

# ChessGPT V1.0

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## **0. Glossary:**

### **0.1 Chessboard:**

A chessboard is a game board used to play chess. It consists of 64 squares, 8 rows by 8 columns, on which the chess pieces are placed.

1. Rank: The eight horizontal rows of the chess board numbered from 1 to 8.
2. File: The eight vertical columns of the chess board lettered from A to H.

### **0.2 Pieces:**

A chess piece is a game piece that is placed on a chessboard to play the game of chess. It can be either white or black, and it can be one of six types: king, queen, rook, bishop, knight, or pawn.

1. Pawn  
Moves forward one square, but captures diagonally one square. On its first move, it has the option to move forward two squares.
2. Knight  
Moves in an "L" shape: two squares in one direction and then one square perpendicular to that, or one square in one direction and then two squares perpendicular. Can jump over other pieces.
3. Bishop  
Moves diagonally any number of squares. Each bishop starts on either a light or dark square and remains on that color for the entire game.
4. Rook  
Moves horizontally or vertically any number of squares. Special move: "castling," in which the rook and the king move simultaneously under certain conditions.
5. Queen  
Combines the power of the rook and bishop, moving any number of squares horizontally, vertically, or diagonally.
6. King  
Moves one square in any direction.

### **0.3 Special moves:**

1. "En Passant": when a pawn is moved two squares from the starting position and ended in the same rank as the enemy pawn, the enemy pawn can capture it by moving to the first square of its path. This can only be done in the very next round.
2. "Castling": the king moves two squares toward the nearest rook and the rook moves to the other side, right next to the king. Doable when none of the two pieces can be moved previously and no pieces are between them.

#### **0.4 Conditions:**

1. Check:  
A check occurs when a player's king is under immediate threat of capture by one or more of the opponent's pieces on their next move. The player in check must make a move to remove the threat.
2. Checkmate:  
Checkmate refers to the situation where there is no move for the player possible which would get his king out of check. Then the player loses.
3. Stalemate:  
A situation where the player whose turn it is to move has no legal move and their king is not in check. It results in a draw.
4. Draw:  
A situation in which neither player can force a win. Draws occur under several conditions, including stalemate, insufficient material, threefold repetition, and the fifty-move rule.
5. Promotion:  
Promotion is the replacement of a pawn with a new piece when the pawn is moved to its last rank. The player replaces the pawn immediately with a queen, rook, bishop, or knight of the same color.

## 1. Computer Chess

### 1.1 Usage scenario

Sketch of a typical screenshot.

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

### 1.2 Goals

The goal of a chess game is to checkmate your opponent's king. This occurs when the king is in a position to be captured (in "check") and there is no legal move the player can make to remove the king from threat. Essentially, this means the king is under direct attack, cannot move out of attack, and cannot be defended by another piece. If a player's king is checkmated, that player loses the game.

### 1.3 Features

#### 1. Menu

- Play Now: Quick start a game with default settings. Players can immediately jump into a game against an AI opponent matched to their skill level or play a local multiplayer game.
- Game Modes: Offers a selection of different ways to play chess.
- Settings: Customize game preferences and access game options such as difficulties.

#### 2. User vs. Computer

The user is able to play against the computer in the Chess game.

#### 3. Player vs. Player

The user is able to play against other local players.

#### 4. Computer vs. Computer

The user is able to make both sides operate by the computer and they will play against each other like in PvE mode.

## 5. Log

The software is able to generate a log file that records each move of the game.

## 6. Gameplay

The game follows the standard rules of chess.

# 2. Installation

## 2.1 System Requirement

System Requirements	
RAM	512MB, or more
CPU	Intel Pentium, AMD K5, or better
Memory	2-3GB, or more
OS	Linux
Display	1024*768 screen resolution or higher

## 2.2 Setup and configuration

### Setup

1. Make sure that your device runs on Linux environment
2. Download the software files and open the software

### Configuration

1. Choose Your Side:  
You will have the option to play as White or Black. This choice can be changed later in the game settings.
2. Difficulty Level:  
Select the difficulty level for the computer opponent. Options typically range from Beginner to Expert. This setting can also be adjusted at any time through the game options menu.
3. Save and Exit:  
After configuring your settings, click 'Save' to apply them. You can always return to the settings menu to make further adjustments.

## 2.3 Uninstalling

Delete all the software files.

## 3 Chess Program Functions and Features

### 3.1 createChessBoard

Create and display a chess board that users can interact with.

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

### 3.2 initializeChessPiece

Create and add chess pieces to the chessboard, to make the game to initialize setup.

### 3.3 checkChessPieceMove

Check validity of movement input by the user. To ensure every move in the game is legal under the rule of a typical chess game. The function should include checking rules for every piece type movement and some special cases as well.

### 3.4 moveChessPiece

Read the input by the user and move the chess piece to the required location if it is valid.

### 3.5 computerMove

Read the move of the user and move correspondingly by the automatic player.

### 3.6 newGame

Prompt the user to input game mode, whether it's PvP, PvE, or EvE, and ask for difficulty if a computer player is involved. Finally, prompt the user to choose a side and begin a new game.

### 3.7 Log

Each move of the user and computer will be recorded in a log file that can be accessed on the menu.

## **Copyright**

Chess

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## **Error messages**

### 1. Moving into Check:

An error message might appear if a player tries to make a move that would leave their king in check. The rule of chess states that you cannot make a move that places or leaves your king in check.

### 2. Moving a Piece Illegally:

Each chess piece has its own specific way it can move. For example, bishops move diagonally, rooks move in straight lines, and knights in an L-shape. Attempting to move a piece in a way that's not allowed by its movement rules would trigger an error.

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