmy@gmail.com&gt; Offline</li> </ol>
join room <game room id>	<p>Join <b>public</b> game room</p> <p>If you join game room successfully, others in the game room will receive the message from server to notify that you join room</p> <p>Fail(1) You are not logged in</p> <p>Fail(2) You are already in</p>	Success	<p>Response to you:</p> <p><b>You join game room &lt;game room id&gt;</b></p> <p>Response to others that joined game room:</p> <p><b>Welcome, &lt;user name&gt; to game!</b></p>

	game room	Fail(1)	You are not logged in
	Fail(3) Game room ID is not exist		
	Fail(4) Game room is private	Fail(2)	You are already in game room <game room id>, please leave game room
	Fail(5) Game is started		
	Please note that you have to send this request and receive the response with <b>TCP</b>	Fail(3)	Game room <game room id> is not exist
		Fail(4)	Game room is private, please join game by invitation code
		Fail(5)	Game has started, you can't join now
invite <invitee email>	Send invitation to invitee	Success	Response to invitee: You receive invitation from <inviter name><<inviter email>>  e.g. Alice< <a href="mailto:alice@gmail.com">alice@gmail.com</a> >  Response to inviter: You send invitation to <invitee name><<invitee email>>
	<b>Invitee email is ensure to be in register list and you should not send invitation to yourself</b>		
	<b>Invitations are expired only if gama room manger leaves room</b>		
	Fail(1) Inviter not logged in	Fail(1)	You are not logged in
	Fail(2) Inviter did not join any game room	Fail(2)	You did not join any game room
	Fail(3) Inviter is not <b>private</b> game room manager	Fail(3)	You are not <b>private</b> game room manager
	Fail(4) Invitee not logged in	Fail(4)	Invitee not logged in
	Please note that you have to send this request and receive the response with <b>TCP</b>		

list invitations	List invitations in <b>ascending</b> order of GameRoomID	Success (No invitation)	List invitations No Invitations
	<p>Your response should start with <b>List Invitations</b>, and add a number to each lines</p> <p>Fail(1) You are not logged in</p> <p>Please note that you have to send this request and receive the response with <b>TCP</b></p>	Success (At least one invitation)	<p>List invitations</p> <p>1. &lt;inviter name&gt;&lt;&lt;invitier email&gt;&gt; invite you to join game room &lt;game room id&gt;, invitation code is &lt;invitation code&gt;</p> <p>E.g.</p> <p>1. Alice&lt;alice@gmail.com&gt; invite you to join game room 101, invitation code is 12345</p>
		Fail(1)	You are not logged in
accept <inviter email> <invitation code>	<p>Join <b>private</b> game room</p> <p>If you join game room successfully, others in the game room will receive the message from server to notify that you join room</p> <p>Fail(1) You are not logged in</p> <p>Fail(2) You are already in game room</p> <p>Fail(3) Invitation not exist</p> <p>There are some reasons lead to Fail(3),</p> <p>1.invitee is not invited</p> <p>2. invitee is invited but the inviter leave the game room, so the invitation is expired</p> <p>Fail(4) Invitation code is incorrect</p> <p>Fail(5) Game is started</p> <p><b>Invitee email is ensure to be in register list</b></p>	Success	<p>Response to you:</p> <p><b>You join game room &lt;game room id&gt;</b></p> <p>Response to others that joined game room:</p> <p><b>Welcome, &lt;user name&gt; to game!</b></p>
		Fail(1)	You are not logged in
		Fail(2)	You are already in game room <game room id>, please leave game room
		Fail(3)	Invitation not exist

	Please note that you have to send this request and receive the response with <b>TCP</b>	Fail(4)	Your invitation code is incorrect
		Fail(5)	Game has started, you can't join now
leave room	<p>Leave game room</p> <p><b>If you are game room manager whom create game room, others are forced to leave game room if you leave</b></p> <p><b>As soon as someone leaves the game room, the game is forced to end</b></p> <p>Success(1) If you are game room manager</p> <p>Success(2) If you are not game room manager and game has started</p> <p>Success(3) If you are not game room manager and game has not started</p> <p>Fail(1) You are not logged in</p> <p>Fail(2) You are not in game room</p> <p>Please note that you have to send this request and receive the response with <b>TCP</b></p>	Success(1)	<p><b>Response to you:</b></p> <p>You leave game room &lt;game room id&gt;</p> <p><b>Response to others:</b></p> <p>Game room manager leave game room &lt;game room id&gt;, you are forced to leave too</p>
		Success(2)	<p><b>Response to you:</b></p> <p>You leave game room &lt;game room id&gt;, game ends</p> <p><b>Response to others:</b></p> <p>&lt;user name&gt; leave game room &lt;game room id&gt;, game ends</p>
		Success(3)	<p><b>Response to you:</b></p> <p>You leave game room &lt;game room id&gt;</p> <p><b>Response to others:</b></p> <p>&lt;user name&gt; leave game room &lt;game room id&gt;</p>
		Fail(1)	You are not logged in
		Fail(2)	You did not join any game room
start game <number of rounds> <guess number>	Start a <b>1A2B</b> game.	Success ( <b>Broadcast to all players in</b>	Game start! Current player is <Current player name>

	<p>&lt;number of rounds&gt; is the number of rounds of this game, after all the player guess once, the game is moved to the next round, therefore each player can guess &lt;number of rounds&gt; times.</p> <p>&lt;guess number&gt; is the number to guess for this game.</p> <p><b>The order of guessing number is the same as the order that player join game room.</b></p> <p>Fail(1) You are not logged in</p> <p>Fail(2) You did not join any game room</p> <p>Fail(3) Only game room manager can start the game</p> <p>Fail(4) Game is already started</p> <p>Fail(5) You should provide 4 digit number</p> <p>Note that &lt;guess number&gt; is optional, if it is not given, random 4 digit number is generated</p> <p><b>Note:</b> You have to send this command and get associated message by <b>TCP</b>.</p>	game room)	
		Fail (1)	You are not logged in
		Fail (2)	You did not join any game room
		Fail(3)	You are not game room manager, you can't start game
		Fail(4)	Game has started, you can't start again
		Fail(5)	Please enter 4 digit number with leading zero
guess <guess number>	<p>Guess number!</p> <p>Fail(1) You are not logged in</p> <p>Fail(2) You did not join any game room</p> <p>Fail(3) Game has not started yet</p> <p>Fail(4) It is not your turn to guess</p> <p>Fail(5) Number to guess is not 4-digit number</p> <p><b>The input is ensure to be number with leading</b></p>	Success (Not Bingo) <b>(Broadcast to all players in game room)</b>	<b>Example</b> Alice guess '0301' and got '3A0B'
		Success (No chances) <b>(Broadcast to all players in game room)</b>	<b>Example</b> Bob guess '3214' and got '2A2B' <b>Game ends, no one wins</b>
		Success (Bingo) <b>(Broadcast to all players in game room)</b>	<b>Example</b> Alice guess '0302' and got Bingo!!! <b>Alice wins the game, game ends</b>
		Fail(1)	You are not logged in
		Fail(2)	You did not join any game



	<b>zero and the input size is less than 10</b>  <b>Non 4 digit number is not count in the guess times (number of rounds) in the game</b>  <b>Note:</b> You have to send this command and get associated message by <b>TCP</b>		room
		Fail(3) You are game room manager	You are game room manager, please start game first
		Fail(3) You are not game room manager	Game has not started yet
		Fail(4)	Please wait..., current player is <Current Player>
		Fail(5)	Please enter 4 digit number with leading zero
exit	<p>Close connection.</p> <p>Two things you may need to do</p> <ol style="list-style-type: none"> <li>1. Leave game room (if you are in game room)</li> <li>2. Logged out (if you are logged in)</li> </ol> <p><b>When receiving EOF from client, it is the same as exit</b></p> <p><b>No need to output any message for this command</b></p> <p>No other commands for client who exits (which means if there is <b>exit</b> command for client A, there is no other commands for client A after <b>exit</b>)</p> <p><b>Note:</b> You have to send this command by <b>TCP</b></p>		

## Scenario

We ensure that all client commands are valid

You can found sample testcases and the correct output in *testcases/* and *testcases\_correct/*

The output format in pdf might not be correct, **please refer to sample testcases**

Make sure your output is the same as sample testcases output, because all the output format can be found in *testcases\_correct/*, **you wont get any credit of that testcase even you just forget to output one comma**

Please make sure the flag **SO\_REUSEADDR** is set and your code should have the same result whatever times you run it.

Ask us from Teams if you have any questions!