Software Engineering Coursework
Design and Implementation of Multiplayer Othello

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1 Introduction

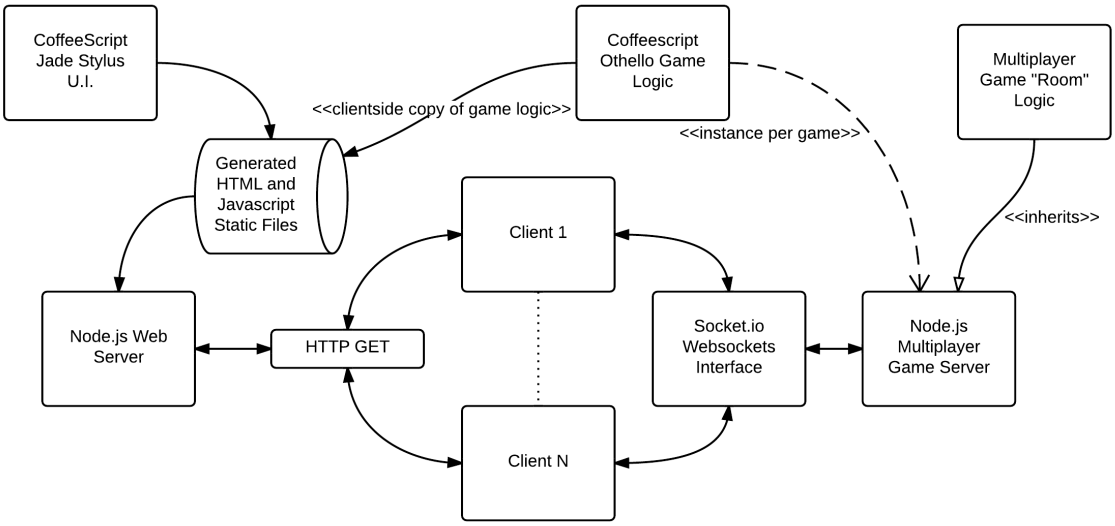
The task that we have been given is to design and implement a computer-based version of Othello, that is playable between at least two human players.

To implement this, we have decided to leverage web technologies to build a webpage, that when loaded, provides the player with a UI for a multiplayer lobby, through which the players can challenge one another and play a game of Reversi.

To focus our design efforts, we decided to utilise the Test Driven Development style through the following workflow:

1. Writing Calling Code
2. Write a shell implementation of the feature, just enough such that it compiles
3. Use Test Driven Development:- writing tests for the feature using the methods defined above; defining the methods such that tests pass ...
4. End up with finished, and tested feature

In designing each component, we also attempted to adhere to `Object Oriented` principles, wherby the number of public methods in each class is minimized to the bare requirement of the features that are inherently necessary to the functionality of the object. This leads to a clean, and simple design.



2 Testing

In accordance with Test Driven Development principles, one of the first stages around building the project was to produce a comprehensive test framework, which could be used throughout the project to ensure that the behaviour of the system, and its components, are correct. To do this, we have utilised the Jasmine Javascript testing framework, with the jasmine-node module such that we can quickly write tests and maintain the core behaviour when we add extra features to the design.

```
C:\Code\othello>jasmine-node --coffee --matchall test
.........................

Finished in 0.047 seconds
28 tests, 42 assertions, 0 failures
```

3 Designing the Othello Game

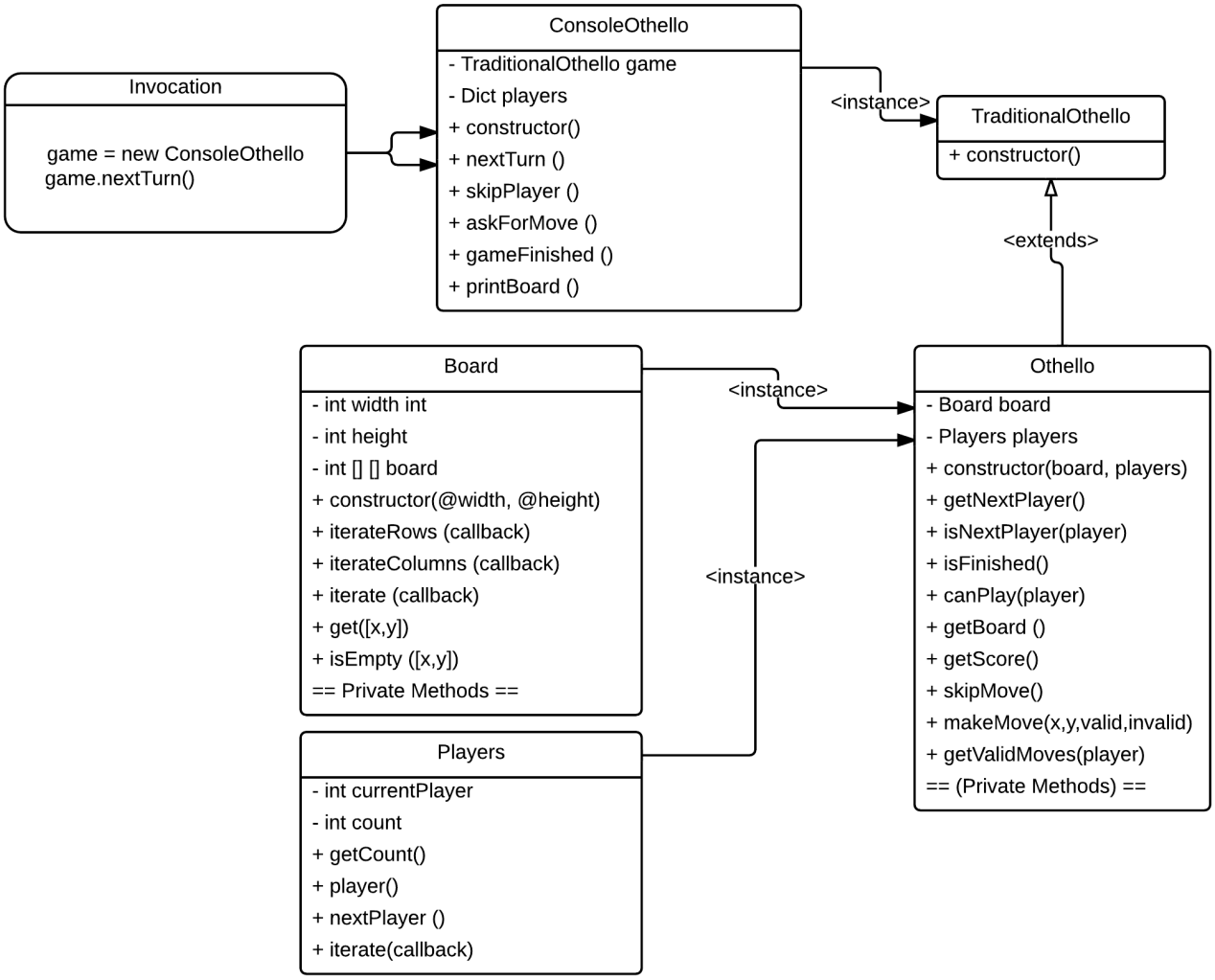
The Othello game logic is relatively simple, but we worked in a top-down style to design the classes. We first considered how to build a console interface to the game class, and what sort of IO should be available to play the game. The requirements for this class was:

- Notifying the player who's turn to play it is, or notifications that there are no valid moves and that a player is being skipped.
- Playing a move, given a move is valid
- Outputting the score of the game.
- Telling the players that the game has finished.

Whilst building these methods, we produced a list of requirements for the Othello Game class, which were:

- Constructor, to initialising the game to a default state given a board size.
- A method returning a boolean if the game has finished or not.
- An iterator, to recurse over each row and column of the board, returning the value of what is there such that it can be displayed.

Using this same principle, we recursively abstracted into the game logic, eventually producing a design that equates to the following diagram:



Utilising this design has given us a multitude of advantages. The seperation of the board class allows us to store and transmit the updates to the game to clients in a succint format. The adaptor pattern also allows us to reproduce the game logic in our Node.js HTTP server in a lightweight manner, with no changes to the code needing to be made between the console version but for the implementation of the TraditionalOthello Class.

A further feature that we implemnted was a HistoryOthello, allowing players to replay the game and undo moves. This was implemented via the Decorator pattern, used to keep the game design free of the extra backage that implemented this feature internally would cause.

The console version can be viewed and played via the file `game/ConsoleOthello.coffee`. It is dependant on the `commander` module.

```
Michal(w),  where would you like to place next stone?
X:  7
Y:  4
You can't place your stone there!
Michal(w),  where would you like to place next stone?
X:  7
Y:  5
  0 1 2 3 4 5 6 7
0 w w w w w w w b
```

```
1 w w w w w w w b
2 w w w w w w w b
3 w w w w w w w b
4 w w w w w w w b
5 w w w w w w w w
6 w w w w w w w b
7 w w w w w w w b
Game has ended, final scores:
Michal: 57
Tom: 7
```

4 HTTP Server

The next stage in the production of our gaming server was the design of networking logic, and implementation of a client side U.I. to play the game on, and challenge other players on the same web page.

5 Designing the User Interface and Networking

6 …

7 Conclusion