Small Computer Software Connect Four
EE/CS 356 Project 5B
Assigned 10/16/19
Due 11/6/19

Othello (Reversi) is a simple game that you play on an 8 by 8 in (20 by 20 cm) checkered board with 64 double-sided black and white discs. Players take turns placing disks on the board with their assigned color facing up. During a play, any disks of the opponent's color that are in a straight line and bounded by the disk just placed and another disk of the current player's color are turned over to the current player's color. The game is easy to learn, but it takes time to master and develop your strategies for winning the game.

For project 5 it will be your task to recreate the Othello Game, but instead of playing the game with someone across the table, you will be playing over the network.

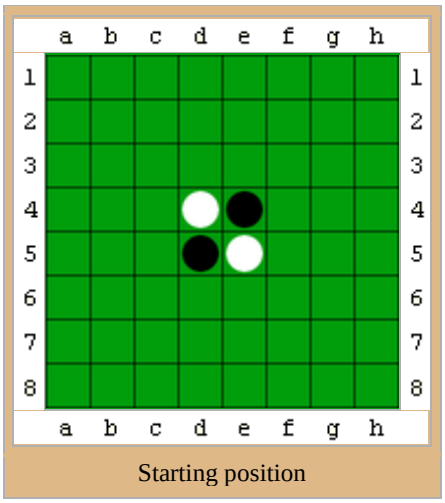
Othello Rules:

Rules

Each of the disks' two sides corresponds to one player; they are referred to here as *light* and *dark* after the sides of *Othello* pieces, but any counters with distinctive faces are suitable. The game may for example be played with a chessboard and Scrabble pieces, with one player *letters* and the other *backs*.

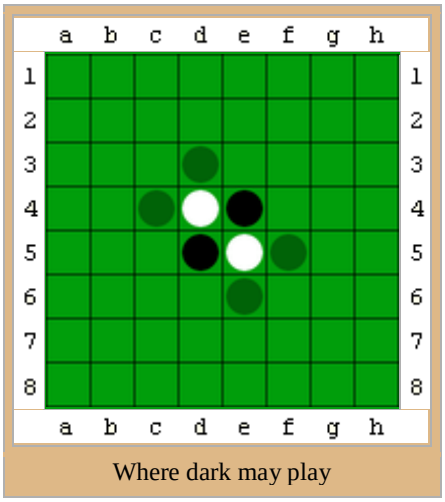
The historical version of Reversi starts with an empty board, and the first two moves made by each player are in the four central squares of the board. The players place their disks alternately with their colors facing up and no captures are made. A player may choose to not play both pieces on the same diagonal, different from the standard *Othello* opening. It is also possible to play variants of Reversi and *Othello* where the second player's second move may or must flip one of the opposite-colored disks (as variants closest to the normal games).

For the specific game of *Othello* (differing from the historical Reversi), the rules state that the game begins with four disks placed in a square in the middle of the grid, two facing white side up, two pieces with the dark side up, with same-colored disks on a diagonal with each other. Convention has initial board position such that the disks with dark side up are to the north-east and south-west (from both players' perspectives), though this is only marginally meaningful to play (where opening memorization is an issue, some players may benefit from consistency on this). If the disks with dark side up are to the north-west and south-east, the board may be rotated by 90° clockwise or counterclockwise. The dark player moves first.



Starting position

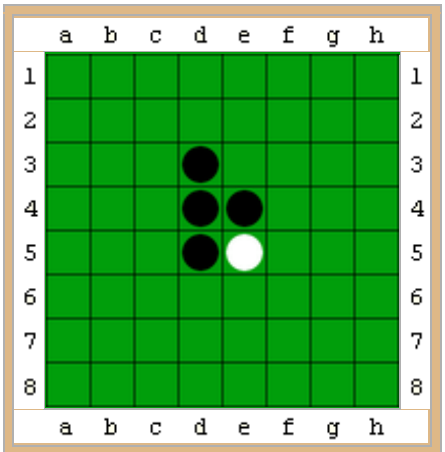
Dark must place a piece with the dark side up on the board, in such a position that there exists at least one straight (horizontal, vertical, or diagonal) occupied line between the new piece and another dark piece, with one or more contiguous light pieces between them. In the below situation, dark has the following options indicated by translucent pieces:



Where dark may play

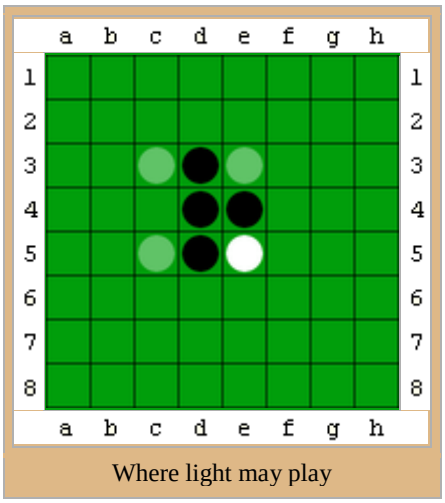
After placing the piece, dark turns over (flips, captures) all light pieces lying on a straight line between the new piece and any anchoring dark pieces. All reversed pieces now show the dark side, and dark can use them in later moves—unless light has reversed them back in the meantime. In other words, a valid move is one where at least one piece is reversed.

If dark decided to put a piece in the topmost location (all choices are strategically equivalent at this time), one piece gets turned over, so that the board appears thus:



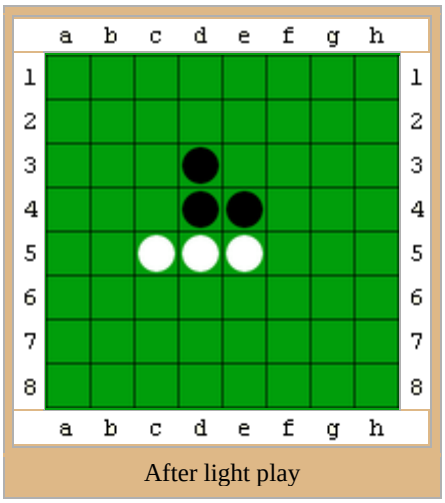
After dark play

Now light plays. This player operates under the same rules, with the roles reversed: light lays down a light piece, causing a dark piece to flip. Possibilities at this time appear thus (indicated by transparent pieces):



Where light may play

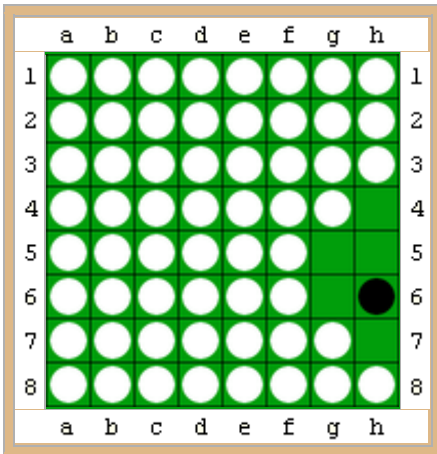
Light takes the bottom left option and reverses one piece:



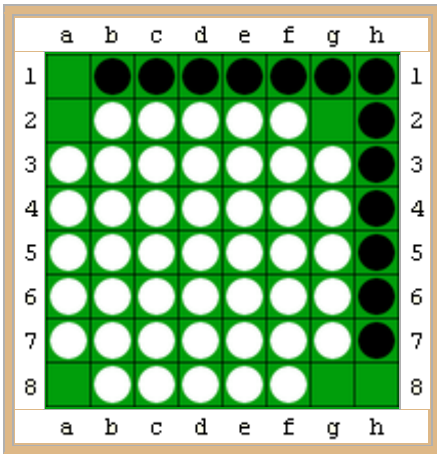
After light play

Players take alternate turns. If one player can not make a valid move, play passes back to the other player. When neither player can move, the game ends. This occurs when the grid has filled up or when neither player can legally place a piece in any of the remaining squares. This means the game may end before the grid is completely filled. This possibility may occur because one player has no pieces remaining on the board in that player's color. In over-the-board play this is generally scored as if the board were full (64–0).

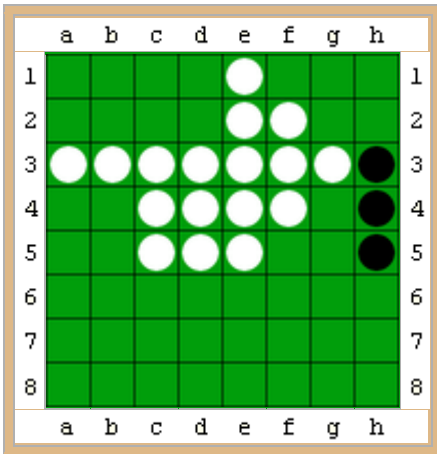
Examples where the game ends before the grid is completely filled:



Vlasáková 1 – 63 Schotte (European Grand Prix Prague 2011)



Vecchi 13 – 51 Nicolas (World Othello Championship 2017, Ghent)



Hassan 3 – 61 Verstuyft J. (European Grand Prix Ghent 2017)

The player with the most pieces on the board at the end of the game wins. An exception to this is that if a clock is employed then if one player defaults on time that player's opponent wins regardless of the board configuration, with varying methods to determine the official score where one is required.

In common practice over the internet, opponents agree upon a time-control of, typically, from one to thirty minutes per game per player. Standard time control in the World Championship is thirty minutes, and this or something close to it is common in over-the-board (as opposed to internet) tournament play generally. In time-defaulted games, where disk differential is used for tie-breaks in tournaments or for rating purposes, one common over-the-board procedure for the winner of defaulted contests to complete both sides' moves with the greater of the result thereby or one disk difference in the winner's favor being the recorded score. Games in which both players have the same number of disks their color at the end (almost always with a full-board 32–32 score) are not very common, but also not rare, and these are designated as 'ties' and scored as half of a win for each player in tournaments. The term 'draw' for such may also be heard, but is somewhat frowned upon.

What are generally referred to as *transcript sheets* are generally in use in tournament over-the-board play, with both players obligated to record their game's moves by placing the number of each move in an 8×8 grid. This both enables players to look up past games of note and tournament directors and players to resolve disputes (according to whatever specific rules are in place) where claims that an illegal move, flip or other anomaly are voiced. An alternative recording method not requiring a grid is also in use, where positions on a board are labeled left to right by letters *a* through *h* and top to bottom (far-to-near) by digits *1* through *8* (Note that this is the opposite of the chess standard, with numerals running upward away from the side (White) that has *a* through *h* left to right, and also that the perspective may be that of either player (with no fixed standard)), so that the very first move of a game may be (based upon standard starting setup) d3, c4, f5 or e6. This alternate notational scheme is used primarily in verbal discussions or where a linear representation is desirable in print, but may also be permissible as during-game transcription by either or both players.

Tournament play using ordinary sets rather than a computer interface—where this can not be an issue—have various ways of handling illegal moves and over- or underflipping (flips that should not be made but are or should be but are not). For example, permitting either player (perpetrator or its opponent) to make a correction going back some fixed number of moves (after which no remedy is available) is one procedure that has been used.

Significant variants of the game, such as where the starting position differs from standard or the objective is to have the fewest pieces one's color at the end, are sometimes—but rarely—played.

A								
B				**X**				
C			**O**	**O**				
D			**O**	**O**				
E	**X**	**X**	**X**	**O**	**O**	**X**		
F	**O**	**O**	**X**	**X**	**X**	**O**		
G								
H								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

Minimal User Interface

Game Play:

Your server should allow for up to 5 concurrent connections to the server. Once two players have connected to the server the game should begin. As, additional connections are made the guest will be told that there is a game in progress and ask the user if they would like to play the winner. If the user would like to wait and play then a next up queue should begin to be populated. Each time another user is connected he/she should be added to the next up queue.

Once two players are connected they will be given a grid that will represent the playing area.

Your server must act as the host of the game and must record all game moves. It will forward opponents moves over the network and update the opposing board in real time. The server should keep track of whose turn it is and only allow the current player to update the board. The rule set can be implemented on either the client of server it is up to the application programmer.

Minimum implementation:

Server that allows 5 concurrent connection and nicely rejects additional connections.

Server that can maintain the board and keep track of whose turn it is.

Your application should at minimum play the game of Connect Four allowing two players to play head to head over the network. Following the rules stated at the beginning of this document.

Interface:

The interface should allow the user to click on the column he/she would like to move. If the move is valid the chip should be placed, if the move is not valid the user should be told the move is invalid and to try again.

The board can be populated as in with X's and O's graphics will be graded as an extra.

Additions:

Images (Red/Black chips)

Multiple Game Play (If for people are connected the second set can choose to play rather than wait for the winner)

Drag and Drop

Reporting to connected user where they stand in line. Estimating wait time.

Online chat between players

Animations