

WWW Technologies and Applications 2024

Assignment 5— HTML5/Node.js/socket

TA: Daniel (zzzxxx0987qq@gmail.com)

Deadline: 11:59 pm, June 20

1. Objectives

- Learn to use sockets to establish the connection.
- Practice the Node.js framework.
- Learn to use Node.js to build a server.

2. High-level description

This homework requires using Node.js to build an online chat room, and its functions including a one-to-one chat room and a group chat room with a Bingo game function. The UI design is not limited to the style we provide here, so you can design your interface freely. However, you must use Node.js for this assignment. You should link your homework5 button on the page you completed for Assignment 1 to this assignment. If not, this assignment will NOT be graded.

3. System layout (30%)

3.1 Login page (5%)

Figure 1 shows the login page layout, which is also the first page that appears when the chat room is opened. Users can enter a nickname as their username in the chat room.

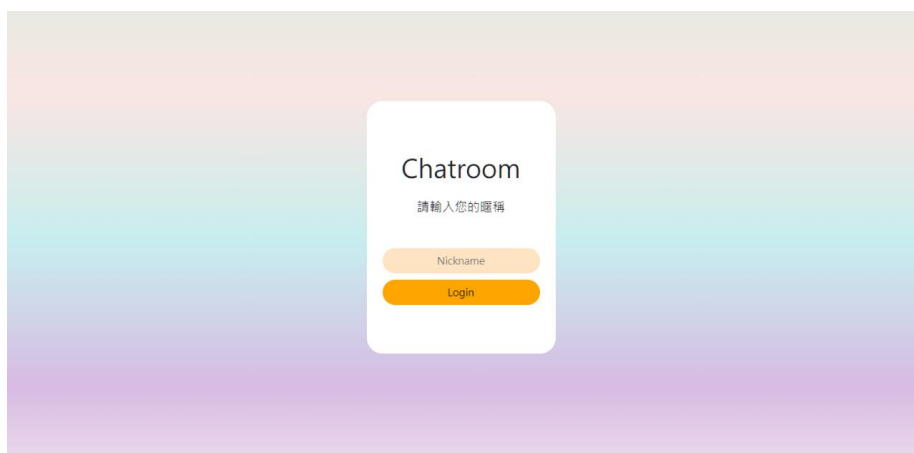


Figure 1. Login page.

3.2 Chat room page (25%)

Figure 2 shows the layout of the chat room page, which is also the default page when users enter the chat room after entering a nickname and clicking the login button. The chat room page is divided into two parts. The layout required for each part is described below.

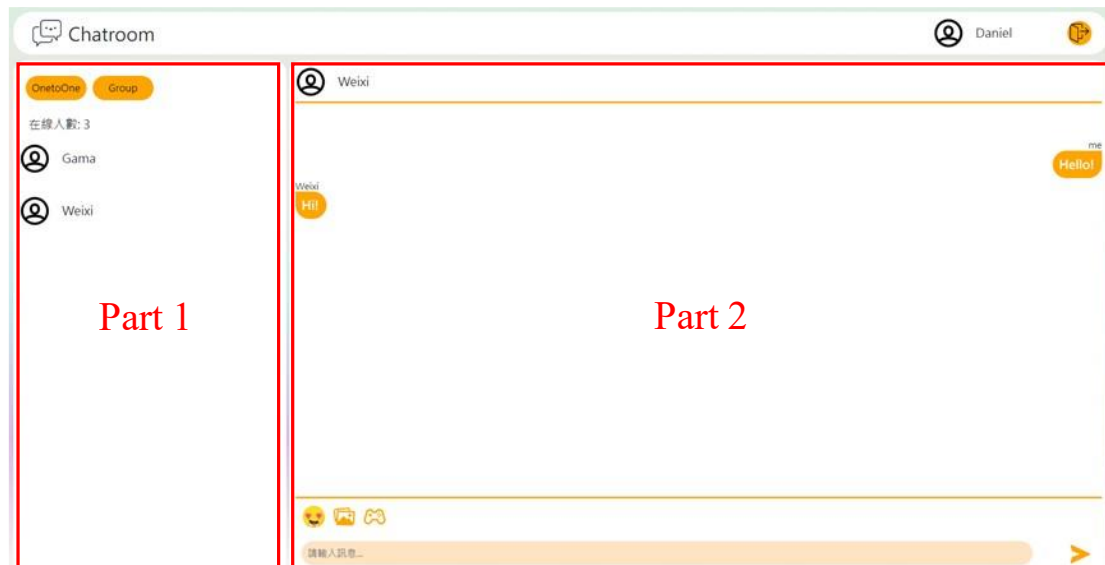


Figure 2. Chat room page.

3.2.1 Part 1 (10%)

In this part, you need to place two buttons, including a one-to-one chat room button and a group chat room button, as shown in Figure 3. Moreover, you need to display the current number of online users and list the usernames of all online users except yourself. Users can click a user on the user list to chat with them one-to-one.



Figure 3. Part 1 on the chatroom page.

3.2.2 Part 2 (15%)

Figure 4 shows part 2 on the chatroom page. This part is divided into three parts. First, display the username of the user chatting with you for one-to-one chat or just show the label “group” for group chat. Second, display the message area, where the messages of you are shown on the right, and the messages sent by other user(s) are shown on the left. A username label of the sender is placed on the top of each message. Third, place the message input area, including three/four buttons: an emoji button, an image button, a **Bingo game button, which is valid for one-to-one chat only**, and a sending message button.

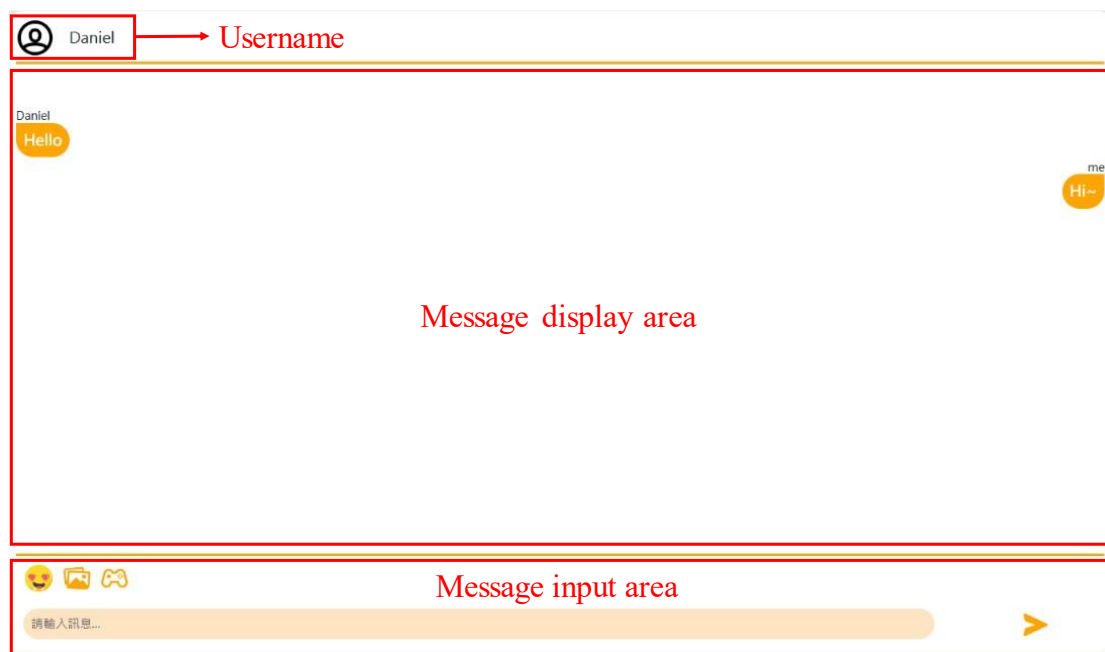


Figure 4. Part 2 on the chatroom page.

4. Chat room functions (80%)

This section describes the functions that the chat room needs to have. For one-to-one and group chat rooms, you must implement five major functions (sending text messages, sending pictures, sending emojis, sending a notification to indicate new messages, and playing a Bingo game). Otherwise, you will only be given a partial score.

4.1 Sending text messages (10%)

As shown in Figure 5, a user can input text messages in the message input area. After the user sends or receives a message from other users, the message must be displayed in the “display messages area” with the sender's nickname included.



Figure 5. Sending text messages.

4.2 Message display area for the group chat (5%)

As shown in Figure 6, when users chat in the group chat room, the message display area must show information about other users entering or exiting the chat room.



Figure 6. Message display area for the group chat.

4.3 Sending pictures (10%)

Figures 7 and 8 show that when a user clicks the image button above the message input area, a picture can be selected from a computer folder and sent to other users.

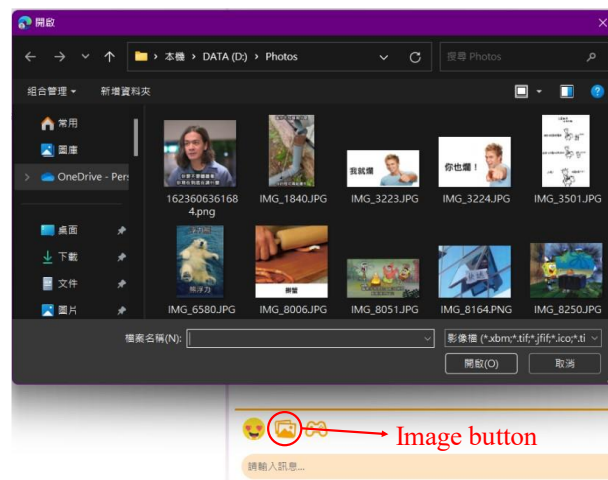


Figure 7. Click on the image button.



Figure 8. Sending pictures to users.

4.4 Notification (10%)

As shown in Figure 9, when users receive messages from a user or a group, notify them with a red dot to indicate new messages. If the message is sent to a particular user, show the red dot next to the name of the user; if the message is sent from the group, show the red dot next to the “Group” button. Remove the red dot when users switch to a chat room with the new messages.

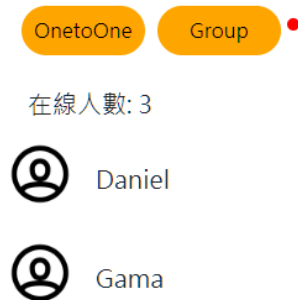


Figure 9. Notification.

4.5 Sending emojis (10%)

As shown in Figure 10, when a user clicks on the emoji button above the message input area, an emoji can be selected from a pop-up window and sent to other users. Additionally, these emojis can be combined with your input text messages, as shown in Figure 11.

Hint: You can display emojis on a webpage using the UTF-8 character set.
Refer to this website for detailed usage instructions:
https://www.w3schools.com/html/html_emojis.asp

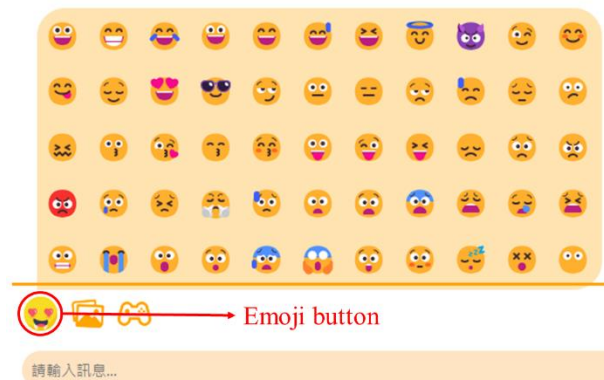


Figure 10. Click on the emoji button.

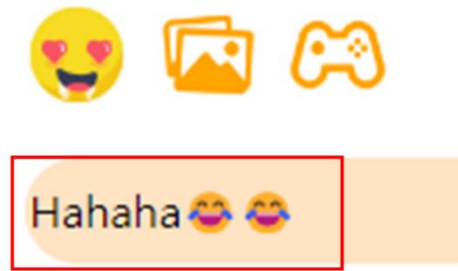


Figure 11. Emojis with input text messages.

4.6 Playing Bingo game (35%)

You need to add the Bingo game function **only in the one-on-one chats, not in group chats**. The Bingo game has four parts: 1. game invitation, 2. game interface, 3. game rules, and 4. bonus.

4.6.1 Game invitation (5%)

As shown in Figure 12, when a user clicks on the Bingo game button above the message input area, a game invitation message can be sent to the other user. In addition, both users need to click on the invitation message to join the game.

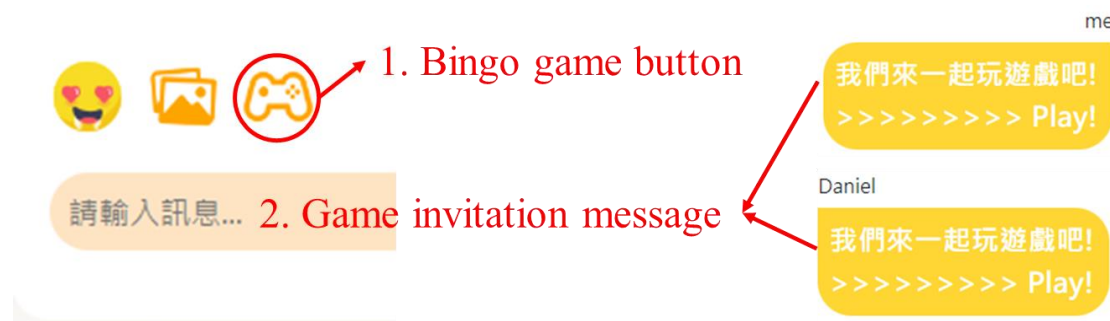


Figure 12. The view after clicking on the Bingo game button.

4.6.2 Game interface (5%)

As shown in Figure 13, when a user clicks on the game invitation message, **the game interface will be displayed and fixed on the screen as a pop-up window. During the Bingo game, both users are able to chat with each other.** This game interface is divided into two parts.

In Part 1, random numbers between 1 and 25 must be displayed, and each number should be clickable for users. In Part 2, game information, game status, and a cancel button must be displayed.

Hint: You can use the “position: fixed” instruction of CSS to fix the game interface on the screen.

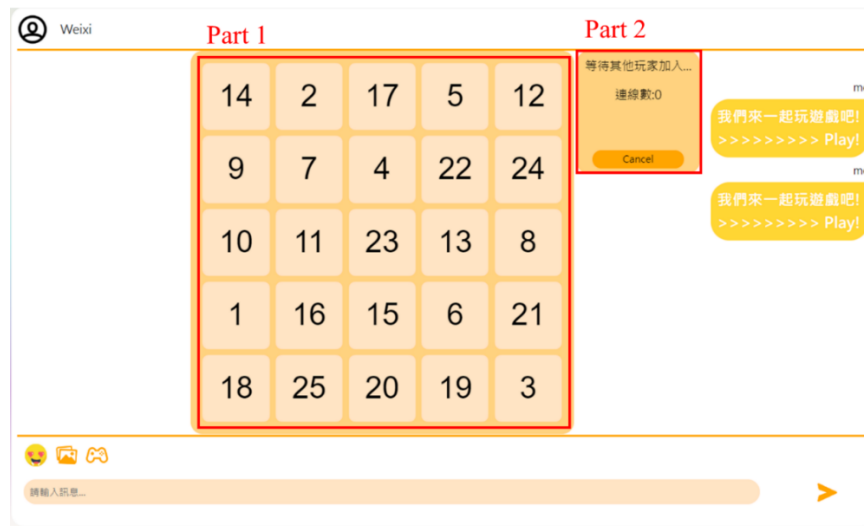


Figure 13. Game interface.

4.6.3 Game Rules (15%)

The Bingo game has a 5x5 grid with 25 numbers. The objective of the game is to arrange lines on the grid. At the beginning of the game, each player's Bingo card must have random numbers between 1 and 25. The server randomly assigns a player to start the game. In this game, players will alternate choosing numbers until the game ends. During the game, the selected numbers are arranged on their card in a horizontal, vertical, or diagonal line. The game ends when the first player completes five lines, and he or she becomes the winner.

As shown in Figure 14, if the other player has not joined at the beginning of the game, a waiting message must be displayed in the “game information.” When the cancel button is pressed, the game will end immediately. Additionally, while waiting message is still shown and a player clicks on a number, an alert window should appear.

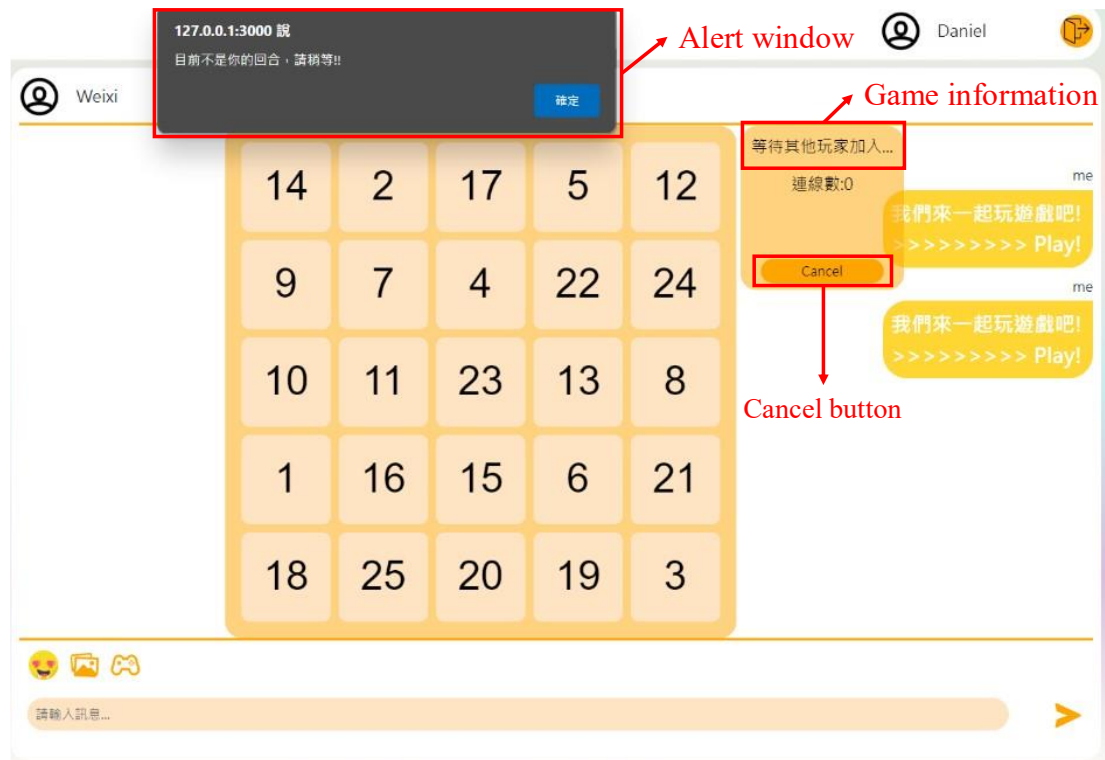


Figure 14. The initial view of the game.

Figures 15 and 16 show that after both players join the game, the server randomly assigns a player to start it. It is necessary to display whose turn it is currently in the “game information” during gameplay. Additionally, the cancel button should be set to disabled.

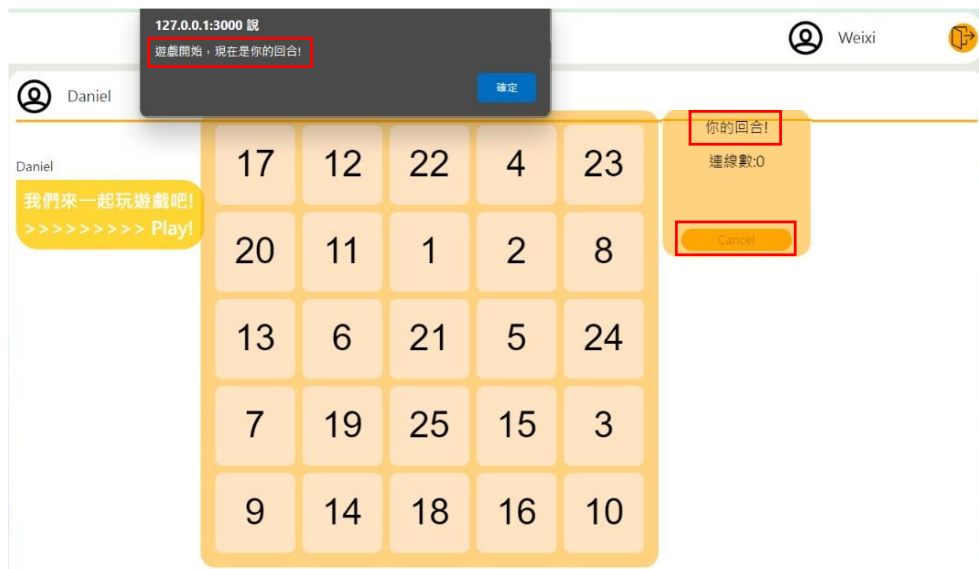


Figure 15. The view of player A who is assigned to start the game at the beginning.

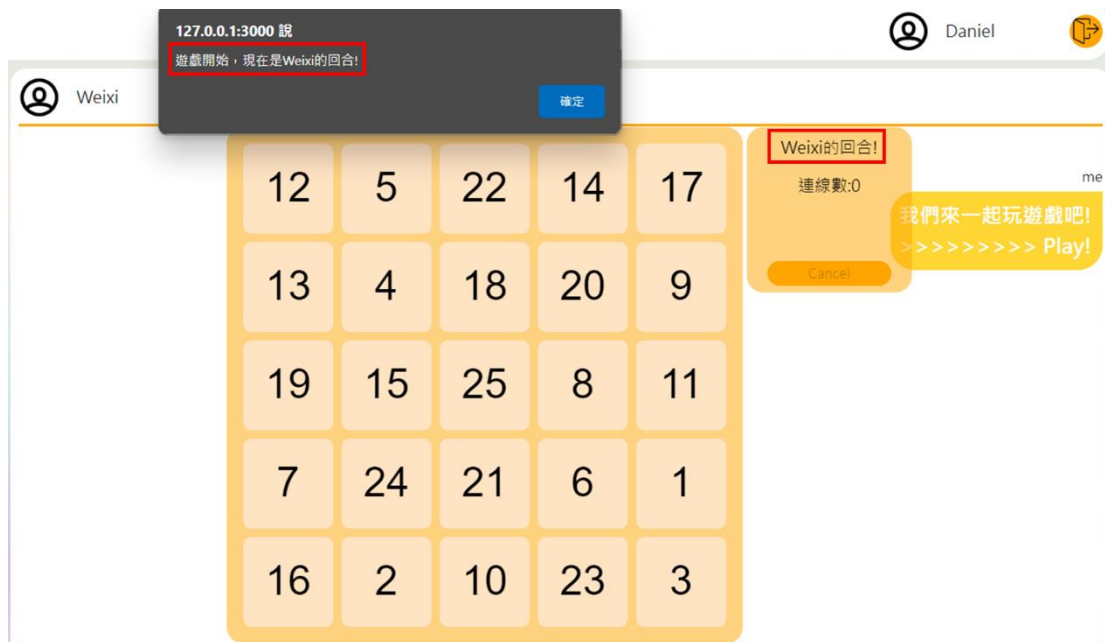


Figure 16. The view of player B who is not assigned to start the game at the beginning

Figures 17 and 18 show that when a player clicks on a number, it (e.g., 13) should be sent to the other player and marked.

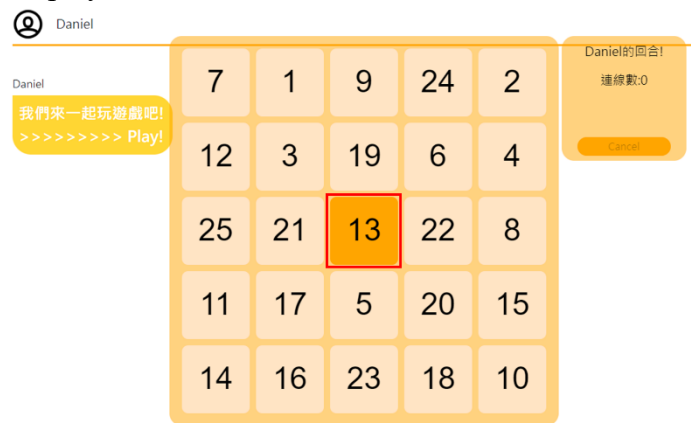


Figure 17. The view of player A who selects a number 13.

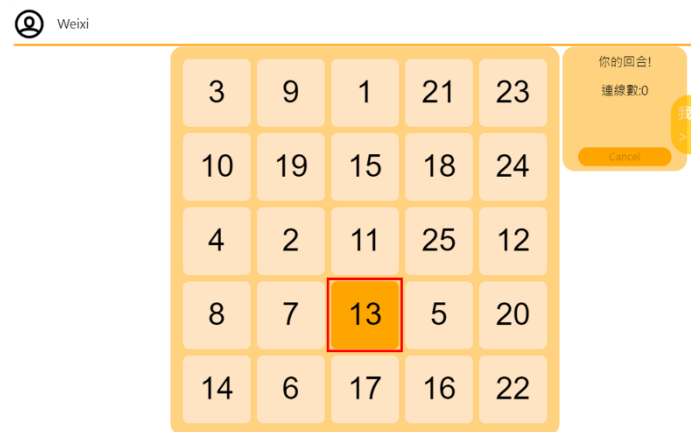


Figure 18. The view of player B who can see the number selected by player A.

As shown in Figure 19, the selected numbers are arranged on the Bingo card in a horizontal, vertical, or diagonal line. After selecting a number, the number of lines should be displayed and updated in the “game status.”



Figure 19. The number of lines is displayed in the “game status.”

As shown in Figure 20, when a player completes five lines before their opponent, he or she wins the game. An alert window displays a “Win” or “Lose” message, asking if the player wants to continue playing. If the player selects “Yes,” the game will be reset. If not, the game will be terminated.

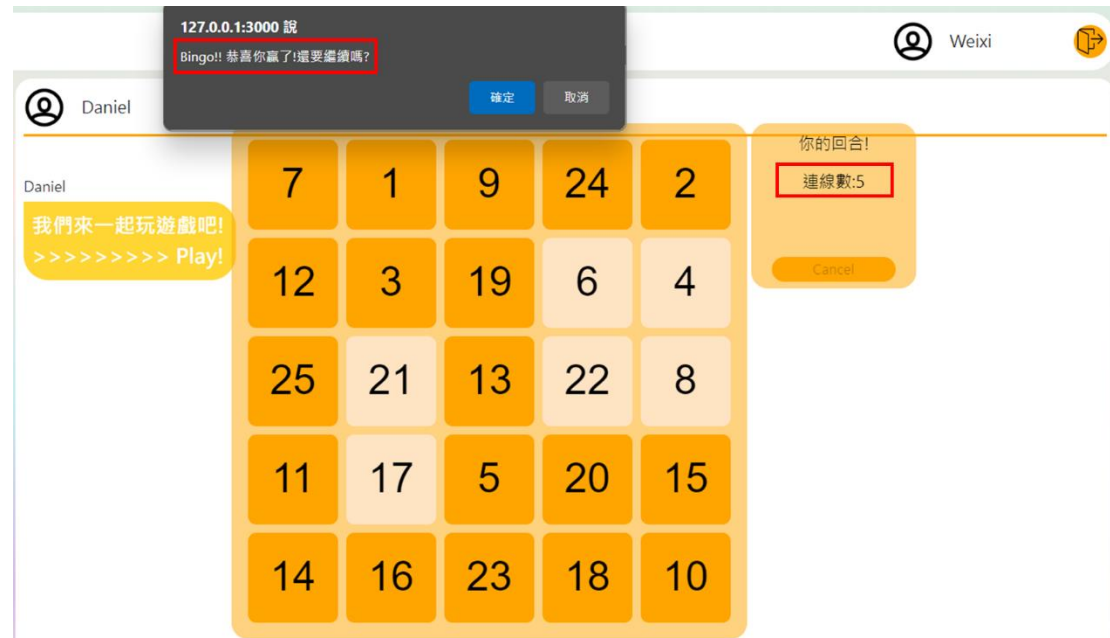


Figure 20. Ending of the game.

4.6.4 Bonus (10%)

You can add new and creative gameplay to the Bingo game as long as it follows the original game mechanics.

For example, you can add a random “lucky number” and “bad number” into the game. When a player selects a lucky number, they get a chance to choose another number exclusive to the player. The other player cannot select this number. When a player selects a bad number, it is considered invalid, unable to arrange a line, and cannot be chosen again. However, it remains a valid number for the other player.

Note that if your creative gameplay is similar to the example above, you will obtain only 80% of the score. Otherwise, you can obtain the full score if it is entirely different.

5. Background

5.1 express-session

express-session is a node.js module that can help you complete the user login function. For more information, please refer to:

<https://www.npmjs.com/package/express-session>

5.2 Socket.io

Socket.io is one of the important techniques used in this assignment to create real-time bi-directional communication for a chat room. For more information, please refer to:

<https://socket.io/>

Hint: In this assignment, to implement a one-to-one chat room, please check the room function of socket.io.

6. How to submit your assignment

6.1 How to submit your assignment

The procedure for submitting your assignment can be found on our document website (<http://www.dmp2024.csie.io/homework/submit>).

6.2 What should be submitted

Please place the assignment under the “hw5” directory in your Apache document directory, and name your assignment “index.html.” For example, the link of your page should be “www.dmp2024.csie.io:3000/your-nodejs-port”. Make sure that you can view this assignment from the class page. You should submit your assignment to GitLab and deploy your website on your server. You should record a demo video to show each function in your assignment and upload it to YouTube.

7. Grading policy

Graders will test your homework only on Google Chrome in 1920*1080. **The homework submitted late will be accepted for up to 7 days after the due date and will receive an automatic 30% penalty. Homework submitted more than 7 days after the due date will not be accepted. Only one final submission (either one on-time or one late submission) is accepted. Your assignment will not be graded without a demo video. You should explain all the functions of your work in the demo video. The link to your demo video should be submitted to eCourse. The TA(s) will mark and give points according to the following grading policy:**

System layout	Login page			5%	
	Chat room page	Part 1	Chat room button	3%	
			Number of online users	2%	
			List of online users	5%	
		Part 2	Display the username	5%	
			Message display area	5%	
			Message input area	5%	
Chat room functions	Sending text messages	Message input		5%	
		Message display		5%	
	The message display area for the group chat			5%	
	Sending pictures	One-to-one		5%	
		Group		5%	
	Notification	One-to-one		5%	
		Group		5%	
	Sending emojis	Emoji list		7%	
		Use emojis		3%	
	Playing Bingo game	Game invitation	Game invitation message		1%
			Click on the message and show the game interface		4%
		Game interface	Part 1		4%
			Part 2		1%
		Game rules	Assign random number		2%
			Waiting message		1%
			Cancel button		1%
			Display whose turn it is		1%
			Click on the number and send it to the rival		4%
			Arrange lines		3%
			Show game results		3%
		Bonus			10%

