Software Engineering GP02 Project

User Interface Specification

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# Introduction

This document is our user interface design specification, created to guide our development of the program as well as being a visual reference from which we can all work from. In the chess tutor requirements, it states that the two main functions of this program are as follows:

1. To help users learn the valid moves in the game of chess, and to enforce those rules.

2. To allow to human players to use the game to play a game of chess.

## Purpose of this Document

The purpose of this document is to describe the main use cases of our program and give visual reference for each developer for the visual structure of the project.

## Scope

This document is for detailing the user specifications for this project by listing all of the needs of each type of user.

This document should be read by all project members and understood thoroughly by both the UI and systems programmers.

## Objectives

The objective of this document is to explain/list the typical users, list all the use cases and further detail how this will affect the development of the project. Finally, this document will go through all the error conditions to help avoid problems when it comes time to code the project.

# Typical users

## General Users

## Beginner

The beginner will be new to chess, but not new to computers or Windows programs. The UI will need clear icons for each piece as well as the moves they can make, as this user may not know what can be done when selecting each from the board. There will also need to be a clear indication of which person is currently playing as well as which colour the user is.

## Expert

The expert will have a good understanding of chess and will not require much tutoring to get started with the program. However, this player may have certain expectations when it comes to the UI, with things like drag and drop being expected when playing. It is also important to not clutter the UI for this type of user as they would become frustrated with hints that while helpful for beginners, would becoming irritating for a more experienced player.

## Example Users

### Mary is long sighted and has never played chess but has a basic knowledge of computers and interacting with Microsoft Windows. They will start a new game and select white. The large icons and simple UI will make it easier for Mary to interact with the game, as well as the indications as to where each piece can be moved to will be helpful for them.

### Mohammad is a teacher and chess expert, who runs an after-school chess club for the students. The indicated permissive play positions will not hinder the playing style of an expert such as Mohammad. The replay function allows for Mohammad to play a game, and step through each of the moves to explain to the class.

### Elon is an extremely busy person, who very rarely finds time to complete a full game of chess, with their friend Jeff. The save function is very useful as it allows them to start and pause their game and return at a later date to finish it.

# USe cases

## Use cases list

UC01 - Start new game.

User selects the ‘start new game’ button from the menu options. This button will lead to the player selecting their desired start colour, and also showing the opponents colour as well (see UC02)

UC02 – Selecting player colours

Once the user has selected start game, they will then be presented with an option to choose start colour (either white or black). The user then selects their chosen colour by selecting the tick box next the colour they wish to use. The game will assign their chosen colour to the user and the other colour to their opponent.

UC03 - Select piece

The user will select a piece when it is their go. The available options for the given piece that the user has selected, will be highlighted on the screen with dots in the centre of the available piece destination squares.

UC04 - Move piece

Described in UC03, the user will select their chosen piece. To move the piece, they will simply have to select the destination square that they wish to move the piece to.

UC05 - Remove piece from the board

When a game is in progress and there is an option for the user to take their opponents piece, the square that their opponents piece is on will be highlighted as an available move. The user will take their opponents piece, and the removed piece will be shown off the board at the side of the screen, it will remain there for the rest of the game or until it is brought back into play with USB05.

UC06 – Promoting a pawn

When a user pawn has successfully moved across the board, the pawn can be promoted to either: a bishop, a rook, a knight, or a queen. A box will appear with those options, and the user can pick what piece they want. Once picked, the piece replaces the pawns location.

UC07 – Save game

If the user wants to save the game they are currently playing, they will click the ‘Save Game’ button. A file explorer window will appear asking the user to select a location they wish to save the game in. They will then need to navigate to their desired location.

UC08 - Load game

On the main menu, the user will select the ‘load game’ button. A file explorer window will appear, and the user will navigate to the folder that the game saves are stored in and select the save file they wish to load. The game will then display the selected chess game on the board in the state that it was saved in.

UC09 - Replay game

When replaying a game, the user will first select the ‘replay game’ button. A file explorer window will appear, and the user will need to navigate to the folder that the game saves are stored in and select the save file they wish to load. The game will then have an option for the user to ‘step through’ the replayed games moves.

UC10 – Quit

For any available ‘Quit’ button, the user will select the quit button, and a dialogue box will appear asking the user if they’re sure they want to quit. Clicking ‘yes’ will quit the game, clicking ‘no’ will close the dialogue box and return to the screen the user was previously on.

UC11 - See all potential moves for selected piece

As stated in UC03, when the user selects a piece, the available moves will be highlighted on the screen, with dots in the centre of either the empty spaces, or the space containing an opposition piece that can be taken.

UC12 - See all removed pieces

Removed pieces will be displayed at the side of the screen for the entirety of the game, unless one of the pieces is replacing a pawn, in which case that piece will be removed from the side of the screen and returned to the board, and the pawn that has been swapped will be moved to the side of the board.

UC13 - Prompt Castling move

When a castling move is valid and available to the user, the user will be shown a lower opacity version of the pieces in the respective cells that they would move to, should the player choose to castle. This will be different from the normal dots that are shown to indicate where the user can move a piece to, as having lower opacity pieces allows for more obvious state of play once the move has been made.

UC14 – Check

If a player has reached a point where their king is in check, the cell the king is located in will be highlighted in yellow to indicate to the player that they must move out of check. This can be done by either moving the king itself, or by moving another piece to ‘defend’ the king. If the player selects the king, in order to take it out of check, any positions that the king would normally be able to move into but cannot in this instance as it would still be in check, will not be shown with a dot in the cell.

UC15 – Checkmate

If a player has reached a point where their king is in check and the king cannot be saved, the cell the king is located in will be highlighted in red and a popup indicating that the game is over will be displayed to both players. The details of this popup are covered in UC21.

UC16 – Back button

The player should be able to select a back button after pressing the start game button in case they change their mind or click on the wrong button and it should take them back to the main menu.

UC17 – Offer draw

Either player should be able to offer a draw to their opponent if neither side can win or both teams wish to end the game. There should be a draw button on the side bar that when pressed will prompt the other player to either accept or decline the request for a draw. If the offer is accepted then the game will end in a draw, if not then the game will continue.

UC18 – Resign button

During a game, either player should be able to resign the game at any time from a button. When pressed this will end the game in the favour of the opposing player and put them both at the main menu screen.

UC19 – Prompt en passant

If a pawn is side by side with an opposing pawn that has just moved two spaces forward (initial two square advance), then once a player selects that pawn they should be prompted to move said pawn behind its opposing pawn. Removing the opposing pawn from the game and putting the player’s pawn in a potentially stronger position. The player should give this prompt similarly to UC13 with a lower opacity piece.

UC20 – Toggle button

There will be a toggle button on the game screen that will allow you to turn off the chess piece prompts for more experienced players. Once pressed there will be no more visual cues about where you can place your chess pieces other than a chess piece not being placed when an illegal move is attempted by either player.

UC21 – End game

Once the game has been concluded, either through a draw, resignation, or checkmate. There will be a popup prompt detailing the result of the game and a button that once clicked, will take the players back to the main menu.

## Use Case Diagram

Diagram

Description automatically generated

# Error conditions

## Potential use case errors

EC01 - Pick colour

When the user has started a game, they will be prompted to choose their starting colour. The game will automatically set the oppositions colour to the opposing colour to the one selected by player 1. It will not allow for both players to be assigned to the same colour.

EC02 - Select piece

If the user attempts to select their opponents colour, the piece should not either show where the possible moves are.

EC03 - Move piece

If the user attempts to select their opponents colour to move, the piece should not be highlighted, or make any indication of movement if the piece is dragged to a different place.

User will not be allowed to move the King into check

The game will not allow for a pawn to move 2 places if it is not the first move for that pawn.

There should be no delay when selecting a piece, this will be an optimisation problem.

The pieces move according to the rules defined [2]. If the piece breaks the rules, it must return to its previous position for the user to try again.

EC04 - Remove piece

If user takes a piece, the game will remove the piece from the cell and place it at the side of the screen. The game will not allow for two pieces to reside in the same cell.

EC05 - Replace pawn with selected removed piece

When the user manages to move a pawn to the other side of the board, thus allowing for a promotion, they should not be able to select the pawn to swap for the pawn on the board.

EC06 - Load game

When the user attempts to load a game to continue playing, if the file selected is invalid, the game will notify them that the file is invalid

If the file format is incorrect, the program must relay that the file is ‘corrupted’ and avoid loading the file.

EC07 - Replay game

When the user attempts to load a game to replay, if the file selected is invalid, the game will notify them that the file is invalid

The replay game function should also not be able to run if the file is invalid or the user has not selected a file to replay

EC08 – Quit game

The Quit game button within the current game section of the program, should not immediately quit game without first prompting the user to save the game. Other quit game buttons that are not within this, are allowed to immediately to quit the game.

EC09 - See all potential moves for selected piece

Selecting the oppositions colour should not show any available moves for their pieces. Also, no moves should show if the user selects a piece at the side of the board that has been taken/removed from play.

EC10 - See previous move

The game should not attempt to show the previous move if the first move has not been played yet

EC11 - See all removed pieces

No pieces should be displayed to the side of the screen if there are no pieces that have been taken yet

EC12 - Prompt Castling move

The valid moves shown to the player for castling will be different from the normal dots shown. The game will instead show lower opacity versions of the pieces, in the positions where they will be, once the move has been finished

If there is a piece obstructing the rook and king, castling is not possible.

If the king has already moved, castling is not possible

EC13 – Check

When the either the king or the opponents king is in check, the game should not allow any moves to made that do not take the king directly out of check, whether this be by moving the king into another position where it is still in check, or moving another piece that does not directly take the king out of check

EC14 – Prompt en passant

The prompt shall be similar to EC12, where there shall be a lower opacity version of the piece, in the position they will be, once the move has been finished.

EC15 – Crashing

In the event of the program crashing, the game must be saved, ready to be continued on start-up.

EC16 – Offer Drawing

In the event of the drawn being ignored (The player makes a move or doesn’t do anything in a period) it must be assumed that the user denies the request and the prompt disappears. The prompt cannot stay up forever.

EC17 – Toggle button

If the toggle button is used to turn off the prompts, the chess pieces will still follow the rules. They should not be able to be placed randomly.

REFERENCES

[1] Software Engineering Group Projects: General Documentation Standards. C.W. Loftus. SE.QA.03. 2.5 Release

[2] Chess (2023) Wikipedia. Wikimedia Foundation. Available at: https://en.wikipedia.org/wiki/Chess (Accessed: February 19, 2023).

DOCUMENT HISTORY

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| 0.1 | N/A | 02-03-2023 | N/A - original version | TPR3 |
| 0.2 | N/A | 13-02-2023 | Added use case specifics | WIA14 |
| 0.3 | N/A | 16-02-2023 | Added error cases and use case corrections | WIA14 |
| 0.4 | N/A | 16-02-2023 | Added examples users | WIA14, JAB153 |
| 0.4.1 | N/A | 16-02-2023 | Minor changes and modifications | WIA14 |
| 0.4.2 | N/A | 17-02-2023 | Added Use Case Diagram and minor changes | WIA14, LVS1 |
| 0.5.0 | N/A | 17-02-2023 | Added 6 new use cases and changed formatting of error conditions | TPR3 |
| 0.5.1 | N/A | 19-02-2023 | Added 4 new error conditions and updated some old error conditions and use cases and added references | LVS1 |