Chess game specification / version 1

CHESS PROGRAM SPECIFICATION

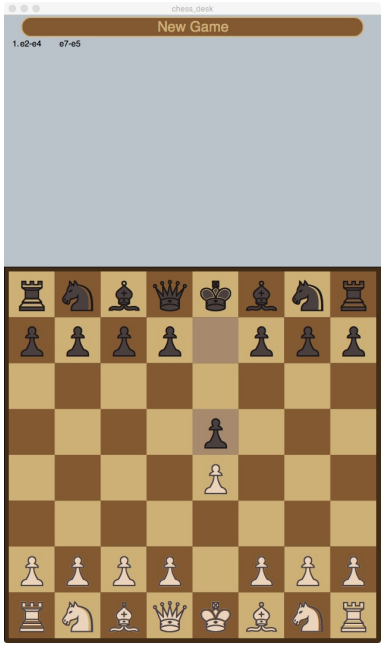
• the two sides are called
BLACK, WHITE

• each board square has a piece:
KING, QUEEN, ROOK, BISHOP, KNIGHT, PAWN, or EMPTY

• the window is subdivided in 3 different ways, depending on the aspect ratio of the window:

if width / height > 1.25 then landscape orientation:
the board uses the left side, and the sidebar on the right holds the play history:

if height / width > 1.25, then portrait orientation:
the move history is drawn above, and the board below



if aspect ratio of screen is less than 1.25 (squarish):
then move history is not drawn

• the checkerboard alternates colors. the uppermost square is light.

DARK_SQUARE #835931
LIGHT_SQUARE #cdb075

• the outside of the checkerboard has a border of width 8 points, using color #402c17

• the square holding the currently selected piece draws a hollow rectangle in the square, thickness 9/100ths of the width of the fox, with a corner radius of 3 pt, inset by 1 points, in the color #8670c5.

• each possible move for the currently selected piece is marked by a hollow rectangle in the square, thickness 9/100ths of the width of the box, with a corner radius of 3 pt, inset by 1 points, in the color #89c294

• the black pieces are drawn as Unicode glyphs starting with U+265A as superimposed graphics, where the solid form is drawn in color #494040, and the outline form of the glyph (-6 in the Unicode space) is superimposed in color #1c1818

• the white pieces are drawn using colors #ebd3bc and #494040

• the two squares involved in the last move are highlighted by drawing a white square at 0.3 to achieve a brightening.

• in the sidebar where the history is drawn, we draw a 40 pt high NEW GAME button. The NEW GAME button is a rounded rectangle, filled with the dark square's color, inset on the left and right by 30 pt, inset top and bottom by 4 pt, has a 15 pt corner radius, and inside the rounded button, the text is drawn at 75% of the height of the area, using the color of the light squares.

in the sidebar, the space below the button displays the move history. If the width of the area is more than 150 points, then multiple columns will fit, and they should be filled downward first.

• inside a game, there are 3 states:
    - GAME_OVER, where any click on the board is interpreted as a request to start a new game.
    - PICK_PIECE, where we are waiting for the player to pick a piece of theirs to move.
    - PICK_DEST, where the player has selected the piece they wish to move, and is not looking for the destination square for that piece.

when picking a piece, if the player changes their mind which piece they wish to move, it will allow this. Once the user has selected a piece, the possible moves for that piece are shown. If the piece has no moves, a BEEP will be emitted. If a user picks a square that is not occupied by their pieces, a BEEP will be emitted.

after a legal move is made, if the opponent is now in check, the sound effect CHECK will be played. If the move results in CHECKMATE, then the state changes to GAME_OVER. Otherwise the game continues, and the active player side switches over, and the state moves to PICK_PIECE where the next turn is played.

at any time a player can click the NEW GAME button to start a fresh game.

• the player cannot move into check. If there are no moves possible, then the sound effect STALEMATE is emitted, and the state changes to GAME_OVER

• in general a move has to be to a square on the board, either an empty square or capturing an opponent's piece.

• movement rules for the king:
    one square in any direction

    castling (left side)
        if king has not yet moved
        and left side rook has not yet moved
        and if column 2 is empty
        and if column 3 is empty
        and if column 4 is empty
        and if column 3 square is not threatened
        and if column 4 square is not threatened
            then the king can move 2 sq to col 3, rook moves to col 4

castling (right side)
if king has not yet moved
and right side rook has not yet moved
and if column 7 is empty
and if column 8 is empty
and if column 7 square is not threatened
and if column 6 square is not threatened
then the king can move two sq to col 7, rook moves to col 6

• movement rules for the queen:
moves either as a rook or as a bishop

• movement rules for the rook:
moves left, right, up, down any number of squares until it hits the edge of the board or captures an opponent piece, or hits a piece of its own side.

• movement rules for the bishop:
moves on diagonals
• movement rules for the knight:
can move to any of the up to 8 squares relative using the four combinations of [+/-1, +/-2], and the four combinations of [+/-2, +/-1], the only piece that can jump over other pieces

• movement rules for pawns:
moves one square towards the opponent's home row to an empty square.
if on the home row can move twice in one turn (effectively moving 2 squares).
if opponent piece is on the diagonal in its direction of forward motion, it can capture an opponent piece
if opponent just moved a pawn two squares, and the players pawn is on the 5th row, it has the option on the next turn only of capturing the pawn by moving to the diagonal, as if the pawn had only moved one square. (en passant capture)

once the pawn reaches the last row on the opposite side, it is promoted. In this slightly simplified version of the game we assume that the promoted piece is always a QUEEN.

• as each move is done, show the move in the sidebar window in algebraic chess notation, which obeys the following rules:

the general form is:
<piece> <column> <row> ["x" or "-"] <column> <row> ["+", "++", " stalemate"]

the columns are labeled a, b, c, …from the left
the rows are numbered 1, 2, 3… from the lower left corner

- the King is abbreviated K
- the Queen is abbreviated Q
- the Rook is abbreviated R
- the Bishop is abbreviated B
- the Knight is abbreviated N

- the pawn does not emit a letter
- for a queen side castle draw 0-0-0, for a kingside castle draw 0-0
- if the move results in capture then the separator is an x, otherwise a dash
- if the move results in check, append a +
- if the move results in checkmate, append a ++
- if the move results in stalemate, append " stalemate"

The general algorithm for a valid move is:

- loop through all the current side's pieces.
- enumerate all possible moves for that piece
- check the validity of the hypothetical move. if the king goes into check as a result of the move, it is discarded as not legal. If no moves are possible, then the game is marked as a stalemate. If the player started in check, and no way to escape is possible, then it is checkmate.

The general algorithm for determining if a square is under attack (necessary for castling determination):

- check up, down, left, right for any path to an opponent rook or queen
- check diagonals for any path to an opponent bishop or queen
- check the 8 knight jump squares
- check for a pawn capture
- check for an opponent king one square away

Art assets supplied:

- 4 sound files:
  - beep.mp3
  - check.mp3
  - checkmate.mp3
  - stalemate.mp3