

# Rationale

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- **Design Goal**

The goal of design is to realize a variant of Scrabble Game. The first part of this game should be the core logic of the solution which should be completed independent of the GUI. Scrabble is a typical word game usually played by two to four players. The game board is composed of 15\*15 grid squares, and different tiles representing one letter or special functions could be placed on the board. Each player has a rack which could hold 7 letter tiles at most, and place two or more letters on the board to form valid words accepted by a standard dictionary. The word could only be read from left-to-right or top-to-down. After placing one word, the player could win some scores based on the corresponding score of the letter and the board position. After all tiles picked up from the tile bag, and no spaces to place new word, or no possible new words to placed on the board, the game is over. The player with the highest score wins the game.

- **Object Model**

The object model mainly consists of 5 parts:

1. the Scrabble Game
2. the Board, and the Cell on the board
3. the Player
4. the Tile Bag and the Tile, including Normal Tile and Special Tile
5. the Dictionary

The main Scrabble Game is the main system of the game. It could support 2~4 players but no AI in this game. When the game starts, it requires to input the player numbers, and randomly decide the order of the player and the start player.

During the game, the player could place the tiles on the empty space of the board, including the normal tiles and the special tiles. The normal tiles should form the valid words which are accepted by the dictionary, and the special tiles are invisible to other players, and could have some special effects when others place tiles on the special ones (trigger the special tiles). The board only checks the valid position of the word, but not the validity of the words. When you place the word and make sure the movement, you earn some scores according to the letter and the position of the word. The scores could be used to purchase special tiles in your turn. If you could not form a word in your turn, you could exchange some of your rack tiles to the tiles in the bag randomly, or you could directly pass your turn. Each player ends up his/her turn, there will be a challenge process for other players to challenge the validity of the word. This process will be illustrated in details later.

The Board is a 2-D List which contains all the information of the cells, the Tiles that placed on the cells, and the words placed by the player, as well as the corresponding scores. For each square on the board, it has an attribute factor which decides the bonus added to the words on the squares. The normal square has a factor of 1, which means the score added only by the score

where the letter represents. There are 4 special squares (i.e. Double Letter, Triple Letter, Double Word, Triple Word) which have 2, or 3 times scores effect on the corresponding letter or the whole words place on them.

- ✓ When a word (composed of normal tiles) is placed on the board, it should obey the behavior contract (referred by `behavior_contract.pdf`). After the word is placed down, the score is calculated based on the corresponding score of the letter and the board position. The bonus effect of score could be superimposed, e.g. this word contains one Triple Letter and one Double Word, the letter on the Triple Letter will have triple score, and all word score will be doubled.
- ✓ When a word is placed on squares contained Special Tile, the special tile is triggered before score is calculated. When a Negative Tile is triggered, the word that activated this tile is scored negatively for the player who activated the tile; when a Reverse Tile is triggered, the turn ends as usual, but after this turn players continue with reversed order; when a Boom Tile is triggered, all tiles within 3-tile radius on the board are removed from the board. Only survival tiles are scored.; my own special tile is Dispose Tile, which means next turn you could only have 5 tiles at rack at most after refill tiles from the Tile Bag. Some other unknown tiles could be added to the game.

The challenge process is allowed after every player places his/her word, and before the next player begin to refill the rack tiles and place the word. There are at most 5 seconds for each other players to challenge the correctness of the word, if he/she chooses not to challenge or the time is on, the opportunity will go to the next player. Finally, if no player challenges the word, the previous player's next refill the tiles and place the word. If one player challenges the word and wins (the word is not accepted in the dictionary), the word will be removed from the board, and the corresponding score will also be deducted from the player earned the score. Then, the turn starts from the lost score's next player. (e.g. A places a word, C challenges, and wins. A removes the word, losses the score, and then B's turn.) If one player challenges the word but loses (the word is accepted in the dictionary), the challenger will lose a turn in this round. (e.g. A places a word, C challenges, but loses, then B places the card, and C loses one turn in this round. If C challenges but multi-times, C loses corresponding times to place word.)