

# Testing Document

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## bigBang

*A Gobang game with “big” features*

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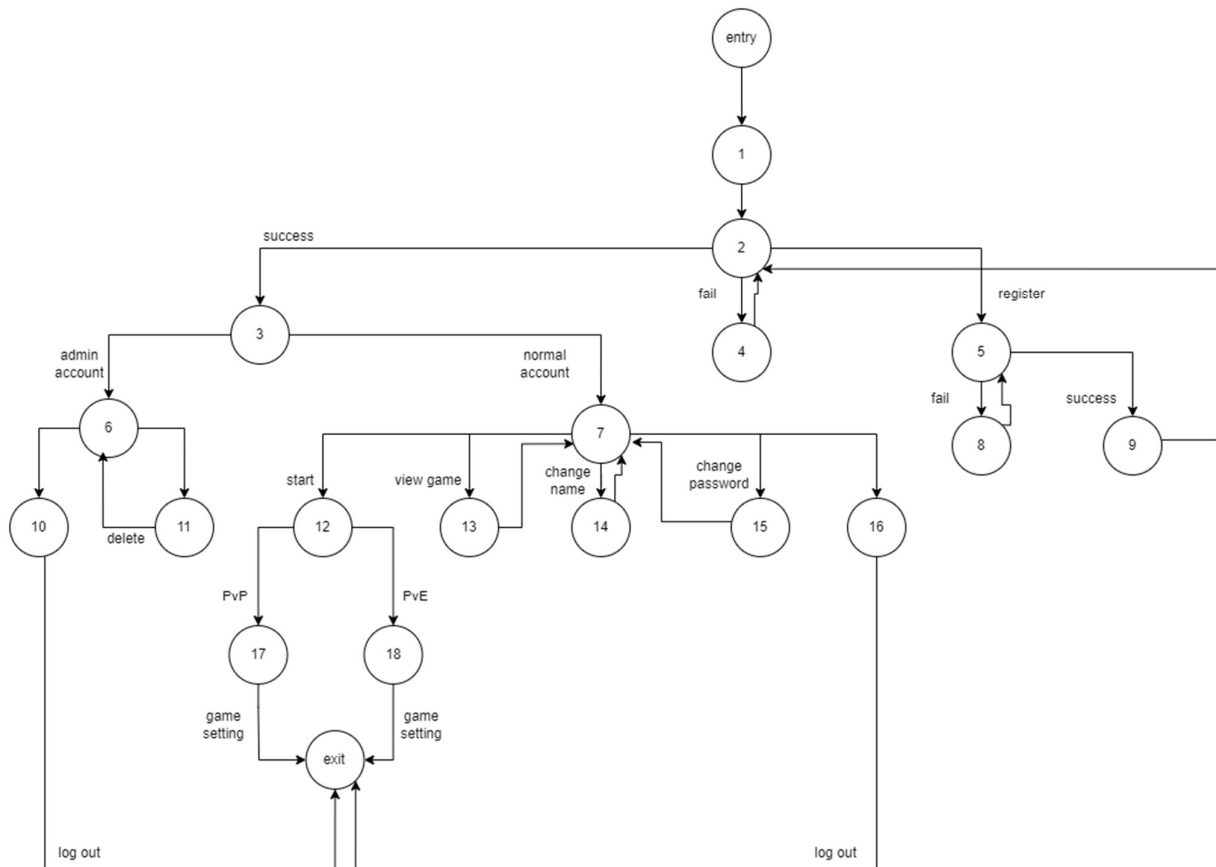
## I. TEST PLAN

To ensure the correctness and robustness of our software, we conducted both white-box testing and black-box testing. All the testing's were performed manually and were recorded accordingly. All the test paths in white-box testing were aimed at covering the four test selection criteria. All the test cases in black-box testing were aimed at covering the functionalities in our software. All the test results were observed by our tester directly. Below are the details of our testing. Each test path includes the event sequence path, and execution result. Each test case includes the path of operation, input, expected behavior, and actual behavior.

## II. TEST CASES

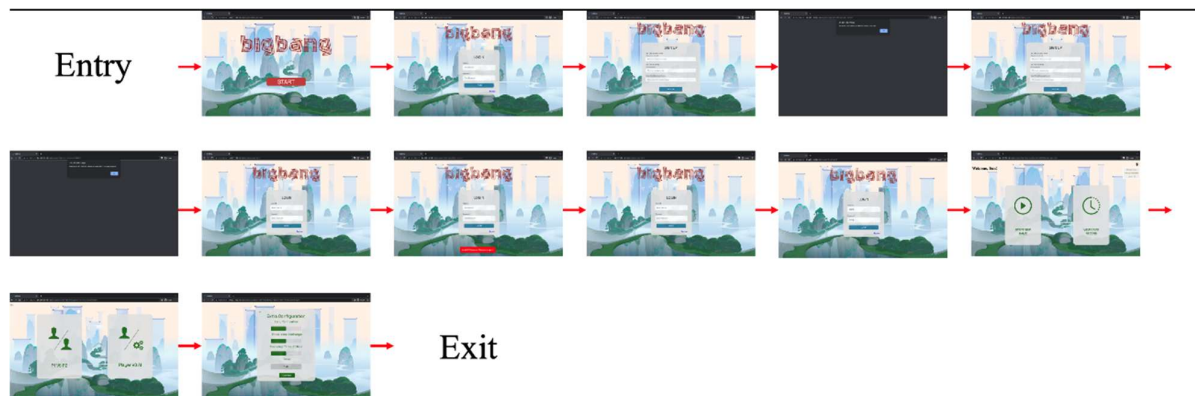
### II.I User Management

#### II.I.I White-box Testing



**Path 1:** Entry→1→2→5→8→5→9→2→4→2→3→7→12→17→Exit

**Description:** This path is aim at testing the flow of fail and successful registration, login, and start new game.



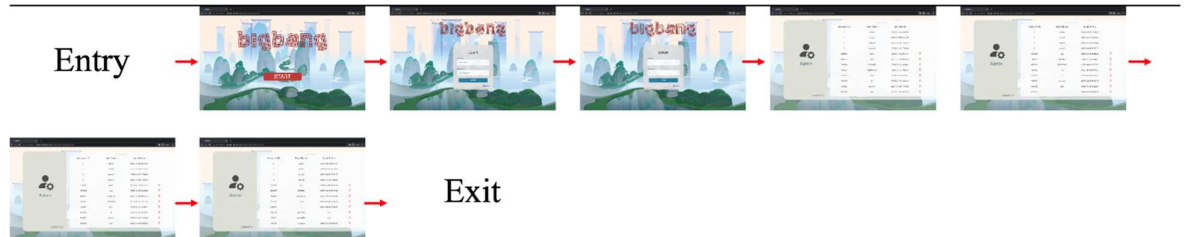
**Path 2:** Entry→1→2→3→7→12→17→Exit

**Description:** This path is aimed at testing the flow of successful login and entering PvP game.



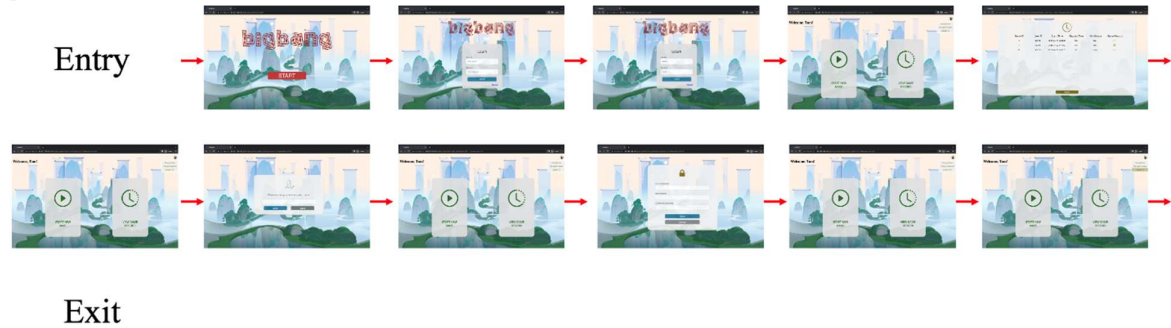
**Path 3:** Entry→1→2→3→6→11→ 6→10→Exit

**Description:** This path is designed for testing the flow of administration.



**Path 4:** Entry→1→2→3→7→13→7 →14→7→15→7→16→Exit

Description: This path is designed for testing the flow of view game record, change name, change password, and logout.



#### Remarks:

The entry of user management module is: <http://34.237.159.19/bigBang/user/Welcome.html>

The exits can be either logout or entering game module.

### II.I.I Black-box Testing

#### Register

Test case 1:

Purpose	To test creating a new account
Input	Name: (empty) Password: (empty) Enter Password Again: (empty)
Expected Output	Reminder appears to require entry
Pass/ Fail Criteria	To test fails if user creates an account with empty entry
Actual Output	Reminder appears to require entry

Test Case 2:

Purpose	To test creating a new account
Input	Name: acc Password: 12345678 Enter Password Again: 12345611
Expected Output	Reminder appears to require same inputs for password
Pass/ Fail Criteria	To test fails if user creates an account with different passwords in the confirmation of password
Actual Output	Reminder appears to require same inputs for password

Test Case 3:

Purpose	To test creating a new account
Input	Name: acc Password: 12345678 Enter Password Again: 12345678
Expected Output	Reminder is appeared to tell user the name is duplicated with another user
Pass/ Fail Criteria	To test fails if user creates an account with current exist name
Actual Output	Reminder is appeared to tell user the name is duplicated with another user

Test Case 4:

Purpose	To test creating a new account
Input	Name: name1234 Password: 12345678 Enter Password Again: 12345678
Expected Output	Return an account ID for user to login
Pass/ Fail Criteria	To test pass if user creates an account with proper entry
Actual Output	Return an account ID for user to login. Pop up reminder: Here is your ID: 615517. Please remember the ID for login purpose!

## **Login**

Test case 1:

Purpose	To test login function
Input	Account: (empty) Password: (empty) Enter Password Again: (empty)
Expected Output	Reminder appears to require entry
Pass/ Fail Criteria	To test fails if user enter account with empty entry
Actual Output	Reminder appears to require entry

Test case 2:

Purpose	To test login function
Input	Account: 615517 Password: 11223344
Expected Output	Pop up reminder: Invalid ID/ Password! Please enter again!
Pass/ Fail Criteria	To test fails if user enter account with wrong password
Actual Output	Pop up reminder: Invalid ID/ Password! Please enter again!

Test case 3:

Purpose	To test login function
Input	Account: 615517 Password: 12345678
Expected Output	Login success and direct to Start Page for normal user
Pass/ Fail Criteria	To test pass if user enter correct account and password
Actual Output	Login success and direct to Start Page

Test case 4:

Purpose	To test login function
Input	Account: 0 Password: 0
Expected Output	Login success and direct to Admin Page for normal user
Pass/ Fail Criteria	To test pass if admin correct account and password
Actual Output	Login success and direct to Admin Page

### **Account Management (for admin)**

Test case:

Purpose	To test delete account function
Input	Click on the trash bin button
Expected Output	Record of the deleted account will disappear in list table
Pass/ Fail Criteria	To test the button of required function
Actual Output	Record of the deleted account will disappear in list table

### **Account Management (for normal user)**

Test case 1:

Purpose	To test change name function
Input	New account name: (empty)
Expected Output	Reminder appears to require entry
Pass/ Fail Criteria	To test fails if user enter new account name with empty entry
Actual Output	Reminder appears to require entry

Test case 2:

Purpose	To test change name function
Input	New account name: acc
Expected Output	Reminder is appeared to tell user the name is duplicated with another user
Pass/ Fail Criteria	To test fails if user creates an account with current exist name
Actual Output	Reminder is appeared to tell user the name is duplicated with another user

Test case 3:

Purpose	To test change name function
Input	New account name: 3388
Expected Output	Change name successfully without any duplicated with other users
Pass/ Fail Criteria	To test fails if user creates an account with current exist name
Actual Output	Change name successfully without any duplicated with other users. (Pop up reminder: You name is changed!)

Test case 4:

Purpose	To test change password function
Input	Current Password: 12345 New Password: 12345678 Confirm New Password: 12345678
Expected Output	Reminder is appeared for wrong current password
Pass/ Fail Criteria	To test fails if user change password with wrong current password
Actual Output	Reminder is appeared for wrong current password (Pop up reminder: Wrong current password!)

Test case 5:

Purpose	To test change password function
Input	Current Password: 1234578 New Password: 12345678 Confirm New Password: 12345678
Expected Output	Reminder is appeared for the same current and old password
Pass/ Fail Criteria	To test fails if user change password is same with current password
Actual Output	Reminder is appeared for the same current and old password (Pop up reminder: New password should be different from old password.)

Test case 6:

Purpose	To test change password function
Input	Current Password: 1234578 New Password: 11223344 Confirm New Password: 11223344
Expected Output	Change password successfully
Pass/ Fail Criteria	To test pass if user change password with correct requirement
Actual Output	Change password successfully. (Pop up reminder: Your password changed successfully!)



## **Start Game**

Test case 1:

Purpose	To test the setting function of game
Input	Click on “P1 vs P2” button Enter room number: 1101 Extra Configuration: { Early Termination: OFF Three-step Exchange: ON Five-step Three Strikes: OFF Timer: NULL}
Expected Output	Send the setting of game to game and direct to Game Page
Pass/ Fail Criteria	To test pass if user set the game mode and start the game in PvP mode
Actual Output	Direct to Game Page with proper game setting

Test case 2:

Purpose	To test the setting function of game
Input	Click on “Player vs AI” button Click on “Medium” button
Expected Output	Send the proper game mode and direct to Game Page
Pass/ Fail Criteria	To test pass if user set the game mode and start the game in PvE mode
Actual Output	Direct to Game Page with proper mode

## **View Game Record**

Test case 1:

Purpose	To test the view game record function
Input	Click on “View Game Record” button
Expected Output	Show all the record of corresponding player in a table
Pass/ Fail Criteria	To test pass if user can see all their game record
Actual Output	Show all the record of corresponding player in a table

Test case 2:

Purpose	To test the print history game board function
Input	Click on game board icon
Expected Output	Print the final game board of the required turn
Pass/ Fail Criteria	To test pass if user can see their final game board of the turn
Actual Output	Print the final game board of the required turn

## II.II Game Control

This part is testing for game control, we will test if all functions in game control will work correctly.

### II.II.I Basic Game Control

#### **Place piece**

Test Case 1:

Purpose	To place a piece
Input	Click on a place on the board where it has no piece exist
Expected output	A piece appears on the board at this place
Pass/ Fail Criteria	The test fails if the color is wrong, or the piece doesn't appear
Actual Output	A piece appears on the board at this place

Test Case 2:

Purpose	To click on the existing place
Input	Click on a place on the board where it has a piece exist
Expected output	No piece appears on the board at this place
Pass/ Fail Criteria	The test fails if there is a piece appears at this place
Actual output	No piece appears on the board at this place

Test case 3:

Purpose	To click on the board when it's not player's turn
Input	Click on a place on the board when it's not this player's turn
Expected output	No piece appears on the board at this place
Pass/ Fail Criteria	The test fails if there is a piece appears at this place
Actual output	No piece appears on the board at this place

#### **Game Over**

Test case 1:

Purpose	To test end game criteria (when the game ends)
Input	Five same color pieces on the same row/column/diagonal line
Expected output	The game ends
Pass/ Fail Criteria	The test fails if the end game information doesn't appear, and the player can still place the piece
Actual output	The game ends

Test case 2:

Purpose	To test end game criteria (when the game doesn't ends)
Input	Five different color pieces on the same row/column/diagonal line
Expected output	The game doesn't end, player can still place pieces
Pass/ Fail Criteria	The test fails if the game ends and player cannot place pieces
Actual output	The game doesn't end, player can still place pieces

## **Undo**

Test case 1:

Purpose	To test undo and accept undo from another player
Input	Player 1 click undo, player 2 click accept
Expected output	Two previous pieces are removed from board
Pass/ Fail Criteria	The test fails if pieces are not successfully removed, or only one piece is removed
Actual output	Previous two pieces is removed

Test case 2:

Purpose	To test undo and decline undo from another player
Input	Player 1 click undo, player 2 click decline
Expected output	The board remains unchanged
Pass/ Fail Criteria	The test fails if some pieces are removed, or the player to drop the piece is incorrect
Actual Output	The board remains unchanged

Test case 3:

Purpose	To test undo and drop piece
Input	Player 1 click undo, then player 1 click on the board
Expected output	Player 1 cannot click on the board before there is decision from player 2
Pass/ Fail Criteria	The test fails if he is able to drop a new piece
Actual Output	Player 1 can still place a piece, failed

Test case 4:

Purpose	To test undo and surrender
Input	Player 2 click undo, then he click surrender
Expected output	Game ends, player 2 lose
Pass/ Fail Criteria	The test fails if game doesn't end or player 1 lose
Actual Output	Game ends, player 2 lose

Test case 5:

Purpose	To test undo and surrender
Input	Player 2 click undo, then player 1 click surrender
Expected output	Game ends, player 1 lose
Pass/ Fail Criteria	The test fails if game doesn't end or player 2 lose
Actual Output	Game ends, player 1 lose

Test case 6:

Purpose	To test undo and timer
Input	Player 2 click undo, then player 1 doesn't click accept or decline
Expected output	The timer stops
Pass/ Fail Criteria	The test fails if the timer continues
Actual Output	The timer continues, test failed

Test case 7:

Purpose	To test undo and Three-step exchange
Input	Player 2 click Three-step exchange, after exchange he click undo
Expected output	An undo will do successfully, but the color will not exchange back, and three-step exchange is not allowed anymore
Pass/ Fail Criteria	The test fails if undo cannot perform successfully, or color exchange again, or white piece can still do three-step exchange
Actual output	An undo will do successfully, but the color will not exchange back, and three-step exchange is not allowed anymore

Test case 8:

Purpose	To test undo and Five-step three strikes
Input	Player 1 has to do Five-step three strikes, after this player 2 clicks undo
Expected output	An undo will do successfully, and player 1 will do Five-step three strikes again
Pass/ Fail Criteria	The test fails if undo cannot perform successfully, or player 1 won't do Five-step three strikes again
Actual output	An undo will do successfully, and player 1 will do Five-step three strikes again

## **Surrender**

Test case 1:

Purpose	To test surrender
Input	Player 1 click surrender
Expected output	Game ends, player 1 lose
Pass/ Fail Criteria	The test fails if the game doesn't end, or a wrong player lose
Actual output	Game ends, player 1 lose

## **Network/ Online playing**

Test case 1:

Purpose	To test exit room and back
Input	Player 1 exit when it's in the game, and then enter back to the same room
Expected output	It's the same board, and same turn respectively
Pass/ Fail Criteria	The test fails if the board changes, or it's not the original player's turn
Actual output	The game board changes, test failed

Test case 2:

Purpose	To test if there is a visitor
Input	Player enter a room with 2 players playing the game
Expected output	Displayed "visitors are not allowed" and denied access to the room
Pass/ Fail Criteria	The test fails if the visitor can still enter the room
Actual output	Displayed "visitor are not allowed", and cannot enter the room

## **Different Game Mode**

Test case 1:

Purpose	To test random mode
Input	Anywhere on the board
Expected output	AI will drop randomly
Pass/ Fail Criteria	The test fails if AI no output, or AI drop wrong color pieces, or AI doesn't drop randomly
Actual Output	AI drop randomly

Test case 2:

Purpose	To test medium mode
Input	Anywhere on the board
Expected output	AI will drop somewhere near the piece if there's a potential/actual 活三 or 冲四
Pass/ Fail Criteria	The test fails if AI no output, or AI drop wrong color pieces, or AI doesn't drop at a reasonable place
Actual Output	AI drop somewhere reasonably to have an attack/ defense (and AI wins sometimes)

Test case 3:

Purpose	To test hard mode
Input	Anywhere on the board
Expected output	AI will drop somewhere near the piece if there's a potential/actual 活三 or 冲四
Pass/ Fail Criteria	The test fails if AI no output, or AI drop wrong color pieces, or AI doesn't drop at a reasonable place
Actual Output	AI drop somewhere reasonably to have an attack/ defense (and AI has a high win rate)

## II.II.II Extra Configuration

Test case 1:

Purpose	Check whether Timer works correctly when only Timer function is opened.
Inputs	Set the Timer to 10 seconds and check whether the Timer of the two players is the same and will the game ends when one of the players runs out of time.
Expected Outputs	The timer reduces one each second, and when player 2 run out of his time, player one win. No matter what happens, two timers on each player's screen should be the same.
Pass/ Fail Criteria	The test fails if anything unexpected happens, like two timers are not the same, or the game is not ended when time out.
Actual Output	Pass. Everything went as expected, without any errors.

Test Case 2:

Purpose	Check whether the "Five-step Three Strikes" module works correctly when no other function interference.
Inputs	Try placing a piece in the places where already exit pieces and where it is already chosen. Then choose three places in the corner to let the

	other player select. The other player does not select where chosen by the first player.
Expected Outputs	The black player cannot put a piece in the places where they already exist pieces or where it is already chosen, and the site selected by the white player will be seen as illegal if it's not the places chosen by the black player.
Pass/ Fail Criteria	If the black player selects less or more than three blanks, or the white player chooses an illegal place successfully, the test fails.
Actual Output	Pass. Everything went as expected, without any errors.

Test Case 3:

Purpose	Check whether the “Three-step Exchange” function can be handled when a user only selects this enhancement rule.
Inputs	When three black pieces are placed on the gobord, and then the white player presses the “Exchange” button. Then finish the game.
Expected Outputs	The previous black player should now be changed to white and placed in the following white piece.
Pass/ Fail Criteria	If the previous black player cannot place white pieces or when the game ends, the system gives out the wrong winner message, and the test fails.
Actual Output	Pass. Everything went as expected, without any errors.

Test Case 4:

Purpose	Test whether the Redo and Timer function react correctly when called at the same time.
Inputs	Set a timer to 90 seconds and press the “redo” button many times. Sometimes accept, and others refuse.
Expected Outputs	No matter what is chosen, the timer should show time correctly. And when one player presses the undo button, time should be paused and waiting for the other player's response.
Pass/ Fail Criteria	The test fails if any player's timer is still running when waiting for a response or the timer returns when the players withdraw his piece.
Actual Output	Pass. Everything went as expected, without any errors.

Test case 5:

Purpose	Test whether the Redo and Five-step Three Strikes functions react correctly when called at the same time.
Inputs	After and before the Five-step Three Strikes function is executed, try the Redo button and accept.
Expected Outputs	Five-step Three Strikes functions should be called gracefully whenever it comes to the five steps of the black player.

Pass/ Fail Criteria	This test fails if the Five-step Three Strikes function cannot be called or executed wrongly, as the black player can only select two or fewer positions or the white player cannot select places correctly.
Actual Output	Fail. The second B performed after Redo did not work properly, the position selected by the white player was not correctly responded to the server, and the server kept the result of the last selection.

Test case 6:

Purpose	Test whether the Redo and Three-step Exchange functions react correctly when called at the same time.
Inputs	Try redoing the button after the Three-step Exchange function is executed.
Expected Outputs	Players could not go back to the status before the exchange happened.
Pass/ Fail Criteria	If the players get the goboard before the exchange, exchanges happen often.
Actual Output	Pass. Everything went as expected, without any errors.

Test case 7:

Purpose	Test whether the Surrender and Timer functions react correctly when called at the same time.
Inputs	When either of the players runs out of his time, click the surrender button.
Expected Outputs	The other player will win, and the timer should be stopped. The timer should be the same no matter what happens.
Pass/ Fail Criteria	If the two timers for each player show any difference from the corresponding timer for the other player, or if either timer does not stop working after a player clicks surrender, the test fails.
Actual Output	Fail. After a player surrenders, the final clock results for both players are shown differently

Test case 8:

Purpose	Test whether the Surrender and Five-step Three Strikes functions react correctly when called at the same time
Inputs	Press the surrender button when the Five-step Three Strikes function is running.
Expected Outputs	The game ends immediately, and print out the winner.
Pass/ Fail Criteria	The game does not stop, or any unexpected happens.
Actual Output	Pass. Everything went as expected, without any errors.



Test Case 9:

Purpose	Test whether the Surrender and Three-step Exchange functions react correctly when called at the same time.
Inputs	After Three-step Exchange is executed, one of the players clicks the surrender button.
Expected Outputs	The game ends immediately, and print out the winner.
Pass/ Fail Criteria	Print out a wrong or different winner on different players' screens.
Actual Output	Pass. Everything went as expected, without any errors.

Test Case 10:

Purpose	Test whether the Timer and Five-step Three Strikes react correctly when called at the same time.
Inputs	Do Five-step Three Strikes when the Timer is turned on.
Expected Outputs	When the white player chooses one of the three pieces placed by the black player, the black player's clock should stop running, and the white player's remaining time should decrease continuously.
Pass/ Fail Criteria	If the opposite of the predicted situation occurs, the test fails.
Actual Output	Fail. While waiting for another player to choose, it still consumes the time of the player who sent the request, which leads to an unfair game.

Test Case 11:

Purpose	Test whether the Timer and Three-step Exchange functions react correctly when called at the same time.
Inputs	Do Three-step Exchange when the Timer is turned on.
Expected Outputs	The clock should take time correctly under all circumstances.
Pass/ Fail Criteria	The test fails if anything unexpected happens, like two timers are not the same, or the game is not ended when time out.
Actual Output	Pass. Everything went as expected, without any errors.

Test Case 12:

Purpose	Test whether the Five-step Three Strikes and Three-step Exchange functions react correctly when called simultaneously.
Inputs	Execute both Five-step Three Strikes and Three-step Exchange functions in a regular game.
Expected Outputs	The game usually ends.
Pass/ Fail Criteria	Any unforeseen circumstances or early termination of the game
Actual Output	Pass. Everything went as expected, without any errors.