

Remote_Checkers Test Case Document

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Revision History

| Member | Date | Change |
|-----------------------|--------|---|
| Olyarnik | 3/1/17 | Document Layout, First Drafts of Introduction and Menu Interactions sections (r0.1.0) |
| Macco | 3/2/17 | First draft of End-Game section (r0.2.0) |
| Olyarnik | 3/2/17 | First draft of Glossary and References sections (r0.3.0) |
| Thompson | 3/3/17 | First draft of Gameplay section r(0.4.0) |
| Olyarnik | 3/4/17 | First draft of Image Glossary section (r0.5.0) |
| Nghe | 3/4/17 | Second drafts of Gameplay and End-Game sections with updated steps and requirements, use-cases lists (r0.6.0) |
| Olyarnik, Thompson | 3/5/17 | Completion of Submission Draft (r.1.0.0) |

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1. Introduction

1.1 Purpose of Document

This document will provide a list of test cases for the Remote_Checkers system. These test cases will be used during the verification of the finished system.

1.2 Overview of Document

The provided test cases are organized according to their area of relevance in the system, namely within the Checkers Game or on one of the menus external to it. The focus is placed on testing user interactions, and as such the testing of non-functional requirements is not covered by this document. All test cases take the following format:

Id: The unique identification number for this test case, of the form Tx.x.x.

Req: The Requirement (R) or Use Case (UC) relevant to this test case. Requirements and Use Cases are defined in the Requirements Document.^[1]

Description: A general summary of the test case.

Steps: Numbered instructions to perform the test, including any preconditions (designated as step 0) or references to other tests.

Expected Results: A summary of the postconditions of performing this test.

Actual Results: Space left blank, to be filled in after performing this test.

Comments: Space left blank, to be filled in after performing this test.

2. Menu Interactions

Id: T2.0.1

Req: UC6.2.13

Description: Getting help from the Main Screen

Steps:

- 0) User has launched the application and is on the Main Screen.
- 1) User clicks the "Help" button.

Expected Results: The Help Window is launched, displaying the basic rules of Checkers and instructions how to use the application.

Actual Results:

Comments:

Id: T2.0.2

Req: UC6.2.14

Description: Viewing connection settings

Steps:

- 0) User has launched the application and is on the Main Screen.
- 1) User clicks the "Settings" button.

Expected Results: The Settings Screen is launched, displaying the Server IP Address currently stored in the config.txt file.

Actual Results:

Comments:

Id: T2.0.3

Req: UC6.2.15

Description: Editing connection settings

Steps:

- 0) User is viewing connection settings (see T2.2).
- 1) User enters anything in the IP Address text field (sample data: "localhost", "myipc", "69.89.31.226", "127.0.0.1", "0").
- 3) User clicks the "Save" button and is returned to the Main Screen.
- 4) User clicks the "Settings" button.

Expected Results: The Settings Screen is launched again, displaying the IP Address that was just entered. This value has been saved into the config.txt file. NOTE that this test does not guarantee that a Server exists at the provided IP Address, only that the stored value can be updated.

Actual Results:

Comments:

Id: T2.0.4

Req: UC6.2.15

Description: Editing Connection Settings (Bad Data)

Steps:

- 0) User is viewing connection settings (see T2.2).
- 1) User blanks the IP Address text field.
- 2) User clicks the "Save" button.

Expected Results: A Message is displayed indicating that the field cannot be left blank. No changes have been saved and the user remains on the Settings Screen. NOTE that there is no immediate test for the validity of the entered IP Address, which could be given either numerically or as a string hostname. The connection to this IP Address is tested in T2.0.7.

Actual Results:

Comments:

Id: T2.0.5

Req: UC6.2.16

Description: Quitting the application from the Main Screen

Steps:

- 0) User has launched the application and is on the Main Screen.
- 1) User clicks the "Quit" button.

Expected Results: The program and all windows for the program terminate completely.

Actual Results:

Comments:

Id: T2.0.6

Req: UC6.1.1, R7.1.2

Description: Trying to connect without a running Server

Steps:

- 0) User has launched the application and is on the Main Screen. The Server component is not running at the IP Address specified on the Settings Screen.
- 1) User clicks the "Start Game" button.

Expected Results: A Message is displayed indicating that a connection could not be established.

Actual Results:

Comments:

Id: T2.0.7

Req: UC6.1.1, R7.1.2

Description: Trying to connect to the Server with invalid connection settings

Steps:

- 0) User has launched the application and is on the Main Screen.
- 1) User clicks the "Settings" button.
- 2) User enters incorrect data for the IP Address. (sample data: "z", "22", "INVALID").
- 3) User clicks "Save" button and is returned to the Main Screen.
- 4) User clicks "Start Game" button.

Expected Results: A Message is displayed indicating that a connection could not be established.

Actual Results:

Comments:

Id: T2.0.8

Req: UC6.2.1, R2.2.3, R5.1.1, R5.1.2, R5.1.4, R6.1, R6.2, R7.1.1, R7.1.2, R7.1.4, R7.1.5

Description: Successfully connecting to the Server

Steps:

- 0) User has launched the application and is on the Main Screen. The Server component is already running at a known IP Address.
- 1) User clicks the "Settings" button.
- 2) User enters the correct data for the Server's IP Address (sample data: if the Server is running on the same computer as the Client, enter "localhost" for IP).
- 3) User clicks "Save" button and is returned to the Main Screen.

4) User clicks “Start Game” button.

Expected Results: The Game Screen with the gameboard UI is launched. A Message informing the user of their color is displayed. If user is the first Player to connect, a Message will be displayed indicating that the Game is waiting for an opponent. If user is the second Player to connect, a Message will be displayed indicating whether it is their turn or not. See Figure 1.

Actual Results:

Comments:

3. In-Game Interactions

Id: T3.0.1

Req: R1.1.1, R1.1.2, R1.1.3, R1.1.4, R1.1.5, R2.2.3, R5.1.1, R5.1.4, R6.1, R6.2

Description: Viewing the Game Screen

Steps:

0) User is on the Game Screen (see T2.0.8).

Expected Results: At the top of the screen, user's color, turn, and score are displayed.

A graphical 8x8 checkerboard is displayed, with 12 Pieces of the user's color on the 12 black squares closest to the bottom of the Board. See Figure 2.

Actual Results:

Comments:

Id: T3.0.2

Req: R5.4

Description: Getting help from the Game Screen

Steps:

0) User is on the Game Screen (see T2.0.8).

1) User clicks the "Help" button.

Expected Results: The Help Window is launched, displaying the basic rules of Checkers and instructions how to use the application.

Actual Results:

Comments:

3.1 Gameplay

Id: T3.1.1

Req: UC6.1.4, R5.1.3

Description: Selecting any Space when not the Active Player

Steps:

0) User is on the Game Screen and viewing the "Opponent's Turn, Please Wait..." Message.

1) User clicks any Space on the Board.

Expected Results: Action is ignored; No change to the system's state.

Actual Results:

Comments:

Id: T3.1.2

Req: UC6.1.2

Description: Selecting an empty Space

Steps:

- 0) User is on the Game Screen (see T2.0.8).
- 1) User clicks any white Space or empty black Space.

Expected Results: Action is ignored; No change to the system's state.

Actual Results:

Comments:

Id: T3.1.3

Req: UC6.1.3

Description: Selecting an opponent's Piece

Steps:

- 0) User is on the Game Screen (see T2.0.8).
- 1) User clicks any Piece of the opponent's color.

Expected Results: Action is ignored; No change to the system's state.

Actual Results:

Comments:

Id: T3.1.4

Req: UC6.1.5, R1.2.4, R1.2.5

Description: Selecting a Piece when another can Jump

Steps:

- 0) User is on the Game Screen and viewing the "Your Turn - Select a Piece to Move" Message. User controls at least one Piece that can make a Jump (see T3.1.8, T3.1.12).
- 1) User clicks a Piece which cannot make a Jump.

Expected Results: Action is ignored; No change to the system's state.

Actual Results:

Comments:

Id: T3.1.5

Req: UC6.2.2, R1.2.1, R1.2.3, R2.2.1, R2.2.4, R6.1, R6.2, R6.3

Description: Selecting a Man to Step

Steps:

- 0) User is on the Game Screen and viewing the "Your Turn - Select a Piece to Move" Message. User does not control any Piece that can make a Jump (see T3.1.8, T3.1.12).
- 1) User clicks a Man that has at least one empty Space located one square diagonally forward from their current position. See Figure 2.

Expected Results: Greenspaces will appear on the Board to signify valid Spaces the selected Man can Step into. See Figure 3.

Actual Results:

Comments:

Id: T3.1.6

Req: UC6.2.3, R1.2.1, R1.2.10, R2.2.2, R2.2.4, R2.2.5, R6.1, R6.2, R6.3

Description: Selecting a Greenspace to Step Into

Steps:

- 0) User has selected a Piece to Step and is viewing Greenspaces (see T3.1.5).
- 1) User clicks a Greenspace.

Expected Results: The last-selected Piece moves into the selected Greenspace. All other Greenspaces return to black Spaces. User's turn ends. Both the user and the opponent's Boards are updated. See Figure 4.

Actual Results:

Comments:

Id: T3.1.7

Req: UC6.2.2, R1.2.5, R2.2.4, R6.1, R6.2, R6.3

Description: Selecting a new Piece when Greenspaces are displayed

Steps:

- 0) User has selected a Piece to Step and is viewing Greenspaces (see T3.1.5, T3.1.11).
- 1) User clicks another Piece they control.

Expected Results: The Board is updated to remove the current Greenspaces and instead show Greenspaces for the newly selected Piece.

Actual Results:

Comments:

Id: T3.1.8

Req: UC6.2.2, R1.2.2, R1.2.3, R2.2.1, R2.2.4, R6.1, R6.2, R6.3

Description: Selecting a Man to Jump

Steps:

- 0) User is on the Game Screen and viewing the “Your Turn - Select a Piece to Move” Message.
- 1) User clicks a Man that has at least one opponent’s Piece located one square diagonally forward from their current position, and an empty Space one square diagonally forward past that on the same diagonal.

Expected Results: Greenspaces will appear on the Board to signify valid Spaces the selected Man can Jump into. See Figure 5.

Actual Results:

Comments:

Id: T3.1.9

Req: UC6.2.4, UC6.2.5, R1.2.1, R1.2.6, R2.2.2, R2.2.4, R2.2.5, R6.1, R6.2, R6.3

Description: Selecting a Greenspace to Jump Into

Steps:

- 0) User has selected a Piece to Jump and is viewing Greenspaces (see T3.1.8, T3.1.12).
- 1) User clicks a Greenspace.

Expected Results: The last-selected Piece moves into the selected Greenspace. All other Greenspaces return to black Spaces. The opponent’s Piece that was Jumped is removed from the Board. If the last-selected Piece can make additional Jumps, those Greenspaces are highlighted. Otherwise, user’s turn ends. Both the user and the opponent’s Boards are updated. See Figure 6.

Actual Results:

Comments:

Id: T3.1.10

Req: UC6.2.6, R1.2.7, R1.2.8, R1.2.10, R2.2.4, R2.2.5, R6.1, R6.2

Description: Getting Crowned

Steps:

- 0) User has selected a Man to Step or Jump and is viewing Greenspaces (see T3.1.5 and T3.1.8).
- 1) User clicks a Greenspace in the top row of the Board.

Expected Results: The last-selected Piece moves into the selected Greenspace. All other Greenspaces return to black Spaces. The moved Piece becomes a King. User's turn ends. Both the user and the opponent's Boards are updated.

Actual Results:

Comments:

Id: T3.1.11

Req: UC6.2.2, R1.2.1, R1.2.9, R2.2.1, R2.2.4, R6.1, R6.2, R6.3

Description: Selecting a King to Step

Steps:

- 0) User is on the Game Screen and viewing the "Your Turn - Select a Piece to Move" Message. User does not control any Piece that can make a Jump (see T3.1.8, T3.1.12). User has successfully Crowned one of their Pieces (see T3.1.10).
- 1) User clicks a King that has at least one empty Space located one square diagonally forward or diagonally backward from their current position.

Expected Results: Greenspaces will appear on the Board to signify valid Spaces the selected King can Step into. See Figure 7.

Actual Results:

Comments:

Id: T3.1.12

Req: UC6.2.4, R1.2.2, R1.2.9, R2.2.1, R2.2.4, R6.1, R6.2, R6.3

Description: Selecting a King to Jump

Steps:

- 0) User is on the Game Screen and viewing the “Your Turn - Select a Piece to Move” Message. User has successfully Crowned one of their Pieces (see T3.1.10).
- 1) User clicks a King that has at least one opponent’s Piece located one square diagonally forward or diagonally backward from their current position, and an empty Space one square diagonally forward or backward past that on the same diagonal.

Expected Results: Greenspaces will appear on the Board to signify valid Spaces the selected King can Jump into. See Figure 8.

Actual Results:

Comments:

3.2 End-Game

Id: T3.2.1

Req: UC6.2.7, R1.3.1, R1.3.2, R1.3.3, R5.1.4

Description: Winning the Game

Steps:

- 0) User has selected a Piece to Step or Jump and is viewing Greenspaces (see T3.1.5, T3.1.8).
- 1) User clicks a Greenspace which either Jumps the opponent’s last Piece OR results in the opponent having no legal Moves.

Expected Results: User receives a “You win!” Message with their score (incremented by 1) and the opponent’s score underneath. The rematch prompt window is displayed.

Actual Results:

Comments:

Id: T3.2.2

Req: UC6.2.8, R1.3.1, R1.3.2, R5.1.4

Description: Losing the Game

Steps:

0) User is on the Game Screen and viewing the “Opponent’s Turn, Please Wait” Message. Opponent wins the Game (see T3.2.1).

Expected Results: User receives a “You lose!” Message with their score and the opponent’s score (incremented by 1) underneath. The rematch prompt window is displayed. NOTE that the user does not directly take any action in this case.

Actual Results:

Comments:

Id: T3.2.3

Req: UC6.2.9, R1.3.4, R5.1.4

Description: Ending in a Draw

Steps:

- 0) User has selected a Piece to Step or Jump and is viewing Greenspaces (see T3.1.5, T3.1.8).
- 1) User clicks a Greenspace which either results in a Board configuration that has shown up twice before, OR the turn ending with no Jumping or Crowning in the last fifty turns.

Expected Results: User receives a “Draw!” Message with their score and the opponent’s score (both remaining the same) underneath. The rematch prompt window is displayed. NOTE that the expected behavior is the same for a draw which occurs at the end of the opponent’s turn.

Actual Results:

Comments:

Id: T3.2.4

Req: UC6.2.10, R1.3.3, R5.2, R5.1.4

Description: Forfeiting the Game

Steps:

- 0) User is on the Game Screen.
- 1) User clicks the “Resign” button, and a window is displayed asking if the user is sure they want to forfeit.
- 2) User clicks the “Yes” button.

Expected Results: The confirmation window closes. User receives a “You lose!” Message with their score and the opponent’s score, incremented by 1 underneath. The rematch prompt window is displayed.

Actual Results:

Comments:

Id: T3.2.5

Req: UC6.2.10, R5.2

Description: Deciding not to forfeit the Game

Steps:

- 0) User is on the Game Screen.
- 1) User clicks the “Resign” button, and a window is displayed asking if the user is sure they want to forfeit.
- 2) User clicks the “No” button.

Expected Results: The confirmation window closes and the Game continues normally.

Actual Results:

Comments:

Id: T3.2.6

Req: UC6.2.11, R3.2.1, R3.2.2, R3.2.3, R7.1.3

Description: Choosing to rematch with the same opponent

Steps:

- 0) The Game has ended by normal means or a forfeit and the rematch prompt window is displayed.
- 1) User clicks the “Yes” button.

Expected Results: If the opponent also chose to rematch, Players’ colors and turn order will be switched and a new Game will be started. If the opponent chose not to rematch, a window is displayed informing the user as such and that they have been disconnected from the Server. The user is returned to the Main Screen.

Actual Results:

Comments:

Id: T3.2.7

Req: UC6.2.12, R3.2.1, R3.2.2, R3.2.3, R7.1.3

Description: Choosing not to rematch with the same opponent

Steps:

- 0) The Game has ended by normal means or a forfeit and the rematch prompt window is displayed.
- 1) User clicks the “No” button.

Expected Results: A window is displayed informing the user that they have been disconnected from the Server. The user is returned to the Main Screen.

Actual Results:

Comments:

Id: T3.2.8

Req: R4.1.3, R7.1.3

Description: Disconnecting from a Game

Steps:

- 0) User is on the Game Screen (see T2.0.8).
- 1) User loses their internet connection and disconnects from the Server.

Expected Results: A window is displayed informing the user that they have been disconnected from the Server. The user is returned to the Main Screen.

Actual Results:

Comments:

Id: T3.2.9

Req: R4.1.3, R7.1.3

Description: Quitting the application from the Game Screen

Steps:

- 0) User is on the Game Screen (see T2.0.8).
- 2) User clicks the corner “X” button to close the application.

Expected Results: The user disconnects from the Server. The program and all windows for the program terminate completely.

Actual Results:

Comments:

Id: T3.2.10

Req: R1.3.3, R4.1.3, R7.1.3

Description: Having the opponent disconnect from a Game

Steps:

- 0) User is on the Game Screen and has been matched with an opponent (see T2.0.8).
- 3) The opponent disconnects from the Server (see T3.2.8, T3.2.9).

Expected Results: User receives a “You win!” Message with their score (incremented by 1) and the opponent’s score underneath. A window is displayed informing the user that they have been disconnected from the Server. The user is returned to the Main Screen. NOTE that the user does not directly take any action in this case.

Actual Results:

Comments:

4. Glossary

Active Player - The Player whose turn it is.

Board - Either the Server's abstract model representation of the current Game's checkerboard, or the Client's graphical representation of the same.

Checkers - The Game being emulated. Players move their Pieces diagonally across the board to try and capture all of their opponent's Pieces.^[2]

Client - Program which the Player interacts with. Displays a graphical representation of the Server's gameboard, which Players can click to make Moves. Player actions will be sent in Message form to the Server for validation, at which point the Board will be updated.

Crowning - The act of a Player moving one of their Pieces all the way to the opposite end of the Board, at which time it becomes promoted to a King.

Game - A single instance of a two-Player session of Checkers, created, stored, and updated by the Server. Holds the state of the Board and implements the rules.

Greenspace - A Space highlighted on the Board as a valid location for the Active Player to move their most recently selected Piece into.

Internet Protocol (IP) Address and Port - Information that a Client needs about a Server in order to make a network connection. The IP Address uniquely identifies the machine running Server code, and the Port specifies a channel where the Server is listening to accept potential connections.

Java - The coding language used for development of Remote_Checkers.

Jump - A Checkers Move where one Player “jumps” their Piece over an opponent’s Piece in the Space directly diagonal. The opponent’s Piece is captured. If a Player can make a Jump on their turn, they must do so.

King - A promoted Piece which can move backwards.

Man - A normal Checkers Piece.

Message - Text sent from Server to Client or Client to Server. The receiver parses the text and decides how to act on it.

Move - The act of a Player choosing a Piece and then a Space to move that Piece into. Either a Step or a Jump.

Piece - A single Checker, either a Man or a King, which a Player controls and moves around the Board.

Player - A physical human playing the Game, done by interacting with a Client instance unique to them.

Remote_Checkers - The Game being designed, allowing two Players to play a Game of Checkers from separate locations over a network connection.

Server - Program which handles main Game facilitation. Starts a Game and allows Clients to connect to it to play. Manages any running Games.

Space - A single one of the 64 squares making up the Board. A Space can either be white, empty black, black with a blue Man, black with a red Man, black with a blue King, or black with a red King. Remote_Checkers also defines Greenspaces as Spaces marked as valid Moves for the Active Player. The Server also designates Spaces as “Valid”, acceptable selections of Pieces for the Active Player to move, but these are not visually different from regular Pieces.

Step - The basic Move of moving a Piece into an empty forward-diagonal Space.

5. Image Glossary

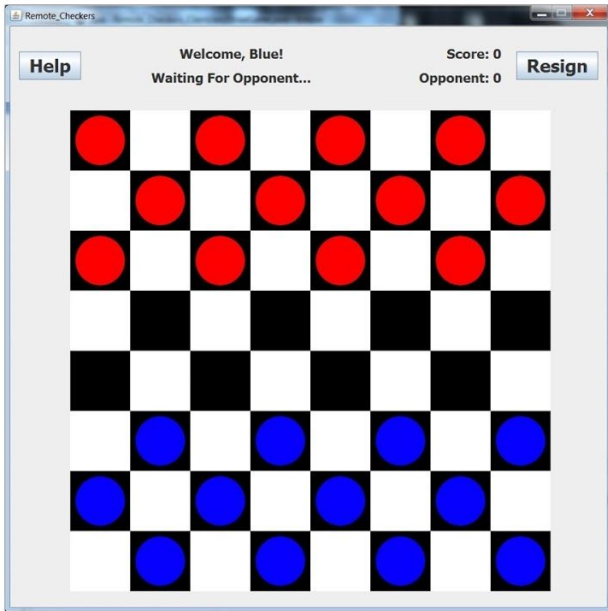


Figure 1: Waiting for Opponent

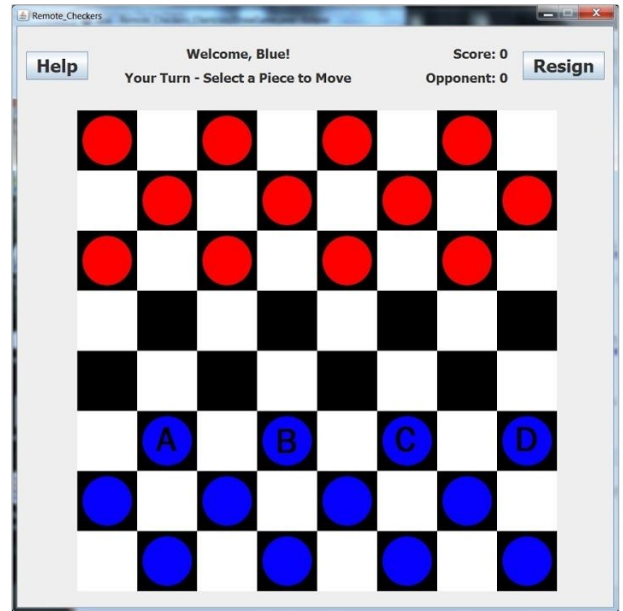


Figure 2: Active Player's View. A, B, C, and D are all legal selections to Step.

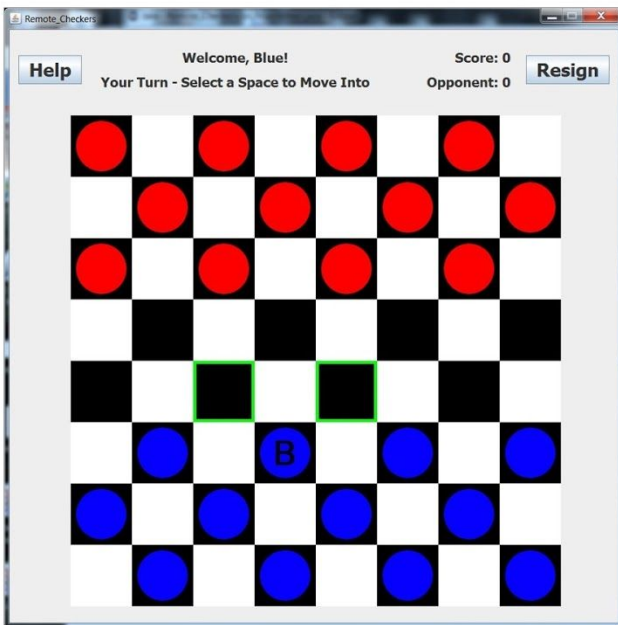


Figure 3: Valid Steps. The highlighted Spaces are legal selections for B to Step into.

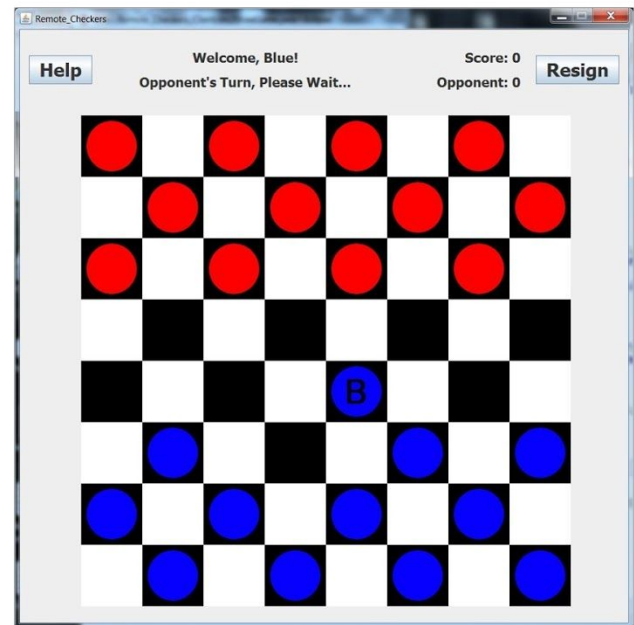


Figure 4: The resulting Board after Stepping Piece B.

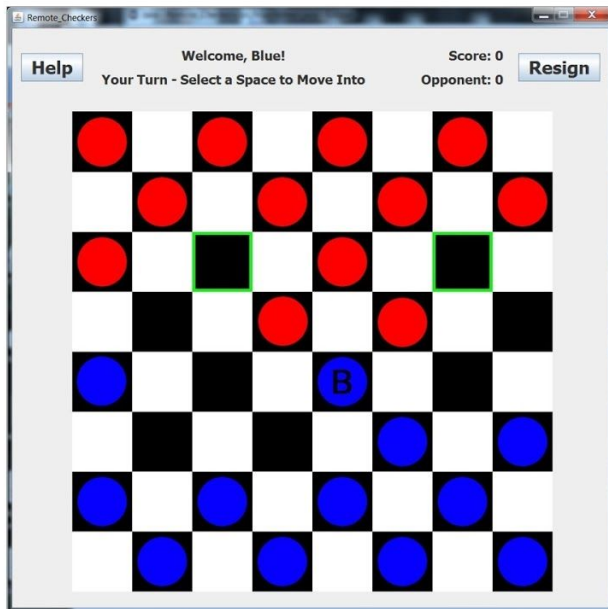


Figure 5: Valid Jumps. The highlighted Spaces are legal selections for B to Jump into.

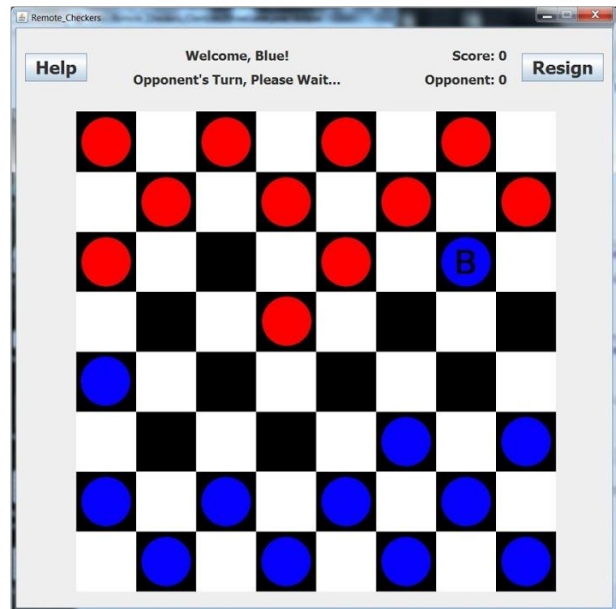


Figure 6: The resulting Board after Jumping Piece B.

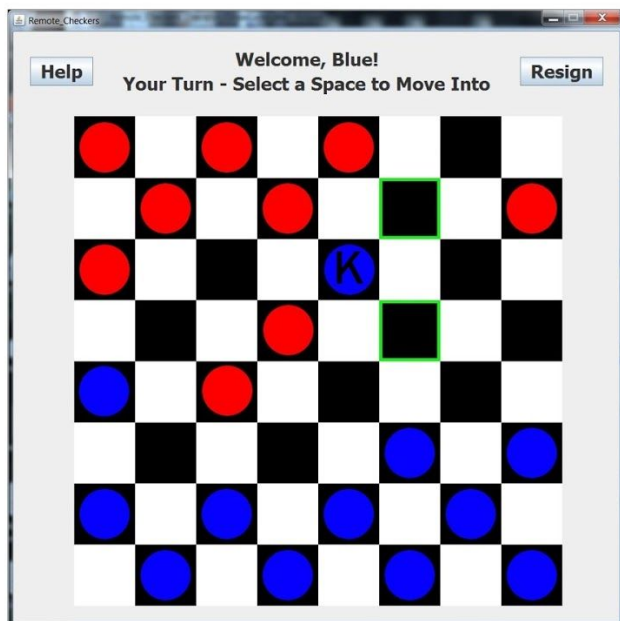


Figure 7: The highlighted Spaces are legal selections for the King to Step into.

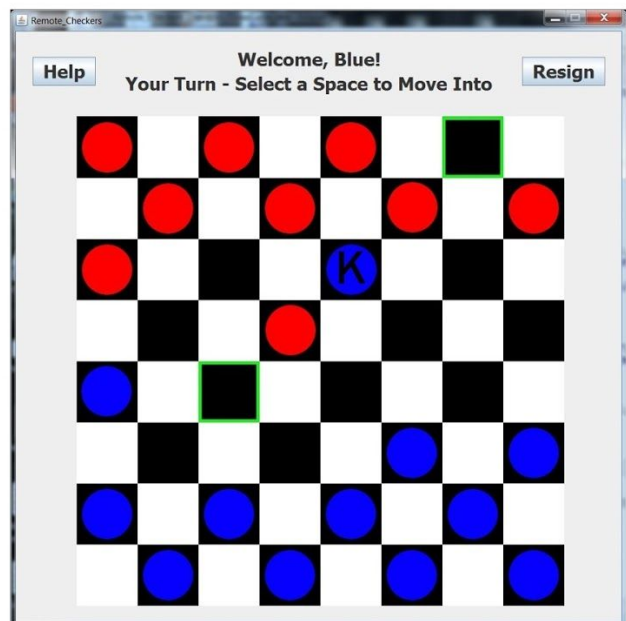


Figure 8: The highlighted Spaces are legal selections for the King to Jump into.

6. References

- [1] Macco, et. al. Remote_Checkers Requirements Specification. Philadelphia, PA, United States, 2017.
- [2] https://www.itsyourturn.com/t_helptopic2030.html#helpitem1197