Kings of Chess

Version 3.1



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Glossary

Instant Messaging Terms

- Client:

- The frontend of a networking application. This handles all of the user interaction and will be what the user uses and sees.

- Datagram Packet:

- A packaging of information that is specifically designed to send between server and client

- Instant Messaging:

- A form of messaging where the users can directly contact each other in a real-time conversational format.

- Internet Protocol (IP):

- This is the protocol foundation for internet communication between server and client. TCP is based on this protocol.

- Server:

- The backend of a networking application. This handles all of the processing and logic allowing users to connect with each other or to the internet.

- Socket:

- A point of contact at which a server or client can connect

- Transmission Control Protocol (TCP):

- A way in which a server and client communicate.

Establishes a connection to the server and client and checks the Datagram Packet to be sent for errors. If everything checks out, the packet is sent

User Datagram Protocol (UDP):

- Another way in which a server and client communicate. Does not check for a connection to the server to be made, and simply just sends the datagrams without checking for

errors, with no way of checking if the information is ever received.

- Faster than TCP, but more risky

Chess Pieces

- Pawn
 - Moves one step forward only
 - Can only capture pieces diagonally in front of it
 - Can move two steps forward if its on its starting square
 - Can perform an "En Passant" (see below)
- Rook
 - Moves horizontally or vertically across the board
- Bishop
 - Moves diagonally across the board
- Queen
 - Moves horizontally, vertically, or diagonally across the
- King
 - Moves one step in any direction
- Knight
 - Moves in an "L" shape, 2 steps in any direction, then one step perpendicular to the first move
 - Only piece that can "jump" over other pieces

<u>Terminology</u>

Rank - A row of the chessboard labeled 1-8

File - A column of the chessboard labeled

Capture - To capture an opponent's piece, you must land on that piece's square at the end of your turn

Check - When a king is under threat of capture by an enemy piece. The player in check must make a move to put himself out of check

Checkmate - When a king is unable to get out of a check. The game ends here and the player in checkmate loses. Promotion - When a pawn reaches its 8th rank, it can be replaced by a queen/king/bishop/rook of the same color

Special Moves

- Castling Move where a king moves 2 spaces in the direction of the rook on either side and the rook moves to the opposite side of the king. This can only happen if the following scenarios are true:
 - 1. Neither the king nor the rook have been moved before
 - 2. There are no pieces between the rook and king
 - 3. The king is not currently in check
 - The king does not pass through a square occupied by an enemy piece
 - 5. The king does not end up in check

En Passant - Special pawn capture that can only occur if an opposing pawn moves two spaces on its first turn and it could have been captured by your pawn if it had only moved one space.

Chess Kings

Usage Scenario of App:

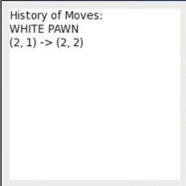
This is an example of what standard gameplay will look like. A player will login or create an account. Then they will select a new game and select their set color and their opponent. Then they will take turns playing against their opponent until the game is completed or the player quits the game. While playing, the user can also view their previously made moves as well as chat with the other opponent.



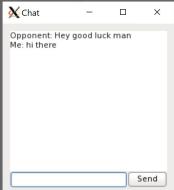












<u>Usage Scenario Provider:</u>

This is an example of what the server side should look like when starting up. Login credentials should show up and if failed a notification will pop up on the server side. Messages passed between two clients should also be shown as well as moves when a game is running.

```
./ChessServer
Chess Kings: Starting...
Chess Kings: Using port 15000...
Chess Kings: Using port 15000...
Chess Kings: Creating a socket to serve clients...
Chess Kings: Preparing the server name to the socket...
Chess Kings: Assigning the server name to the socket...
Chess Kings: Assigning the server name to the socket...
Chess Kings: Assigning the server name to the socket...
Chess Kings: Accepted connection from Client.
Chess Kings: Received message: WHITE (4, 1) -> (4, 2)
WHITE (4, 1) -> (4, 2)

server echo WHITE (4, 1) -> (4, 2)

chess Kings: Received message: bye

server bye
Chess Kings: Received message: bye

server bye
Chess Kings: Received last message from Client, closing data connection.
Chess Kings: Received last message from Client, closing data connection.
Chess Kings: Received message: bye

server bye
Chess Kings: Received message: bye

server bye
Chess Kings: Sending response: server bye.
Chess Kings: Received message: bye

server bye
Chess Kings: Sending response: server bye.
Chess Kings: Received message: will be connected from Client, closing data connection.
Chess Kings: Received message: will be connected from Client, closing data connection.
Chess Kings: Received message: will be connected from Client, closing data connection.
Chess Kings: Received message: will be connected from Client, closing data connection.
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Chess Kings: Received message: will be connected from Client, closing data connection.
Chess Kings: Received message: will be connected from Client, closing data connection.
Chess Kings: Received message: BLACK (2, 1) -> (3, 5).
Chess Kings: Received message: BLACK (2, 1) -> (3, 5).
Chess Kings: Received message: BLACK (2, 1) -> (3, 5).
```

Goals

Primary Objective - To be able to play a game of chess with real-time communication with your opponent

Secondary Objective - To capture your opponent's king, putting it in a checkmate and avoid your own king from getting captured

<u>Features</u>

- Fully Functional Online Gameplay
- Instant Messaging Capability
- Human vs Human
 - Offline and Online Opponents

- Human vs Computer
 - 3 Computer Difficulties
- Set Selection
- Special Moves:
 - Castlino
 - En Passant
 - Pawn Promotion

Installation

System Requirements

- Windows, Mac, or Linux OS
- GCC Compiler
- Math Library
- Stable Internet Connection
- Storage space to store game files
- Access to the UCI EECS Servers

Setup and Configuration

Game:

Load up your GCC Compiling software.

Create a directory to hold the project (if desired).

Download the game .tar package into your desired folder.

Extract all the game files from the .tar package

- gtar -xvzf Chess Kings.tar.gz

Read the readme if you need additional help

- vi README.md

Go to the bin folder

- cd bin

Now you can run the game whenever you want from bin folder by typing

- ./ChessKings

Provider:

Load up your GCC Compiling software.

Create a directory to hold the project (if desired).

Download the game .tar package into your desired folder.

Extract all the game files from the .tar package

gtar -xvzf Chess Kings.tar.gz

Read the readme if you need additional help

- vi README.md

Go to the bin folder

- cd bin

Now you can run the server whenever you want from bin folder by typing

./ChessServer

Uninstalling

Go to the root directory (if you are in /bin

- cd ..

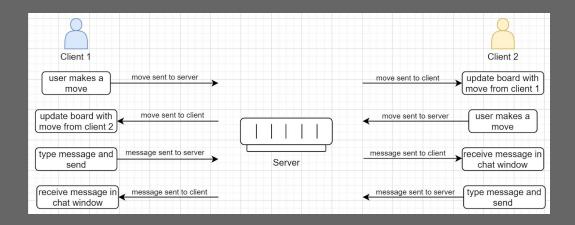
Remove generated game files

- rm -rf *

Chat Functions and Features

Basic Function Calls:

Communication Flow:



Login Menu:



- Username/Password:
 - Input:
 - Username: Plain-text Field Input
 - Password: Hidden-text Encrypted Field Input
 - Output:
 - None
- Login:
 - Input: Button Click

- Output: Establishes connection to server and validates
 User, and then takes User to the online Main Menu Screen
- Errors:
 - User Not Found: Will tell the user to verify login credentials and try again
 - Invalid Server Connection: Will notify the player that the server is down and encourage the user to play an offline game
- Create Account:
 - INPUT: Button click
 - OUTPUT: Creates a new account on the Server
 - Errors:
 - User Already Exists: Will tell the user to verify login credentials and try again
 - Invalid Server Connection: Will notify the player that the server is down and return them to main Login Screen

Main Menu (Online Version):

- New Game:
 - Input: Button Click
 - Output: Will take the user to the New Game Menu
 - Error:
 - Invalid Server Connection: Will notify the player that the server is down and return them to main Login Screen
- Help:
 - Input: Button Click
 - Output: Will take the user to Help Menu
- Manage Contacts:
 - Input: Button Click
 - Output: Will Take the user to Manage Contacts Screen

Manage Contacts:

- Contact List: (View Only)
 - Input: None
 - Output: Displays a list of the User's Contacts
- Add Contact:
 - Input: Button Click
 - Creates a popup in which the user can enter another username to add to their contacts
 - Output: Displays the new contact in the user's contact
 list
 - Error:

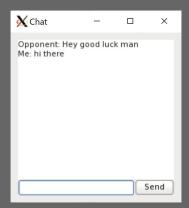
- User Not Found: Will notify the user that the contact to be added does not exist, and will prompt the user to try again.
- Delete Contact
 - Input: Button Click
 - Creates a popup in which the user can enter another username to delete from their contacts
 - Output: Removes the contact from the user's contact list
 - Error:
 - User Not Found: Will notify the user that the contact to be added does not exist, and will prompt the user to try again.

New Game Menu (Online Version):



- Select Opponent:
 - Input: Clickable Dropdown Menu
 - Select your opponent from a list of contacts
 - Output: None
- Select Set Color:
 - Input: Button Click Select Black or White
 - Output: None
 - NOTE: This function is only valid for the user starting the game, the opponent will automatically be assigned the other color
- Start Game
 - Input: Button Click
 - Output: Starts New Game
 - Error
 - Invalid Server Connection: Will notify the player that the server is down and return them to main Login Screen

Game Chat:



- Send Message:
 - Input:
 - Single Line Text Field Input
 - Send Button
 - Output: (FOR BETA: The chat message is sent to server, but not back to opponent)
 - Sends a Message to the Opponent and Displays it in the Chat Box
 - Errors:
 - Invalid Server Connection:
 - Will notify the user that the server connection is not working

Chess Functions and Features

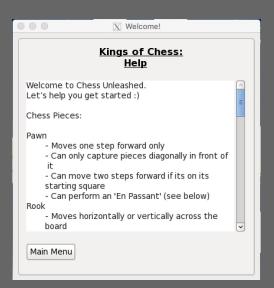
Basic Function Calls:

Menu (Offline)



Start Game:

- INPUT: Select Buttons
 - Users will press New Game to start a game, which will lead them to the game select menu
 - Users will press Help to enter the help screen
- OUTPUT:
 - Move onto Game Select menu or Help menu



- Help:

- A list of Chess Pieces, Terms, and Special Moves
- INPUT: Press Main Menu to Exit

- OUTPUT: Return to Main Menu



- Set Color Select: Player decides if they want to play as White or Black
 - INPUT: Press White or Black
 - OUTPUT: None
- Opponent Select: Player selects who they want to play against
 - INPUT: Press Human to play against a Human Opponent or CPU to play against the CPU
 - Press Start Game to start playing
 - OUTPUT: None
- Difficulty Select: Player sets the difficulty of the AI
 - Input: Click on Easy, Medium, or Hard
 - OUTPUT: None
- Start Game: Button to start the game
 - INPUT: Click the Start Game button after clicking other menu buttons to select opponent, color, and difficulty
 - OUTPUT: Starts Game

Game



- Piece Select: Player selects what piece they would like to move
 - INPUT: Click the piece you want to move
 - OUTPUT: None
- Move Piece: Player selects what position they would like to move to
 - INPUT: Click the square you want to move to
 - OUTPUT:
 - Piece is moved
 - If the piece captures another piece when it moves, a capture message is displayed "(PIECE 1) has captured (PIECE 2)"
 - ERRORS:
 - Illegal Move Error: will result in a redo of the move
- AI Move: When the player desires the AI to make its move
 - INPUT: Click the AI's Turn square in the bottom right
 - OUTPUT:
 - Piece is moved

- If the piece captures another piece when it moves, a capture message is displayed "(PIECE 1) has captured (PIECE 2)"



- Promote: If a pawn reaches the 8th rank, then player can choose what piece to promote to
 - INPUT: Click on piece type you wish to promote your pawr
 - OUTPUT: Piece is changed to the desired piece type
- En Passant: Pawn is able to capture another pawn that just double stepped "in passing" as if it only moved one space.
 - PRECONDITIONS: opposing pawn just double stepped right next to a pawn
 - INPUT: Click the pawn you want to use to capture, then click the diagonal square that the opposing pawn just double stepped over.
 - OUTPUT: Pawn moves to the diagonal square and captures the opposing pawn past it.

- Castling: Player is able to move the king 2 spaces towards the rook and the rook gets move to the other side of the king to protect it
 - PRECONDITIONS: empty space between the two pieces, king is not in check
 - INPUT: Click the king and click two spaces in the direction you want to castle
 - OUTPUT: King does either a king side castle or queen side castle

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Error Messages

MENU:

Invalid Input: will prompt the user to enter valid selection GAME:

- Invalid Move: will prompt the user to enter a valid move
- No Move History: will display no moves to be shown SERVER:
 - Name taken: If username is taken, the server will not allow the user to create an account with that name.
 - Incorrect Password or Username: If an incorrect password or username is entered the server will not accept as credentials to login.
 - Server Connection Lost/Failed: The server is not connected

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