Project work

Faculty of technical science Novi Sad

Department:	Applied Software Engineering
Course:	Computer architecture
Topic:	Chesspernado

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1. About the game

Chesspernado is an original game made by Danilo Novakovic inspired by chess, tetris and plants vs zombie idea.
The game is Player vs AI, played on a 12x8 board. Players goal is to protect the first row as long as possible
from the attacking enemy pieces. Player starts with 3 knights and 2 bishops, and is able to upgrade and buy
more from the shop as the game progresses.

2. Realization

Program is realized in C programming language via standard C libraries. Graphic enviroment is Terminal. This was made possible with command „tput reset" which resets the Terminal. Whenever matrix, for example, is soppoust to be printed out, terminal is reset just a moment before. It happens so fast that, to human eye, it seems like terminal is standing in place.

Some of the ANSII color codes are:
- [0m resets all color/format styles (to white on black board)
- [1m **bold** (also interpreted as „high intensity" colors
- [4 <u>underline</u> on
- [30m do [39m are colors: black, red, green, yellow, blue, purple, cyan, white (in that order) (change color of the text)
- similary [40m do [49m (in same order) change background color

When called from .c file, a prefix \x1b should be added (ex. \x1b[30m)

2.1. Compiling

Linux: Open terminal, navigate to directory containing the source files and then execute the following command: „*make all other*"

Once you compile program succesfully you run it by typing:
./chesspernado

3. Rules

COMMANDS SUPPORTED:

/back - only in tutorial mode. Goes back to the main menu.
/random - only at init_setup (beginning stage). Generates 3 knights and 2 bishops on random positions.
/exit, /end - exits the program
/undo - undoes previous move. Can be used from start to finish of the CURRENT wave. Once the wave completes undo history
is deleted!
/help - prints Chesspernado Manual whenever you want during the game
/skip - skips 1 move during wave.
/revive - you can sacrifice 60 points to revive dead piece (you can set him anywhere from 1 to 5th row)
/buy - summons SHOP window, from which you can buy certain pieces and features for X points

Notation of the moves is as follows:
Piece/column/row/column/row (what piece do you want to move, from where, to where)
examples: Bf4d6, Nb8c6 etc.

PIECE & MOVEMENT IN CHESSPERNADO:

- SUICIDE ROOK (R): Is a special piece that lasts for ONE MOVE ONLY. He first waits for player /other pieces to make a move, and then

sprints forward [i+k][j] until he hits ANYTHING (either end of the board, enemy or the player). Once he collides with an object
he will then explode, killing both himself and that object (either player or enemy). User can buy this piece in the shop
as many times as he likes as long as he has points for it, and he can place as many as the suicide rooks he likes.
If there are multiply suicide rooks on the boardthe priority will have those in front.

- HAPPY KING (K): Is a special piece that lasts until destroyed. Happy King is so happy that he won't hurth a fly, meaning that
he cannot kill other enemy pieces. He shares his love of life
with player, and generates 1 point each turn.
Happy king can't be moved.
User can buy this piece from the shop, and it is generated on random positions anywhere from 1st row to 5th, on any column.

- BISHOP (B): can move any number of squares diagonally, but cannot leap over other pieces.

- AI_BISHOP (b): has rules of regular bishop but will only move in following manner. BISHOP AI always "wakes up on the left foot"
meaning that he will prioritize moving as far to the bottom-left as he can above all. Only if he is unable to move to the left anymore
will he swap directions meaning he will move as far to the bottom-right as he can. AI_BISHOP will only eat enemy piece if it is caught
in this LEFT-RIGHT pattern. (AI_BISHOP is worth 12 points)

- KNIGHT (N): The knight moves to any of the closest squares that are not on the same rank, file, or diagonal, thus the move forms an "L"-shape:
two squares vertically and one square horizontally, or two squares horizontally and one square vertically.
The knight is the only piece that can leap over other pieces.

- AI_PAWN (p) : The pawn can move forward to the unoccupied square immediately in front of it on the same file, or on its first

move it can advance two squares along the same file, provided both squares are unoccupied;
or the pawn can capture an opponent's piece on a square diagonally in front of it on an adjacent file, by moving to that square.
The AI_PAWN will prioritize eating enemy piece over going forward.
(AI_PAWN is worth 6 points)

GOAL OF THE GAME & PHASES

- The goal of the game is to stop enemy pawns & bishops from reaching to 1st row of the board.
- If board is FULL on AI's turn, then the game will end.
- If player lost ALL OF HIS PIECES then the game will end.
- At the end of the game player will be prompted to enter the name, afther what the result will be printed out in the scoreboard.txt
NOTE: Score won't be recorded if the program has been closed with /exit command

 PHASES:

I) Initial setup
At the beginning of the game player decides places 3 knights and 2 bishops on any column from 1st to 5th row of the board.
during this phase player can use :
    /end, /exit - exit the game
    /re - resets the initialization setup
    /random - generates bishops and knights on random positions.
Upon completion player will be prompted to confirm the setup.

II) Waves:
After initial setup, the game beginns, and randomly generated waves beginn. Each wave gets harder and harder as the game goes on.

 TURNS:
PLAYER: Player is able to move 1 piece during his turn (with exeption of shop).
ENEMY_AI: During 1 turn EVERY piece with legal moves will be move. If NO PIECE has ANY LEGAL MOVE then N new pawns will be randomaly
summoned anywhere from 12 to 7th row.

4.BONUS: Standard PvP Chess

There is also BONUS option in Main Menu which is Standard PvP Chess also made by me in C programming language only via standard libraries in Terminal.

Piece names:
 K - king,
 Q - queen,
 R - rook,
 B - bishop
 N - knight,
 P – pawn

Commands supported:

/exit, /end - exits the program
/ff - surrender | resignation
/undo - undoes previous move of the current player (which means last 2 moves)
/redo - redoes last undo-ed move
NOTE:
     1) You can't redo if you undo all the way up to the beginning of
     the game
      2) You can't redo if you make a different move after using /undo

Notation of the moves is as follows:
Piece/column/row/column/row (what piece do you want to move, from where, to where)
examples: Pa2a4, Nb8c6, Pc2c3 etc.

Chess moves:
BASIC PIECE MOVEMENT:
- KING: moves one square in any direction.
The king also has a special move called castling that involves also moving a rook.

- ROOK: can move any number of squares along a rank or file, but cannot leap over other pieces.
Along with the king, a rook is involved during the king's castling move.

- BISHOP: can move any number of squares diagonally, but cannot leap over other pieces.

- QUEEN: The queen combines the power of a rook and bishop and can move any number of squares along a rank,
file, or diagonal, but cannot leap over other pieces.

- KNIGHT: The knight moves to any of the closest squares that are not on the same rank, file, or diagonal, thus the move forms an "L"-shape:
two squares vertically and one square horizontally, or two squares horizontally and one square vertically.
The knight is the only piece that can leap over other pieces.

- PAWN: The pawn can move forward to the unoccupied square immediately in front of it on the same file, or on its first
move it can advance two squares along the same file, provided both squares are unoccupied;
or the pawn can capture an opponent's piece on a square diagonally in front of it on an adjacent file, by moving to that square.
A pawn has two special moves: the en passant capture and promotion

SPECIAL MOVES:

1) CASTLING :
Once in every game, each king is allowed to make a special move, known as castling.
Castling consists of moving the king two squares along the first rank toward a rook (which is on the player's first rank)
and then placing the rook on the last square that the king has just crossed.
Castling is permissible under the following conditions:

- Neither the king nor the rook have previously moved during the game.
- There cannot be any pieces between the king and the rook.
- The king cannot be in check, nor can the king pass through squares that are under attack by enemy pieces,
or move to a square where it would result in a check.
Note that castling is permissible if the rook is attacked, or if the rook crosses a square that is attacked.

2) EN PASSANT:
When a pawn advances two squares from its starting position and there is an opponent's pawn on an adjacent file next
to its destination square, then the opponent's pawn can capture it en passant (in passing), and move to the square the
pawn passed over. This can only be done on the very next move, otherwise the right to do so is forfeit.
For example, if the black pawn has just advanced two squares from g7 (initial starting position) to g5,
then the white pawn on f5 may take it via en passant on g6 (but only on White's next move).

3) PROMOTION:
When a pawn advances to the eighth rank, as a part of the move it is promoted and must be exchanged for the player's choice
of queen, rook, bishop, or knight of the same color. Usually, the pawn is chosen to be promoted to a queen,
but in some cases another piece is chosen; this is called underpromotion.

4) CHECK:
When a king is under immediate attack by one or two of the opponent's pieces, it is said to be in check.
A response to a check is a legal move if it results in a position where the king is no longer under direct attack (that is, not in check).
This can involve capturing the checking piece; interposing a piece between the checking piece and the king (which is possible only

if the attacking piece is a queen, rook, or bishop and there is a square between it and the king); or moving the king to a square where it is not under attack.

Castling is not a permissible response to a check. The object of the game is to checkmate the opponent; this occurs when the opponent's king is in check,

and there is no legal way to remove it from attack. It is illegal for a player to make a move that would put or leave the player's own king in check

5.Copyrights

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