Checkers But Chess

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Rules of Chess

1. 2 players (White and Black)

2. White moves first and each player takes turns moving a piece.

3. The game continues until one player is checkmated, resigns, or a draw.

4. Draw: There are conditions when a draw can happen

    a. A player is not in check but also does not have any legal moves. This results in a stalemate.

    b. Both players agree to draw after a player makes an offer to do so.

    c. When the same board position is played 5 times.

    d. When the game reaches a dead position

        i. King VS. King

        ii. King VS King and Bishop

        iii. King VS King and Knight

5. Checkmated: When one king is being attacked by a piece and there is no way for the king to get out of the check

6. Resigns: When a player forfeits the match.

Computer Chess

1. Introduction
   Welcome to the Checkers Chess Project! Designed by 5 UCI Students. This project attempts to recreate the game of Chess from scratch. This is the first team programming project of EECS 22L, "Software Engineering Project in C language".

   This project is designed to be an interesting exercise where you can practice all elements of software engineering and work in teams.

   In particular, you will practice specifying and documenting the software program, designing data structures and algorithms, designing software modules, writing original source code, testing and debugging the software program, and collaborating and communicating effectively in a team.

2. Goals
   The goal of this programming exercise is to design and develop a chess program in which a user can play interactive chess against the computer.

   Some of our goals include:
   1. Implementing GUI
   2. Implementing AI vs Player mode
   3. Implementing AI vs AI mode
   4. Implementing Player vs Player mode

3. Features
   Additional features we would like to implement in our program include the following:
   1. Using ASCII unicode for Chess Pieces
   2. Choosing between Player v Player and Player v AI
   3. Log file for moves

Installation

A. <u>System requirements</u>
        Linux, std=c11, gtk library
B. <u>Setup and configuration</u>
        Download tar.gz file and Makefile
        Extract tar.gz file with gtar xvzf
        [Linux] Type "make all" to build program
        [Linux] Type "./Checkers_But_Chess"
C. <u>Uninstalling</u>
        [Linux] Type "make clean"
        [Linux] Type "rm Makefile"
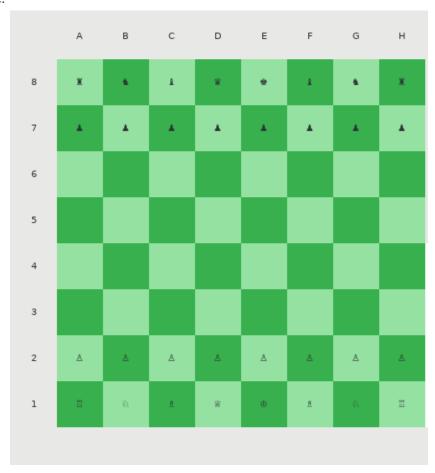
Chess Program: Functions/Features

Recall Features:

1. Using ASCII unicode for Chess Pieces
2. Choosing Player v Player
3. Player vs computer option
4. Log file for moves
5. Moving Pieces

Functions of Feature 1

    a. User input: N/A

    b. Program output: N/A

    c. Screenshot:

Functions of Feature 2
- a. User input: if selected 'player vs computer' option
- b. Program output: AI of varied level plays against player
- c. Screenshot:

Functions of Feature 3
- a. User input: mode of gameplay, options, player color choice (black or white)
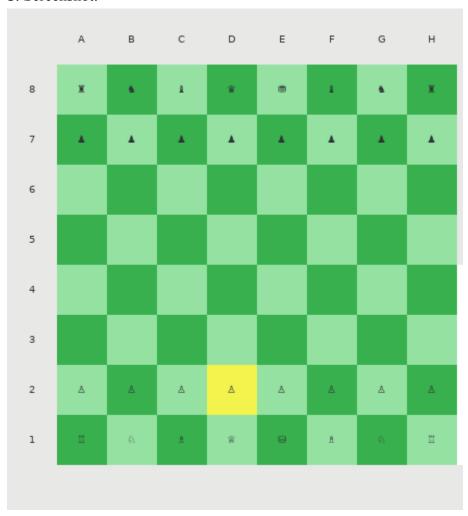- b. Program output: perform specified action following user input
- c. Screenshot:

Function for feature 4
   A .User input: moves pieces
   B. Program output: display move by player/computer with the piece, rank and file
   C. Screenshot:

1.E2 to E4 2.E7 to E5 3.D2 to D4 4.C7 to C5 5.F2 to F4 6.F7 to F5 7.D1 to G4 8.E8 to F7 9.G4 to H5 Black in Check 10.F7 to F6 11.H5 to G6 Black in Check 12.F6 to G6 13.C2 to C4 14.C5 to D4 15.E4 to F5 Black in Check 16.G6 to F5 17.F4 to E5

Function for feature 5

A.Two click (First click is the piece / Second is where you want to move)

B.Program Output: Highlights the piece you are moving

C. Screenshot:

Back Matter

A. Copyright

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E. Error messages
- Players doing an illegal move
- Installation fails

F. Index
1. GUI: Graphical User Interface

        Def. An interface that uses icons/menus, and a mouse to manage interaction with the system

2. AI: Artificial intelligence

        Def. The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, decision-making, etc., …

Glossary

1. King ♛

Slow piece that can move only one step in every direction – forward, backward, to the sides or diagonally. The King can capture any of the opponent's pieces that are standing in any square surrounding the King.

2. Queen ♛
   Can move in every direction – horizontally, vertically and diagonally. Unlike the King, however, the Queen can move in a straight line all the way to the other side of the board, stepping on every square that isn't taken up by another piece – making her the most powerful piece in the game of Chess. The Queen can capture a piece by landing directly on the other player's square.

3. Bishop ♝
   Can only move diagonally and step on any square that isn't taken up by another piece. If a Bishop starts the game on a Black square, he will only be able to step on Black squares for the rest of the game, and the same goes for a Bishop that starts the game on a White square. Similarly to the other pieces, the Bishop can only capture an opponent's piece by landing on the square that the piece is standing on.

4. Knight ♞
   Can move two squares forward or backward and one square to the side, or two squares to the side and one square forward or backward, so that his movements resemble the shape of an L. The Knight is the only piece in the game of Chess that can skip over the other pieces when it moves. Even though he can skip over squares while they are occupied by other pieces, the Knight can only capture a piece that is standing on the square he lands on.
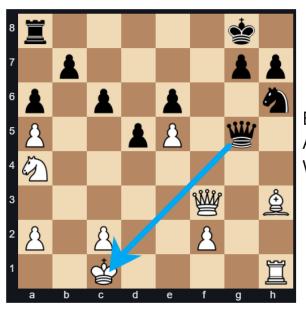
5. Rook ♜
   Can move in a straight line forwards and backwards through any square on the board that isn't occupied by another piece. To capture the other player's pieces, the Rook needs to land directly on the piece's square.

6. Pawn ♟
   Can only move forwards one step at a time. When they capture the other pieces they can only do so when the opponent's piece is on a square diagonally in front of them. If another piece is standing in front of the Pawn, he will not be able to keep moving. Only when they first move from the starting position, they can choose to jump over the square immediately in front of them, therefore moving forward by two squares. If a Pawn manages to reach the other side of the board he can be promoted to any piece of his liking except the King. Once the Pawn is promoted, he can move in the same way as the piece he was promoted to moves.

7. Check
   When the player's king is under the attack of a piece. The player with the king that is in check must get out of check before being able to move otherwise.

Black Queen
Attacking
White King

8. <u>Checkmate</u>
When a player's king has no possible escape while they are in check.

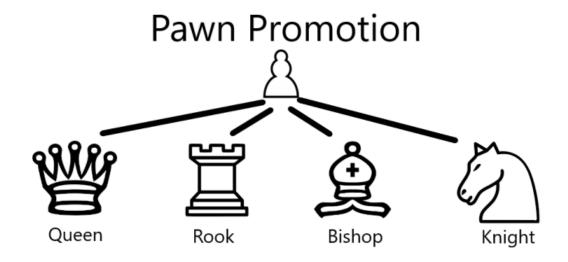White Queen attacks
Black King.

White Queen also
blocks escape route.

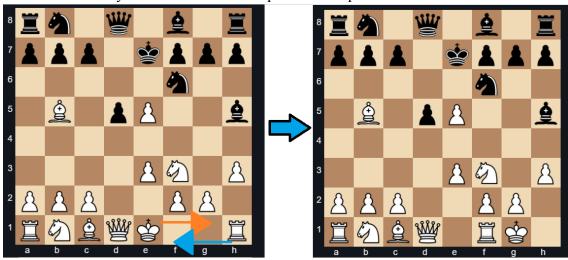9. <u>Resign</u>
When a player concedes the game.

10. <u>Pawn Promotion</u>
When a pawn advances to the 8th rank, the end of the board, the player can choose to promote the pawn into a queen, rook, bishop, or a knight.
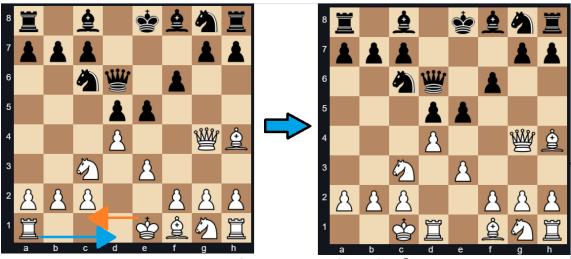
Pawn Promotion

Queen   Rook   Bishop   Knight

11. <u>Castling</u>

Moving the king two squares toward a rook, then placing the rook on the other side , adjacent to it. The conditions being the king and rook involved must not have moved previously to castling. There are no pieces in between the rook and the king. The king cannot be currently in check or will end up in a check position.
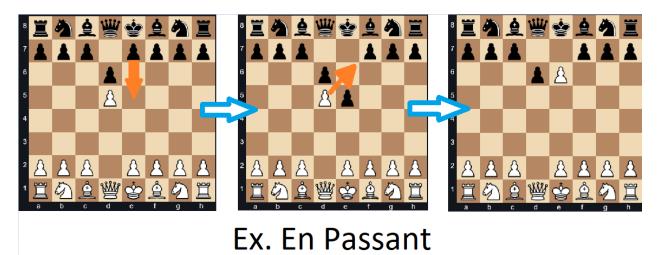

Ex. Castling to the right

Ex. Castling to the left

12. <u>En Passant</u>

When a pawn advances two squares from its original square and ends the turn adjacent to a pawn of the opponent's on the same rank. The pawn can capture the adjacent pawn.

Ex. En Passant