User Manual

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V 1.0

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Rules of Chess

Chess Pieces

King - Can move in any direction, but only one step at a time. The king must never move into check. When castling, the king can move two squares towards a rook in one turn.
Queen - Can move horizontally, vertically, and diagonally across the board.
Rook - Can move horizontally and vertically across the board.
Bishop - Can move diagonally across the board.
Knight - Can jump to eight different squares which are three steps from its current position in one direction and one step in the other, moving in an "L" shape and skipping over other pieces in its path.
Pawn - Can only move forward towards the opposite end of the board, but captures on a diagonal. A pawn may move two steps at once from its starting position, but only a single step at a time afterwards. If the pawn reaches the end of the board, it is promoted to another piece (rook, bishop, knight or queen). With the "en passant" mechanic, pawns can capture pieces in specific places when moving forward two squares from their starting position.

Special Moves and Chess Terminology

Castling - A special move in the game of chess involving the king and one rook. It is the only move in chess in which a player moves two pieces at the same time. Castling consists of moving the king two squares towards a rook on the player's first rank (row), then moving the rook onto the square over which the king crossed. Castling can only be done if the king and rook involved have never moved, the squares between them 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.
En Passant - A special pawn capture which can occur immediately after a player moves a pawn two squares forward from its starting position if an enemy pawn could have captured it had it 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. The en passant capture must be done on the very next turn, or the right to do so is lost. It is the only move in chess in which a piece captures another without moving to the square of the captured piece. If an en passant capture is the only legal move available, it must be made.
Check - When the king is threatened by at least one enemy piece. In such a case, either the king must be moved out of check, the enemy piece must be captured, or another piece must block the enemy's path to the king.
Checkmate - When the king is unable to get out of check. This ends the game of chess.

Chess rules retrieved from http://archive.uschess.org/beginners/letsplay.pdf.

Computer Chess

Usage Scenario

When the game starts the user is prompted to choose the game mode, and after that, to choose the side, then the game begin.

```
L16T12@zuma:~/chess/bin% ./chess
Available game modes:
1. Player vs. Player
2. Player vs. AI
3. AI vs. AI
Choose a game mode: 2
Player 1, choose a side (w for white, b for black): w
```



```
White, enter a move (algebraic format; e.g. b2b3):
```

Each turn the player is prompted to enter a move in a variant of the algebraic format; e.g. a2a3, which a2 is the starting position of the piece and a3 is the final position.

There are errors messages if the player does an invalid move:
- Error; move is out of bounds!
  This happens if the user inputs coordinates out of the chessboard.
- Error; no move made!
  This Happens if the player move to the same place that the piece was before.
- Error; capturing your own pieces is not allowed!
  This happen if the player moves to a square occupied by other piece owned by him.
- Error; you do not control that piece!
  This Happen if the player try to move an adversary piece.
- Error; piece does not exist!
  This Happen if the user try to move a piece on an empty square
- Error; invalid move!
  This happen for every other error against the rules of chess.

Goals

The purpose of this software is to allow users to play the game of chess on a computer. This game will follow all the rules of chess, display a virtual chessboard, allow a user to chose from playing another user or A.I., and keep a log of all moves made.

Features

1. Different game modes: Player vs. Computer, Player vs. Player, Computer vs. Computer.
2. UTF-8 interface.
3. Log files of games.

Installation

System Requirements

- Linux-based OS
- x86-compatible processor
- Minimum 4 MB of free disk space
- Minimum 256 MB of RAM
- Monitor and keyboard

Setup and Installation

1. Open a terminal window

2. Use the command `cd` to navigate to the correct folder
3. Extract the source code from the archive with the command
   `tar xzf Chess_V1.0.tar.gz`
4. Build the software with the `make` command.
5. To begin a game, run the `chess` executable in the generated "bin" folder.

Uninstalling

1. Open a terminal window
2. Use the command line to navigate to the "Chess_V1.0" folder
3. Delete the installation folder with the command `rm -r Chess_V1.0`

Chess Program Functions & Features

1. Modes: Allows Person V.S. Computer, Person V.S. Person, and Computer V.S. Computer.

2. Chess Logs: Records the history of Pieces' movements.
   The log will be saved in the text file chess.log in the Long Algebraic Notation in UTF-8 format:

- Each Round will be recorded in one line with two columns, first column is the whites moves and in the second the blacks moves;
- each movement record piece type, start position and final position

Appendix

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References

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