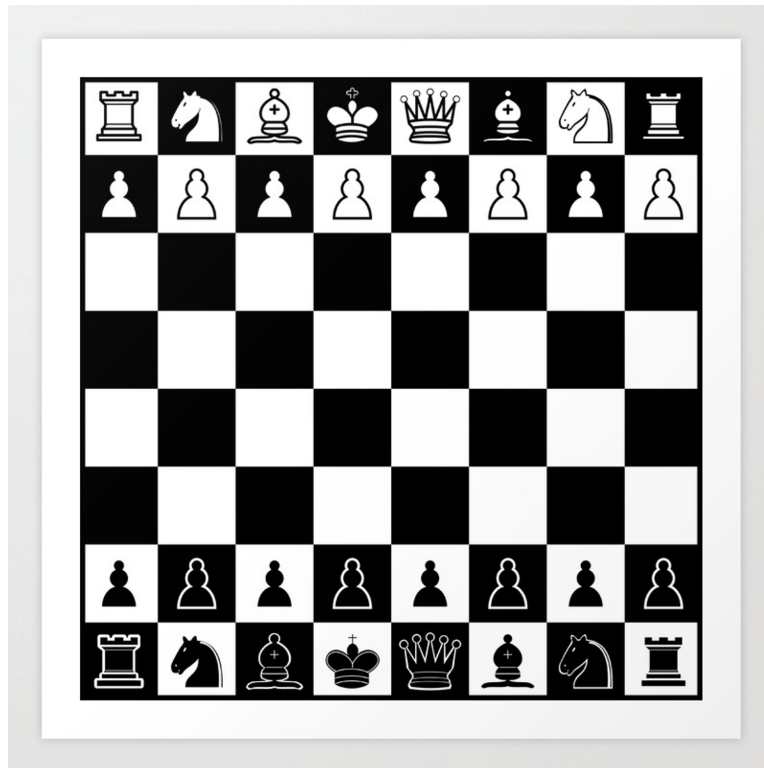


# **r/chess**

## **User Manual**



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**Software Version: 0.1**

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# Glossary of Chess Terms

## The Pieces

- The queen can move horizontally, vertically, and diagonally across the board.
- A rook can move horizontally and vertically across the board.
- A bishop can move diagonally across the board.
- A knight can jump to eight different squares which are two steps forward plus one step sideways from its current position.
- The king can move in any direction, but only one step at a time. Also, the king must never move into check.
- A pawn can move only forward towards the end of the board, but captures sideways. From its initial position, a pawn may make two steps, otherwise only a single step at a time. If the pawn reaches the end of the board, it is automatically promoted to another piece (usually a queen).

## Other Terms

- Check - Check is a condition that occurs when a player's king can be captured by the opponent on the next turn. A player must get out of check in the next move.
- Checkmate - Checkmate occurs when a player's king is checked and there is no possible move for the king to escape the check. If a player's king is checkmated, the player loses the game.
- File - Each column on the chess board is called a file.
- Rank - Each row on the chess board is called a rank.
- Castle - Castling allows the two pieces, the king and a rook to move at the same time in one move. The king can either move two spaces to the left or to the right while the rook desired to perform castling jumps across to the other side of the king, ending up being right next to the king.  
In order to castle though,
  - The king and the rook you want to castle with cannot have moved.
  - There must not be any pieces in between the king and the rook
  - The king cannot be in check.
  - The king cannot be in check after castling has taken place.
- En passant - May occur right after one player moves a pawn two squares forward and the opposing pawn could have captured the same pawn had it moved one square forward.

# Computer Chess

## Usage Scenario

8	bR	bN	bB	bQ	bK	bB	bN	bR
7	bP		bP	bP	bP	bP	bP	bP
6								
5		bP						
4								
3			wP					
2	wP	wP		wP	wP	wP	wP	wP
1	wR	wN	wB	wQ	wK	wB	wN	wR
	a	b	c	d	e	f	g	h

Your opponent has moved their pawn from b7 to b5.

What piece would you like to move?

Enter a coordinate:

The program's ideal scenario is for people to play chess against a computer, and for their games to be improved after multiple playthroughs.

## Goals

- Fully playable game of chess with official rules
- AI that makes logical (and legal) moves

## Features

- Full chess board with moveable pieces
- Interactive main menu that presents the user with options
- Black and white sides
- Levels of CPU difficulties (may or may not be implemented)
- Player VS CPU
- CPU VS CPU (may or may not be implemented)
- Quick CPU (makes a move in under 60 seconds)

# Installation

## System Requirements

- Linux OS running a recent version of gcc
- No GPU required
- A CPU that can run modern C
- 50mb of disk space
- 50kb of free RAM

## Setup and Installation

To set up `r/chess`, make sure that the executable file `"r_chess"`, has been properly downloaded. Then create a directory called `"chess"` and place the executable inside of it, then run the executable and you're done!

## Uninstalling

To uninstall the program, launch the `"r_chess"` executable file. Then in the menu, select the option that says `"uninstall"`. Once that command is run, all files created/managed by `r/chess` will be deleted, including the executable file.

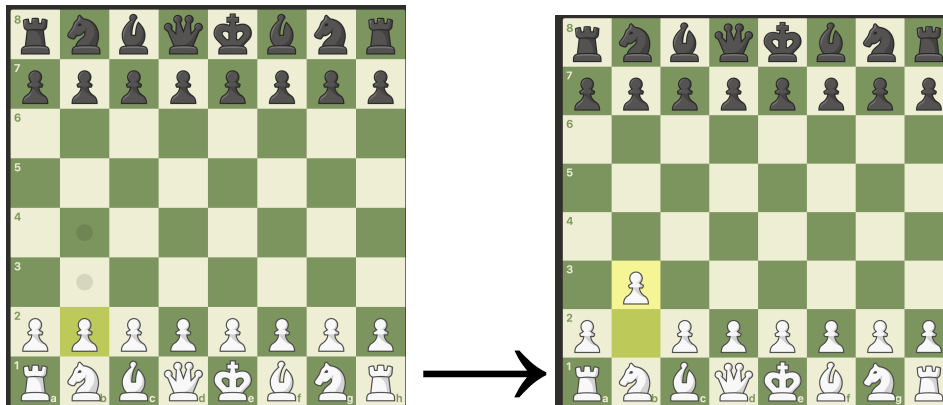
# Program Functions and Features

## int main()

- Shows the menu that prompts the user for actions they want to do.
  - Choose which side the player wants to play (black or white).
  - Read the human readable log of all the moves.
  - Choose from different difficulties (optional).
- Shows an interface on which the user sees the chess board and makes moves
- Runs the chess game by repeating functions using while loops until a side wins or the user quits the game.

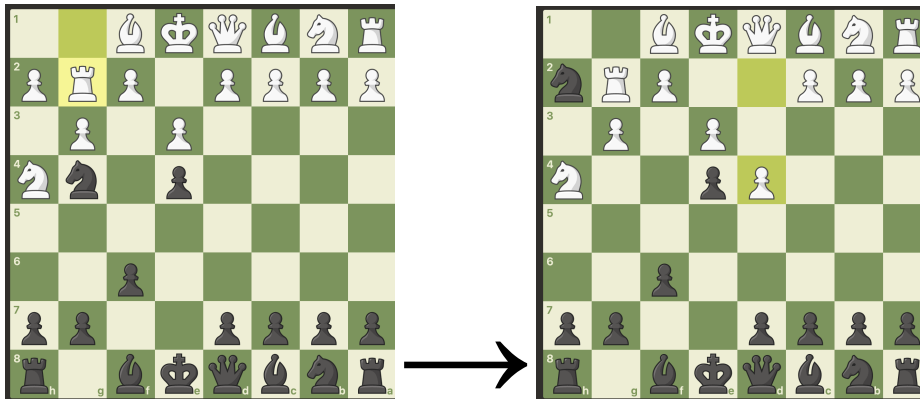
## void move()

- Allows a player's piece to move and change its position on the board
- Updates a player's piece position on the board



## void capture()

- If a player's piece is able to legally move to another position on the chess board that has his or her opponent's piece, then a player will be able to eliminate his or her opponent's piece by moving into the said position.



## int checkLegalMove(\*Piece nameOfThePiece)

- A boolean function that checks if a piece's desired move is legal or not.
- Will likely be called inside the move() function
- Returns 0 if the move is illegal, returns 1 if the move is legal



## int check(\*Piece king)

- A boolean function that checks if a player's king is in check.
- Will likely be called every time a player makes a move.
- If a player's king is in check, then he or she must move its king or eliminate the opponent's piece that is causing the king to be in check.
- Returns 0 if the king is not in check, returns 1 if the king is in check.



(black bishop is checking white king)

## int checkmate(\*Piece king)

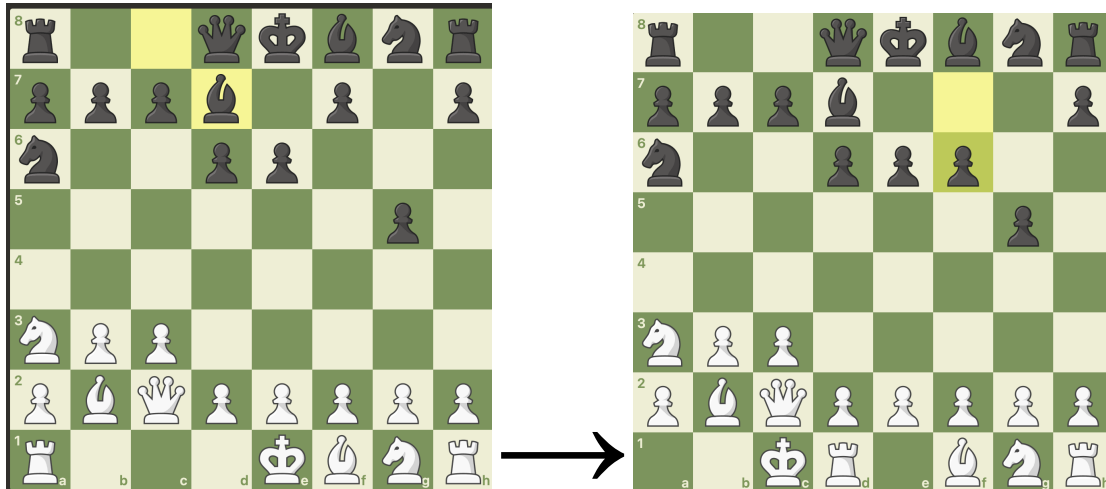
- A boolean function that checks if a player's king is in checkmate.
- Will only be called when check() is called.
- If a player's king is in checkmate, then the "Player X wins!" text will appear and the game will end.
- Returns 0 if the king is not in checkmate, returns 1 if the king is in checkmate.



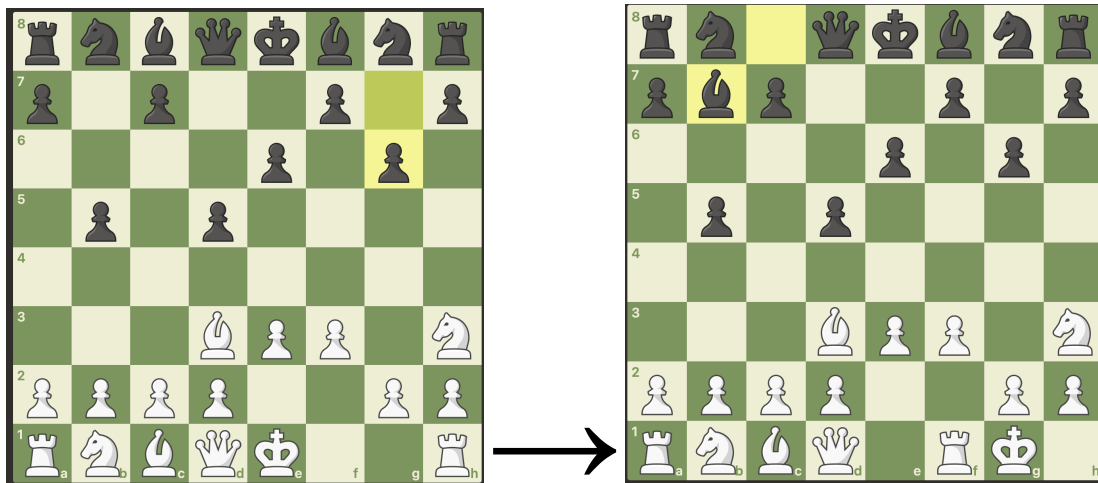


## void castle()

- Checks if the requirements for castling are fulfilled.
- Executes the castle move.



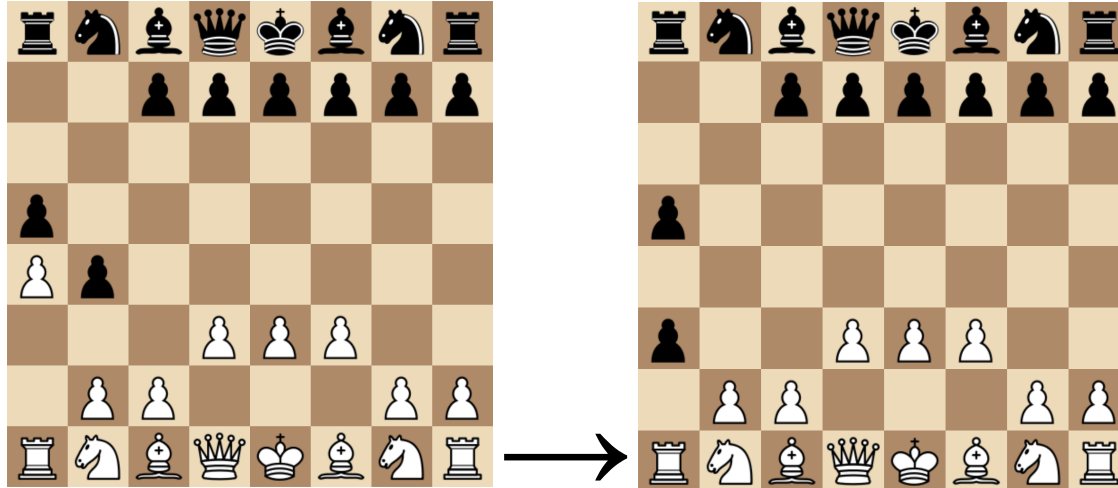
(King moves two spaces to the left and the rook is moved to the king's right)



(King moves two spaces to the right and the rook is moved to the king's left)

## void enPassant()

- Checks if the requirements for en passant are fulfilled.
- Executes the en passant move.



## Main Menu Options

- Option for CPU difficulties (may or may not be implemented)
- Option for Player VS CPU
- Option for CPU VS CPU (may or may not be implemented)
- Option for the player to choose sides (black or white)
- Option for the player to quit the game (while during a game or in the main menu)
- Option for the player to access a readable log of all moves made during the game (via a text file)

# Copyright and Disclaimers

**NOTICE:** The code used in this program, as well as other programs from the r/chess Team, is not meant for public commercial use. This work is licensed under a CC-BY-NC license. Any use of this code for the monetary benefit of others will be severely punished.

**\*Presented images may not represent the actual program\***

# Error Messages

On making an erroneous selection in the menu:

“Invalid option!” then a repeat of the menu selections.

On choosing an invalid space to move a piece to:

“Invalid space! Please pick again.” The prompt to pick a coordinate to move to is repeated.

On choosing an invalid piece to move:

“Invalid piece! Please pick again.” The prompt to pick a piece is repeated.

On making an illegal move during a game:

“This move is illegal! The game has been aborted. \*Player 2\* wins!”. The game is automatically decided in the other player’s favor and the game is canceled.

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