Design Documentation

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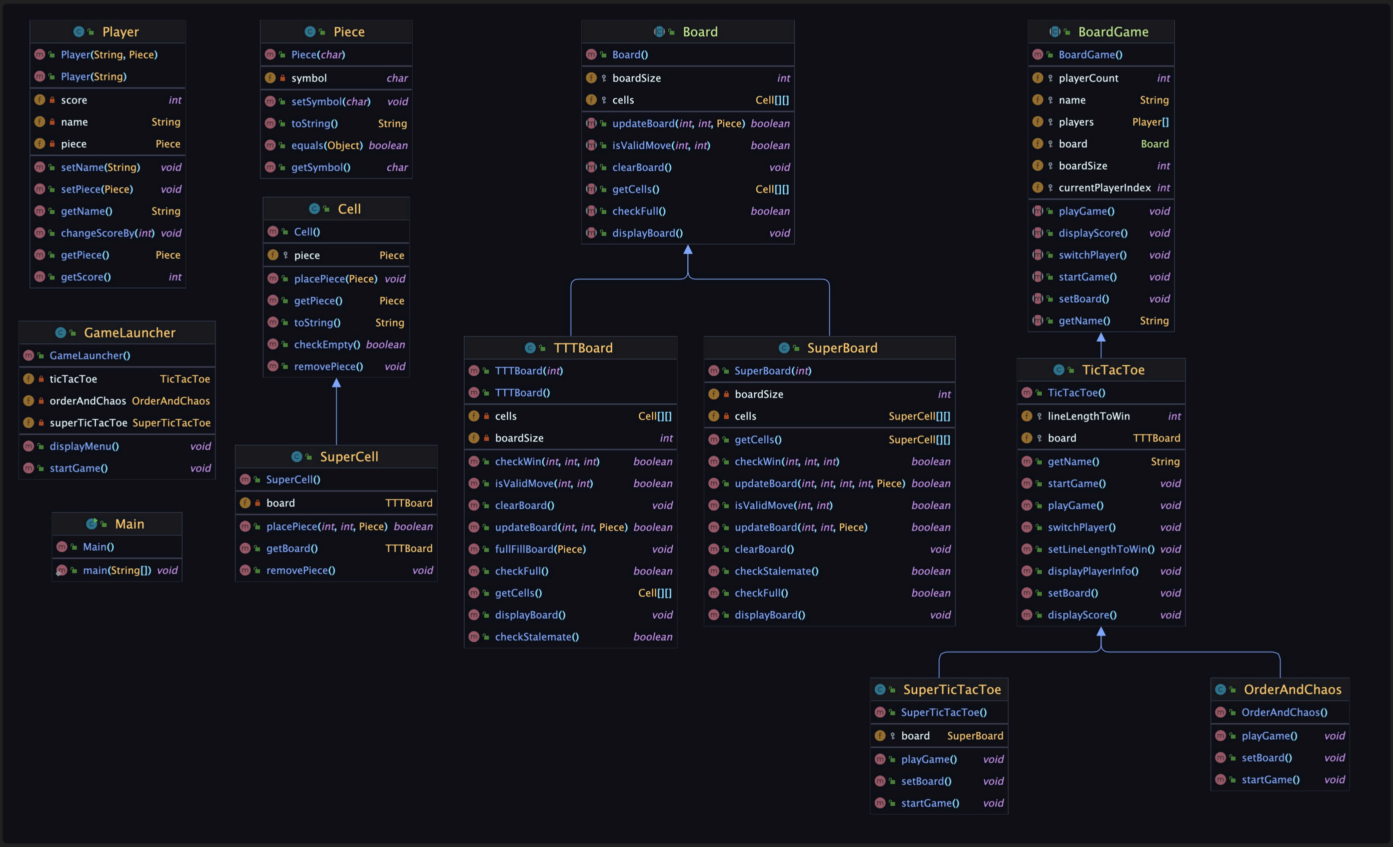
Class Structure



In my design, there are 4 basic components of a board game that are represented as classes. These are the Piece, Cell, Board, and Player classes. The Board class is responsible for managing the game board and all cells, the Piece class is responsible for managing the pieces on the board, the Cell class is responsible for storing pieces and managing the cells on the board, and the Player class is responsible for managing the players in the game. All of these classes are used or extended to create a game of chess.

Then it comes to the `BoardGame` class, which is responsible for managing the game itself. It has a `Board` object, a list of `Player` objects. The `BoardGame` class is responsible for managing the game state, the game loop and user interactions.

The `TicTacToe` class extends the `BoardGame` class and implements the game logic for Tic Tac Toe with additional member *lineLenthToWin* and specific `TTTBoard` type board. Since the game Order And Chaos and Super Tic Tac Toe are all based on Tic Tac Toe, they are also extended from `TicTacToe` class with their own implementation of game logic.

The `TTTBoard` class extends the `Board` class and implements the board for Tic Tac Toe and Order And Chaos. It has a 2D array of `Cell` objects, each of which can store a `Piece` object. The `TTTBoard` class is responsible for managing the cells on the board and checking for wins.

The `SuperBoard` class also extends the `Board` class and implements the board for Super Tic Tac Toe. It has a 2D array of `SuperCell` objects, each of which store a Tic Tac Toe board and a super piece. The `SuperBoard` class is responsible for managing the super Tic Tac Toe board and checking for wins.

The `SuperCell` class extends the `Cell` class and implements the cell for Super Tic Tac Toe. It has a `TTTBoard` object and a super piece. The `SuperCell` class is responsible for managing the pieces on the small boards and checking for wins.

To run the game, the `Main` class is used. It uses the `GameLauncher` class to start the game. The `GameLauncher` class is responsible for starting the game and handling user input.

Scalability and Extendibility

In class `BoardGame`, players are stored in a list. This allows for any number of players to be added to the game instead of being limited to 2 players. Thus, in the method *switchPlayer*, I used the modulus operator to get prepared for multiplayer situation. The `BoardGame` class contains simple game logic and can be extended to create new games by extending the `BoardGame` class and implementing the game logic. The `TTTBoard` class can be extended to create new games as long as it is a board game.

Because all board games have a board, players and the methods in the BoardGame class can also be used for any board game.

Also, any board game can have its board extended from the Board class like TTTBoard or SuperBoard. Because all boards are composed of cells and need to update and display, etc. The Cell class can be extended to create new types of cells like SuperCell. Because all cells need to place and get pieces etc.

In the game Tic Tac Toe, user can customize the size of the board (3-9) and even change the rule for how many pieces need to be in a line to win. The line length to win should be no more than the board size, of course. With the member *boardSize* and *lineLengthToWin* reserved instead of fixed, the game can be easily customized to other similar games. For example, if you wanna design a new game Connect Four, you can just change the *boardSize* and set *lineLengthToWin* to 4.

Changes to my Design

1. I put the method checkWin and checkStalemate in the TTTBoard class instead of game class. Because it is more reasonable to let the board to check the status of the board. I did not put checkWin in the abstract board class, because different board games may have different win methods. But with the checkWin method in the TTTBoard, all TicTacToe like games can use this method by customizing the input rule.
2. I added a new class cell Piece to represent the piece in the game.
3. I added a new abstract class Board to represent the generic board in the game. The TTTBoard and SuperBoard all extend Board class.