

Chess V2.0



Breakdown Tech

Renetta Nelson, Chris Fernando, Giselle Meza, Joey Ortiz,
Brandon Schnedar, Ethan Groenow
Henry Samueli School of Engineering

Table of Contents

1. How to Play Chess

- 1.1 Introduction - Pg. 2
- 1.2 Game Scenario - Pgs. 3,5
- 1.3 Objective - Pg. 5

2. Installation

- 2.1 System Requirements - Pg. 5
- 2.2 Setup and Configuration - Pg. 5
- 2.3 Uninstalling - Pg. 5

3. Functions and Features

- 3.1 AI Difficulty - Pg. 6
- 3.2 Game Settings - Pgs. 6,7
- 3.3 Customization - Pg. 7
- 3.4 Navigation - Pg. 8
- 3.5 AI Quality- Pg. 8

4. Error message - Pg. 8

5. Copyright - Pg. 9

6. References - Pg. 9

7. Glossary - Pgs. 9,10

8. Index - Pgs. 10,11

1.How to Play Chess

1.1 Introduction

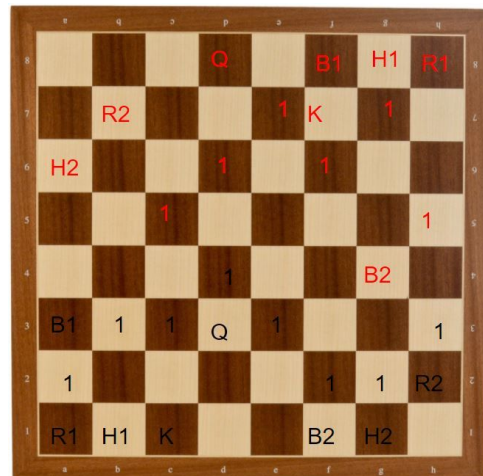
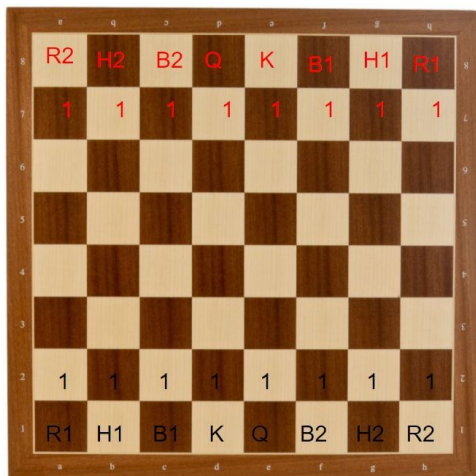
Welcome to Chess 2.0! This program allows you to play chess against artificial intelligence. If you ever played a game of chess before in real life, this game will be perfect for you. If you haven't, fear not. This section teaches you the rules of the game.

Rules of Chess

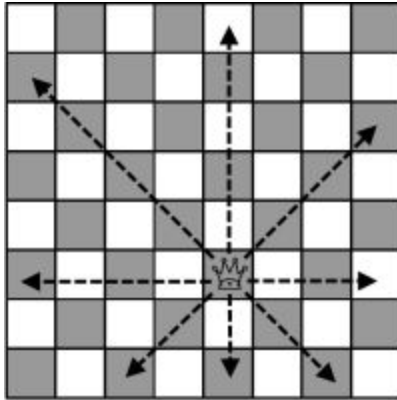
- ❑ The game starts with all pieces in their respective starting positions (refer to the first gameplay screenshot)
- ❑ White takes the first turn and moves a piece. Once White's turn is over, Black's turn begins and they may move a piece.
- ❑ White and Black continue to take turns
- ❑ The player must move a piece on their turn. If a player cannot move a piece, the game is a draw.
- ❑ Queen can only move horizontally, vertically, and diagonally across the board.
- ❑ Rook can only move horizontally and vertically across the board.
- ❑ Bishop can only move diagonally across the board.
- ❑ Knight can jump to eight different squares which are two steps forward plus one step sideways from its current position (can move in a L shape).
- ❑ King can move in any direction, but only one step at a time. The king must never move into check. There is also a special "castling" move for the king.
- ❑ 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). There is also a special "en passant" move for the pawn.
- ❑ Castling can only be done if the king has never moved, the rook involved has never moved, the squares between the king and the rook involved are not occupied, the king is not in check, and the king does not cross over or end on a square in which it would be in check.
- ❑ The en passant capture must be done on the very next turn, or the right to do so is lost. Such a move is the only occasion in chess in which a piece captures but does not move to the square of the captured piece. If an en passant capture is the only legal move available, it must be made.

- ❑ Anytime a king is in danger of being attacked, that king is considered “in check.” The king must now get out of danger in their following move. There are three ways to get out of check. The first is to move the king out of danger, the second is to attack the opposing piece that is putting the king in check, and the third is to block the opposing piece with another piece.
- ❑ The chess game ends as soon as one king is trapped in "checkmate". That is, there is no move for the player possible which would get his king out of check. Then the player loses.

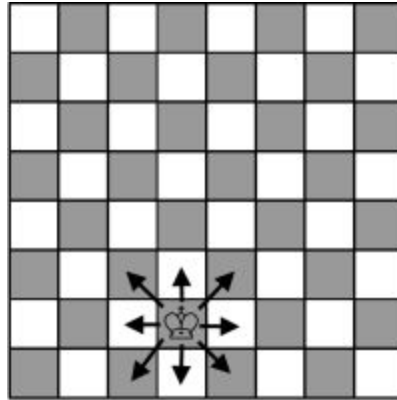
1.2 Game Scenario



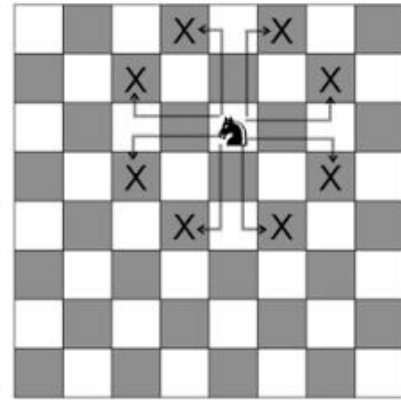
Each number/letter represents a piece on the board (refer to the glossary for information on each piece.) 1 stands for Pawn, R stands for Rook, H stands for Knight, B stands for Bishop, K stands for King, and Q stands for Queen. There are two Bishops, Knights, and Rooks for each side, which is represented by the number next to the respective piece (e.g R1 stands for Rook number 1).



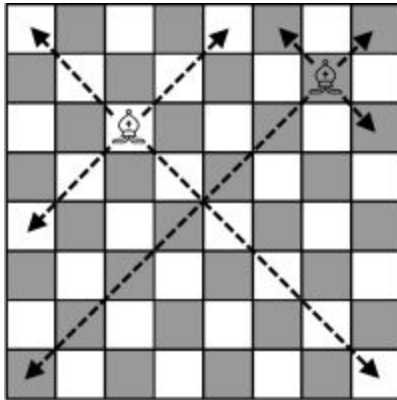
How the Queen moves



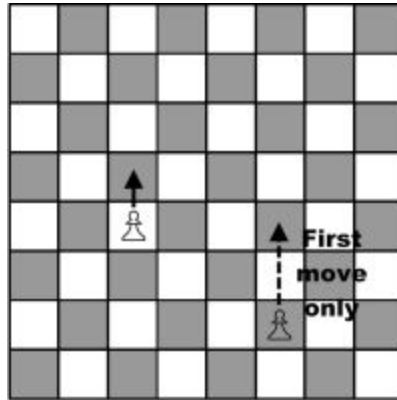
How the King moves



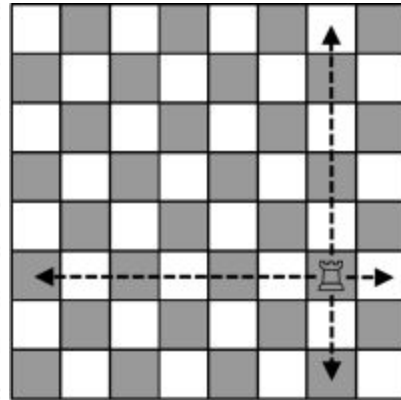
How the Knight moves



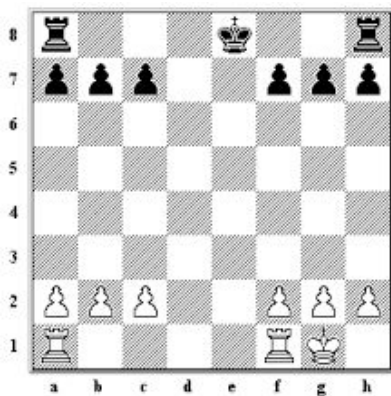
How the Bishop moves



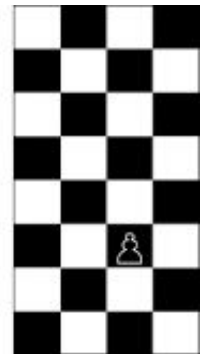
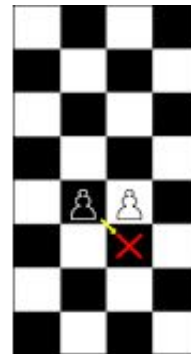
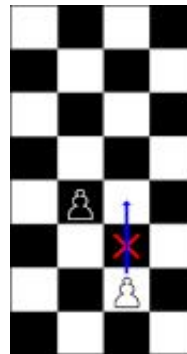
How the Pawn moves



How the Rook moves



Castling



En passant

1.3 Objective

- The goal of chess is to checkmate your opponent's king. You and your opponent will take turns trying to systematically take over the board by capturing each other's pieces, until eventually one player has checkmated the other's king. A player may also win if they trap the opponent's remaining pieces, so that they can no longer make any more legal moves.
- Occasionally a game can result in a draw if later in the game both players only have a few pieces left. If 50 moves are made and neither player has been checkmated or trapped, then a tie is declared. A draw can also occur when a player cannot move any more pieces.

2.Installation

2.1 System Requirements

- ❑ The system requirements necessary to run Chess v 2.0 smoothly are:
 - ❑ 2GHz dual core processor
 - ❑ 2GB RAM
 - ❑ 25 GB hard drive space
 - ❑ Linux operating system available

2.2 Setup and Configuration

- ❑ To install Chess v 2.0
 1. Ensure that you have all the necessary tar package
 2. To extract the files type "gtar xvfz *package.tar.gz*" (the package name will either be Chess_V1.0 if you are downloading the user version, or Chess_V1.0_src if you downloading the source code version)
 3. Type in "make" in the linux command line
 4. Run the program by typing "./Chess" in the command line

2.3 Uninstalling

- ❑ To uninstall Chess v 2.0 from your computer
 1. Make sure that you are in "chess" directory where the program files are installed
 2. Type "make clean" in the linux command line
 3. Optional: Delete the directory where all the files are located using the -rm command in linux command line.

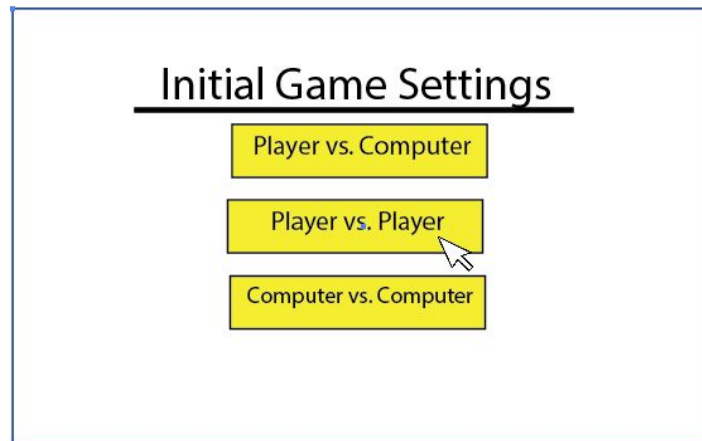
3.Functions and Features

3.1 AI Difficulty

- ❑ The player will be able to choose to play with an AI of minimum difficulty
 - ❑ This difficulty is designed for beginners who are new to chess.

3.2 Game Settings

- ❑ Computer vs. Computer
 - ❑ The user can set up a game between two A.I's of varying difficulty.
- ❑ Player vs. Player
 - ❑ Each side of the board is controlled by a player. Challenge a friend or play against yourself!
- ❑ Player vs. Computer
 - ❑ The player will be able to play against the computer. Choosing the difficulty, the player can compete with the computer in the game of chess.
- ❑ Withdraw previous move
 - ❑ The “undo” option will allow the player to withdraw an unwanted move. The player can then redo their move and continue on with the game.



3.3 Customization

- ❑ White or Black option
 - ❑ The player will be able to choose the option of being the white chess pieces or the black chess pieces.
- ❑ Chess piece representation

- ❑ The board will show the image of the chess pieces, allowing the player to visualize the movement of the pieces.

A	B	C	D	E	F	G	H	
bR	bKn	bB	bQ	bK	bB	bKn	bR	8
bP	bP	bP	bP	bP	bP	bP	bP	7
								6
								5
								4
								3
wP	wP	wP	wP	wP	wP	wP	wP	2
wR	wKn	wB	wQ	wK	wB	wKn	wR	1

3.4 Navigation

- ❑ First type in coordinate of the piece you wish to move, then type in a second coordinate to desired destination
 - ❑ The player will be able to type in where they want to go. The piece will go to that destination point. Then it will go to the next player.
- ❑ If a pawn moves to the end of the board, the player is given the “promotion” options. In order to promote, type in one of the options.

3.5 AI Quality

- ❑ Efficient speed
 - ❑ The AI is designed to take less than a minute to make a move.
- ❑ Calculated moves
 - ❑ The simplistic AI moves the pieces randomly, picking any piece that can move legally that turn.

4.Error messages

There are instances where an error message can occur. Each error is associated with a certain invalid move. Below are a list of errors that may appear on the screen while playing the game.

- “Illegal Move”
- “Teammate is occupying that square”
- “Someone in the way”

5.Copyright

Giselle Meza, Joey Ortiz, Ethan Groenow, Chris Fernando, Brandon Schnedar, Renetta Nelson
© 2018 Breakdown Tech
All right reserved.

This document is protected under US and international copyright laws. Copying or distributing without documented permission from Breakdown Tech is prohibited. This document and all illustrations are in compliance with US fair use and public domain policies.

6.References

Chess Burst, Team. "Illegal Moves." *ChessBurst.com*,
www.chessburst.com/chess-rules/illegal-moves.html.

"Chess Wallpaper." *Http://Wallpaper-Gallery.net/Single/Chess-Wallpaper/Chess-Wallpaper-9.Html*.

Federation, US Chess. "Learn to Play Chess." *US Chess, USCF*,
www.uschess.org/content/view/7324/28/.

7.Glossary

Pawn: The simplest piece on the board that moves forward one space, but captures opposing pieces diagonally. The pawn can move either one or two spaces forward if it is the pawns first move. If the pawn reaches the end of the board, it is promoted to any piece. It cannot remain a pawn or become a king.

Rook: The rook is capable of moving horizontally or vertically as many spaces as it can as long as it is not blocked.

Bishop: The bishop is capable of moving diagonally in any direction as many spaces as it can as long as it is not blocked.

Knight: The knight moves in the strangest way compared to the other pieces. It moves in an "L" shape. It moves horizontally or vertically two spaces and then it makes a right angle in either direction. It is capable of jumping over pieces to get to its destination.

Queen: The strongest piece on the board that is capable of moving in any direction(diagonally,horizontally, or vertically) as many spaces as it can as long as it is not blocked.

King: The most vital piece in the game of chess. If the king is put in a checkmate scenario, the game is over. It can move one spot in any direction(diagonally,horizontally, or vertically) making it very immobile.

Castling: This is a special move where the king is able to move two spaces towards the rook and the rook is placed to the side of the king towards the center of the board. This move is playable only when the rook and the king have not been moved at all and the

space between the two pieces is completely clear of any other chess piece. The player can castle on either side, but it cannot be used to get out, into, or through check.

En passant: This is a special pawn capture which can occur immediately after a player moves a pawn two squares forward from its starting position, and an enemy pawn could have captured it had the same pawn moved only one square forward. The opponent captures the just-moved pawn as if taking it "as it passes" through the first square. The resulting position is the same as if the pawn had moved only one square forward and the enemy pawn had captured normally.

Check: The case when the player's king is in danger of being taken over. To get out of check, a player must either move the king out of danger, move a piece to protect the king, or take over the attacking piece.

Checkmate: The case when the player cannot get out of check. The game is over if a player ends up in this position.

8.Index

A

A.I - Pgs 6, 8

B

Bishop- Pgs. 3,5

C

Castling- Pgs. 2, 4, 8

Checkmate- Pgs. 3, 5, 8, 9

Check- Pgs. 2, 3, 5, 7, 8, 9

Configuration- Pgs. 5

Customization- Pgs. 7

E

En Passant- Pgs. 2, 4, 8

Errors- Pgs. 8

G

Game Settings- Pgs. 6

Goal- Pgs. 5

I

Installation - Pgs. 6

K

King - Pgs. 3, 4, 5, 6

Knight- Pgs. 3, 4, 5

P

Pawn - Pgs. 3, 4, 5

R

Rook- Pgs. 2, 3, 4, 8

Rules- Pgs. 3

S

System- Pgs. 5

Q

Queen- Pgs. 3, 5