

Connect 4 Technical Document

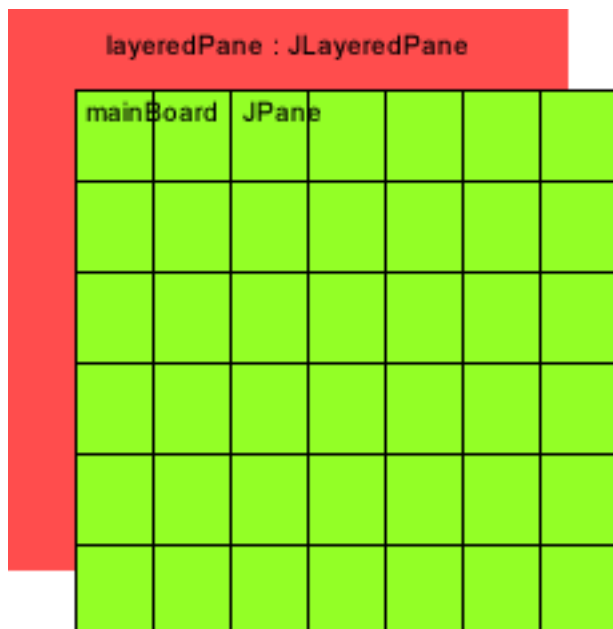
Timesheet

Feature	Time Spent (hours)
Board Class	2
Connect4 Class <ul style="list-style-type: none">- Initial UI (JFrames, labels, buttons)- gameBoard UI- mousePressed event- hoverBoard- mosueMoved event- Overall design	3 4 2 2 1 2
Computer Class <ul style="list-style-type: none">- Implementing computer player in Connect4 class	2 1

I spent about 25 hours in total on the game. This time includes learning Java Swing.

Design Decisions

I decided to use a combination of Java Swing components to draw the game grid.



The game play area is made up of 3 main components. Firstly a JLayeredPane is created of the correct size with the mouse motion and clicked listeners. Secondly a JPanel is created to fit inside the JLayeredPane, and is given a GridLayout manager – splitting it up into the correct number of rows and columns, as chosen by the user. Finally a square JPanel is created and its background image is set to emptySquare.png. When the user selects a column, the respective square JPanel's background is changed to the player's counter. Finally the square above this is changed to the active state.



Empty square 'Active' square Played square

Data Structures Used

I used a 2D array of size columns x rows to hold a representation of the game board whilst in play. An available space is represented by 0, and a played space by the player's ID number who played it. Logic can then be done on this array to determine if a move is valid, if there are any winners, and if the game is a draw (board full).

I used the built in Java stack structure to hold each move made by a player. When a player makes a move, it's x,y coordinate is pushed to the stack. When the user wants to undo a move, they can pop from the stack and the relevant logic/UI updates can then be applied.

Problems & Limitations

- I have implemented a Monte Carlo method of AI. This works by simulating N number of games for each possible move available to the computer and determining which move gave them the biggest win ration. At the moment I haven't found the best number N such that the computer makes the best move, without taking >1 minute per move.
- I have only allowed a single user to play 1 computer at a time, although this could definitely be a future update. I have also left the difficulty fixed, however this would be very easy to change.
- The user counter icon file names are fixed.