CS 451/551 - User Interface Design
Fall 2021
Assignment 3
To be demonstrated on Nov 08, 2021 (Monday) and Nov 10, 2021 (Wednesday)

We will play the traditional scrabble game in this assignment. At the same time, you will also experience how to develop a GUI for different types of users and how to handle mouse events.

<u>User Profiles</u>: We have two types of users - beginners and challengers. Beginners will use a smaller board called Junior Scrabble Board (see Figure 1) and challengers will use a Regular Scrabble Board (see Figure 2).
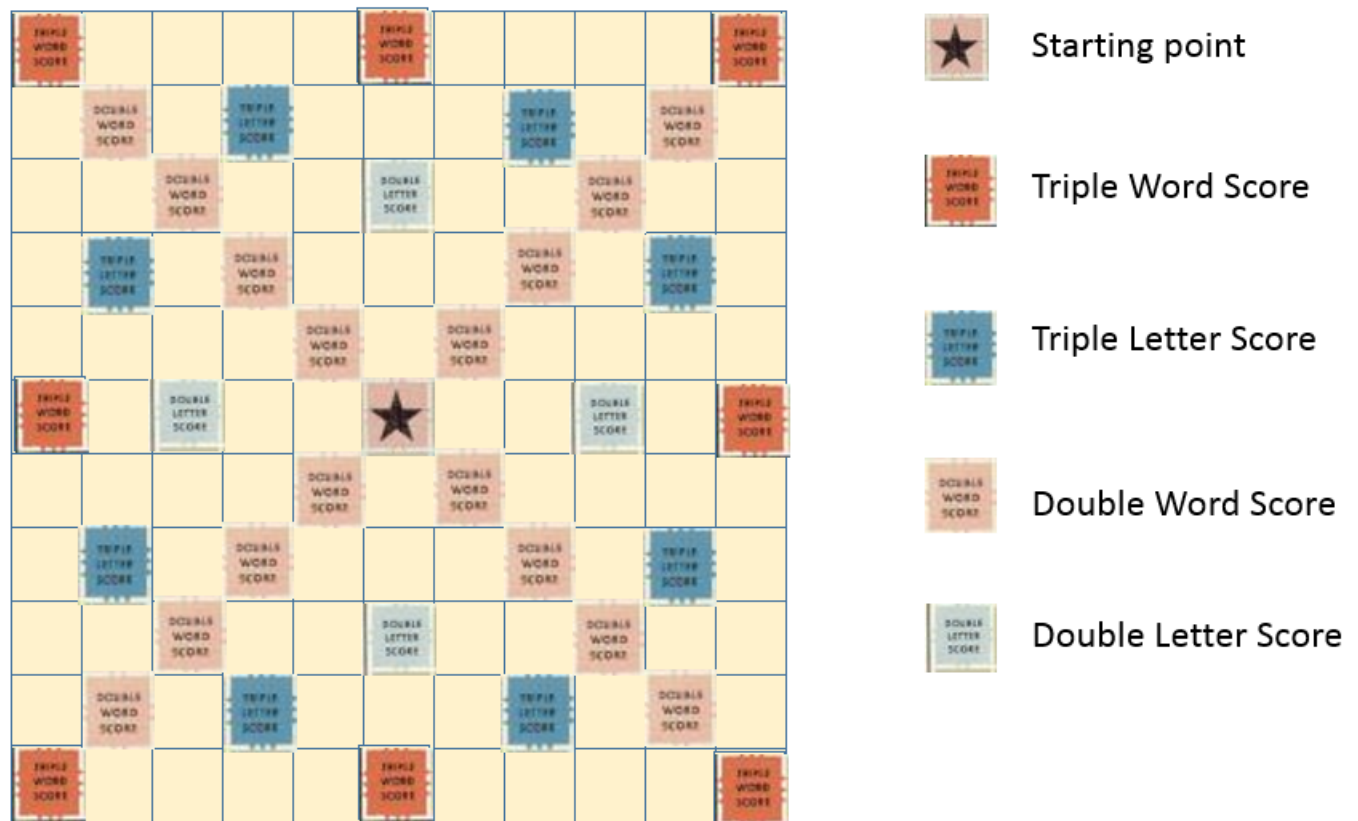

Figure 1: Junior Scrabble Board

<u>Rules of the game (applicable to all players)</u>

- There are 100 letter tiles available at the beginning of the game in a pile. Each tile has a distinct letter and its score. Table 1 shows the letters, their scores and the number of tiles available in each letter.

- Each player gets seven tiles selected randomly from the pile at the beginning of the game. When a player uses N tiles for a word ($1 \leq N \leq 7$), the player gets N more tiles, selected randomly from the pile, to play for the next round. If there are not N tiles available, then the player gets whatever is left in the pile. The game ends when any one of the players has used all the tiles he/she had.

- When a player gets his/her turn, the player must put a word on the board connecting at least one letter on the board. The first word on the board must start at the star (center of the board). Words can be placed only horizontally (should read from left to right) or vertically (should read from top to bottom).
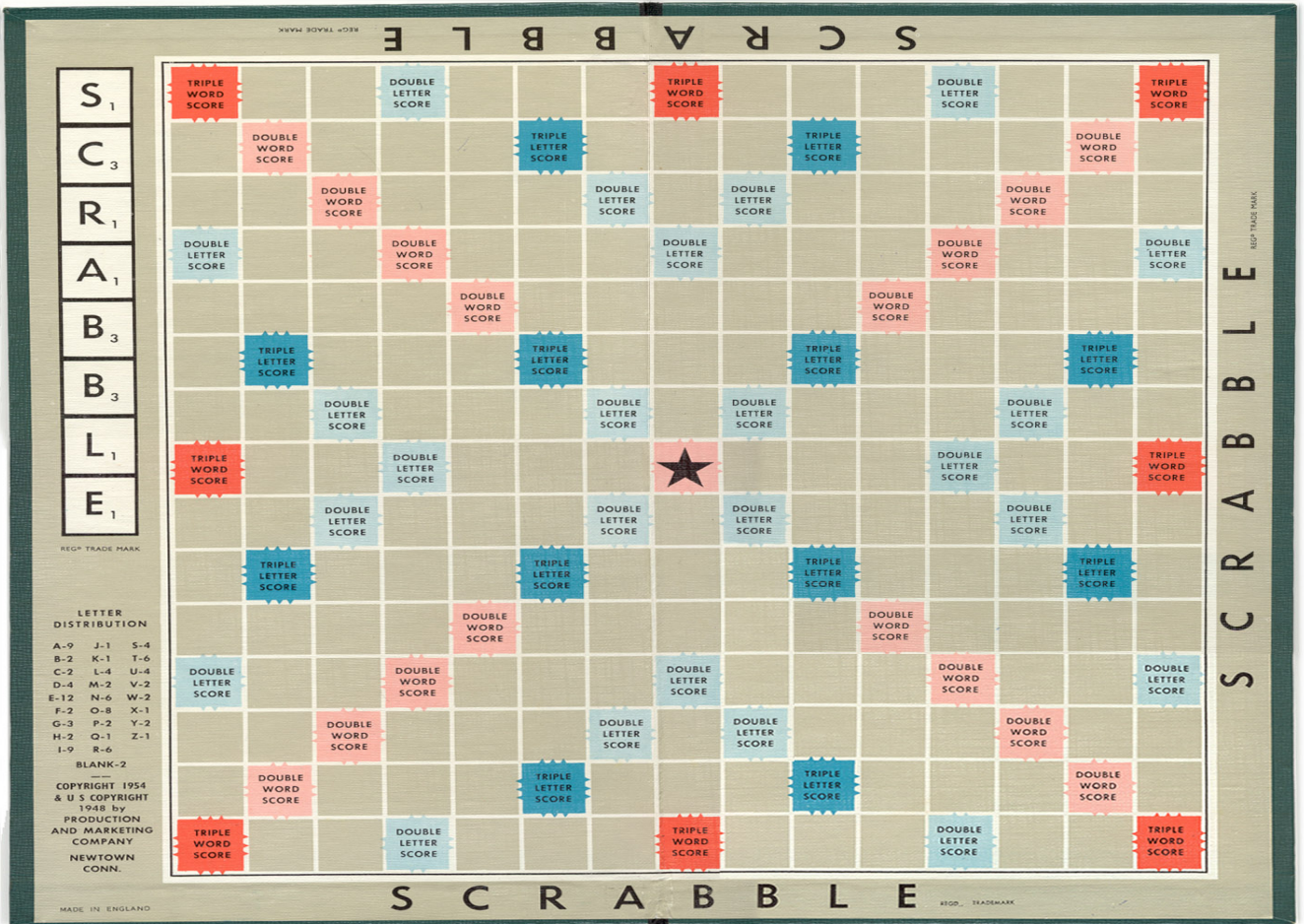
Figure 2: Regular Scrabble Board

The word must be available in the word list provided (Click here to download the word list - it is a simple text file containing one word per line). You can add more words to this list or use another but bigger word list. If a word is successfully placed on the board, the player's score is increased by the sum of scores of each letter in the word.

- Some places on the board will increase the score of the letter placed on that board (triple letter score and double letter score).

- If any one of the letters in the word is placed on a Double Word Score position, then the score for the entire word is doubled. Similarly, any letter of the word placed on a Triple Word Score position will increase the score of the word three times. Notice that a player will get scores for all new words created during his/her turn (happens sometime when you place a few letters connecting several existing words and the existing words all become new; for example, SEND becomes SENDS when you add a S at the end).

- If a player cannot place any word on the board, the player may pass his/her turn and wait for another opportunity.

- When the game ends (when at least one player has used all the tiles), the player who got the highest score becomes the winner of the game.

Additional rules for beginners

- Beginners can only use the Junior board (shown in Figure 1).

Letter	Score	No. of tiles	Letter	Score	No. of tiles	Letter	Score	No. of tiles
A	1	9	B	3	2	C	3	2
D	2	4	E	1	12	F	4	2
G	2	3	H	4	2	I	1	9
J	8	1	K	5	1	L	1	4
M	3	2	N	1	6	O	1	8
P	3	2	Q	10	1	R	1	6
S	1	4	T	1	6	U	1	4
V	4	2	W	4	2	X	8	1
Y	4	2	Z	10	1	Blank	0	2

Table 1: Tiles and their scores

- There must be exactly two players - no more, no less.

- Each word can be of at most four letters long.

Additional rules for challenges

- Challengers can only use the regular board (shown in Figure 2).

- Two (minimum) to four (maximum) players.

- There is no limit on the length of a word.

Programming requirements

- Initially, the system should collect information about players - number of players and their names. Their scores must be initialized to zero.

- To start with, seven tiles (randomly selected from the pile) should be given to each player.

- The system should highlight/show which player is currently playing. This player will be called 'current player' hereafter.

- Only the tiles of the current player must be visible. The tiles of other players must not be visible.

- Current player should be able to pass on to the next player without playing (e.g., not able to find a good word using the given tiles).

- Tiles must be placed on the board by dragging the tiles from player's area to the board or by clicking on the tile and clicking the square on the board. In other words, no dialog or text input is allowed.

- The score must be updated as soon as the player's turn is over - completing a word on the board.

- The current player gets N tiles ($1 \leq N \leq 7$) from the pile right after completing a word. These N tiles should be randomly selected from the pile.

- For beginners,

  - when the current player completes a word, a separate message containing the score of each letter used and the score of the word should be displayed;

  - a brief description of how to play should be available to view;

As before, you will be assigned an evaluator, and you will be evaluating another group. The evaluation forms must be submitted right after the demo, before the end of the day. The order of evaluations and the presenter-evaluator table will be posted later.

In addition to the standard evaluation by another group, everyone will be asked to rank all the demonstrations. The group that gets the most points from all students in the class will be given a 5% bonus for this assignment.