

Compenent 2 -Alexandra

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Scrabble Algorithm

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Abstract

¹ This article describes the creation of an online Scrabble game that gives users a digital platform to enjoy the well-known word game in a social setting. It describes the main components, design ideas, implementation specifics, and upcoming improvements. With the accessibility and connectivity offered by the online Scrabble game, players can demonstrate their word-building prowess and engage in international competition [1].¹

Task 1: Requirements

- I. Describe the rules of Scrabble.

1.1 Rules of Scrabble

1.1.1 Scrabble Game Set:

A Scrabble game set, which comes with a board, 100 letter tiles, four tile racks, and a tile bag, is required.

1.1.2 Players:

A game of Scrabble can have two to four players. To store their letter tiles, each player needs a tile rack.

1.1.3 Game Board Setup:

Place the Scrabble game board nearby on a flat surface so that all players may access it. Ensure that the board is accessible and visible to all players.

1.1.4 Letter Tile Distribution:

All 100 letter tiles are placed face-down in the tile bag before the game begins. To create their initial rack, each player selects seven tiles at random from the bag.

1.1.5 Dictionary:

To resolve any disagreements throughout the game over the authenticity of terms, keep a dictionary on hand for reference. Before the game starts, everyone should agree on the dictionary.

1.1.6 Randomizing Turn Order:

Decide who will start at random. To execute this, have each player take a tile from the bag, and then have the person whose tile has the letter closest to "A" go first. Determine the turn order, and then put the tiles back in the bag.

1.1.7 Turn Sequence:

Each player takes turns while the clockwise movement of the game continues. Once the turn order is decided, it is followed throughout the entire game.

1.1.8 Legal Words:

There can be no words other than those recognised in a shared lexicon. Unless specifically permitted by the players before the game begins, proper nouns, acronyms, prefixes, and suffixes are normally not allowed.

1.1.9 Word Formation:

Connecting to other words on the board is required to build words. Both horizontal and vertical word formations are possible. Unless a word already exists on the board, each word must be at least two letters long.

1.1.10 Placing Tiles:

Tiles must be arranged in a straight line, either horizontally or vertically, to form words. They should be arranged so that they fit inside the grid, do not overlap, and do not go past the board's edges.

1.1.11 Using Own Tiles:

At least one tile from the player's own rack must be used in every word. To create new phrases or lengthen old ones, players can also employ the board's existing tiles.

1.1.12 Validating Words:

Any player may contest a word that one of the other players has formed. In these circumstances, refer to the accepted dictionary. The word is deleted from the board, and the player's turn is forfeited if it is determined to be incorrect.

1.1.13 Scoring:

Add up the point values of all the letters to determine the score for each word that is generated. Calculate the total score using the premium squares on the board, such as double and triple letter scores and double and triple word scores.

1.1.14 Drawing New Tiles:

Players renew their racks by taking fresh tiles from the tile bag after each turn until they have seven total. Players go forward with fewer tiles if there are not enough in the bag.

1.1.15 Game End:

When a player uses all their remaining tiles and there are none left in the bag, or when no more words can be constructed, the game is over. At the conclusion of the game, the player with the highest score wins.

- II. ¹ Create a requirement features list for a possible computer-based solution for the game using the requirements prioritisation technique.

1.2 List of requirements

I decided to use the MoSCoW method to divide the list of requirements into several categories based on their priority [2].

1.2.1 Must Have:

1. User Registration:

Ensure that users who wish to access the online Scrabble game can do so by setting up accounts with special usernames and passwords.

2. Multiplayer Functionality:

Allow numerous players to join the game at once and compete with one another in real time.

3. Game Board:

Show a virtual Scrabble board with a grid pattern with premium squares that resembles the real-world board.

4. Letter Tile Management:

Create a system to organise and deliver letter tiles to each participant, allowing them to trade tiles while waiting for their turn and randomly distributing the initial distribution of tiles.

5. Word Validation:

Include a built-in dictionary to check the accuracy of words created by players and flag questionable or illegible language.

6. Turn-Based System:

Make sure the game has a turn-based structure where players take turns consecutively and receive the proper notifications when it is their turn.

1.2.2 Should Have:

1. Game Lobby:

Provide a game lobby where users can establish new game rooms or join those that already exist to begin playing Scrabble.

2. Score Tracking:

Create a scoring system that will automatically determine each player's score based on the words they have created and the point values of the tiles they have used.

1.2.3 Could Have:

1. Chat Functionality:

Create a chat function so that players may converse with one another and have fun or talk about the game.

2. Game Timer:

Include a timer option to set a time restriction for each player's turn to make the game move along more quickly.

1.2.4 Won't Have:

1. AI Opponent:

The original release of the game will not allow players to compete against artificial intelligence-controlled opponents.

2. Customizable Game Settings:

There will not be any alterations to the game's default settings for board configurations, tile distributions, or premium square arrangements.

3. Online Leaderboards:

Online leader boards that monitor high scores or player rankings will not be implemented in the game's initial iteration.

4. Mobile Compatibility:

Mobile device compatibility will not be given top priority for the game's first release.

- III. ¹ Select three of the options to implement under Must and explain their priorities.

1.3 Three Must have priorities.

1.3.1 User Registration:

Priority: Must Have

Explanation:

A fundamental prerequisite for the online Scrabble game is user registration. Players can set up their own accounts with special usernames and passwords. User registration is necessary to guarantee secure access to the game and give each player a customised experience. Players can keep track of their game histories, standings, and accomplishments by creating user accounts. Additionally, it makes features like texting, friend lists, and profile customization possible. Players would not have unique identities within the game without user registration, which would make it challenging to customise and improve their gaming experience.

1.3.2 Game Lobby:

Priority: Must Have

Explanation:

An essential component of the online Scrabble game is the game lobby. It offers a central hub where users may establish new game rooms or join those that already exist to begin playing Scrabble. Players congregate in the game lobby, where they can find other players and start game sessions. By giving users a place to connect and communicate, it makes multiplayer capability possible. Players would not have an uncomplicated way to find opponents without a gaming lobby, which would lead to a fragmented and disjointed multiplayer experience.

1.3.3 Game Board:

Priority: Must Have

Explanation:

An essential component of the online Scrabble game is the gaming board. It entails displaying a virtual game board with a grid pattern with premium squares that resembles the real-world Scrabble board. Players create words and arrange their letter tiles on the game board, which serves as the main visual interface. It lays the groundwork for word construction and gameplay. For players to strategize, visualise word placements, and comprehend the current state of the game, an accurate and clear display of the game board is necessary. Players would not be able to play Scrabble well without a correctly depicted and functional game board, which would undermine the essence of the gameplay.

Task 2: Implementation

- I. Identify the **variables** you need to use in your solution.

2.1 Variables use for online Scrabble game.

To create these variables, I will use Pascal method down below [3]. These variables are foundational to the functioning of an online Scrabble game solution. They facilitate user registration, game setup, gameplay mechanics, and data management [4] [5].

- 2.1.1 UserNames
- 2.1.2 PassWords
- 2.1.3 GameRooms
- 2.1.4 GameBoardState
- 2.1.5 LetterTiles
- 2.1.6 PlayerRacks
- 2.1.7 GameHistory
- 2.1.8 Timer

- a) Brief descriptions of the variables. If any are constants, indicate.

2.2 Descriptions of variables

Here is the description of the variables [6] [7].

2.2.1 Usernames:

UserName is a variable to store the usernames chosen by players during user registration. It would be a string variable that contains the individual player identifiers.

2.2.2 Passwords:

PassWord is a variable to store the passwords chosen by players during user registration. Although it would be a string variable, it should be encrypted or hashed for security reasons.

2.2.3 Game Rooms:

GameRooms is a variable or data structure to manage the game rooms in the game lobby. The information about each gaming room, including the room name, the number of participants, and other pertinent information, may be stored in an array, list, or database table.

2.2.4 Game Board State:

GameBoardState is a variable or data structure that represents the state of the game board. It would keep track of the letter tiles' locations on the board as well as their point totals and any unique squares (like double word scoring).

2.2.5 Letter Tiles:

LetterTitles is a variable or data structure to manage the distribution and storage of letter tiles. Regarding the accessible letter tiles, their corresponding quantities, and their point values, it might take the form of an array or bag-like structure.

2.2.6 Player Racks:

PlayerRacks is a variable or data structure to store the letter tiles assigned to each player. It would keep track of the letters and the point values they correspond with for the tiles in a player's rack.

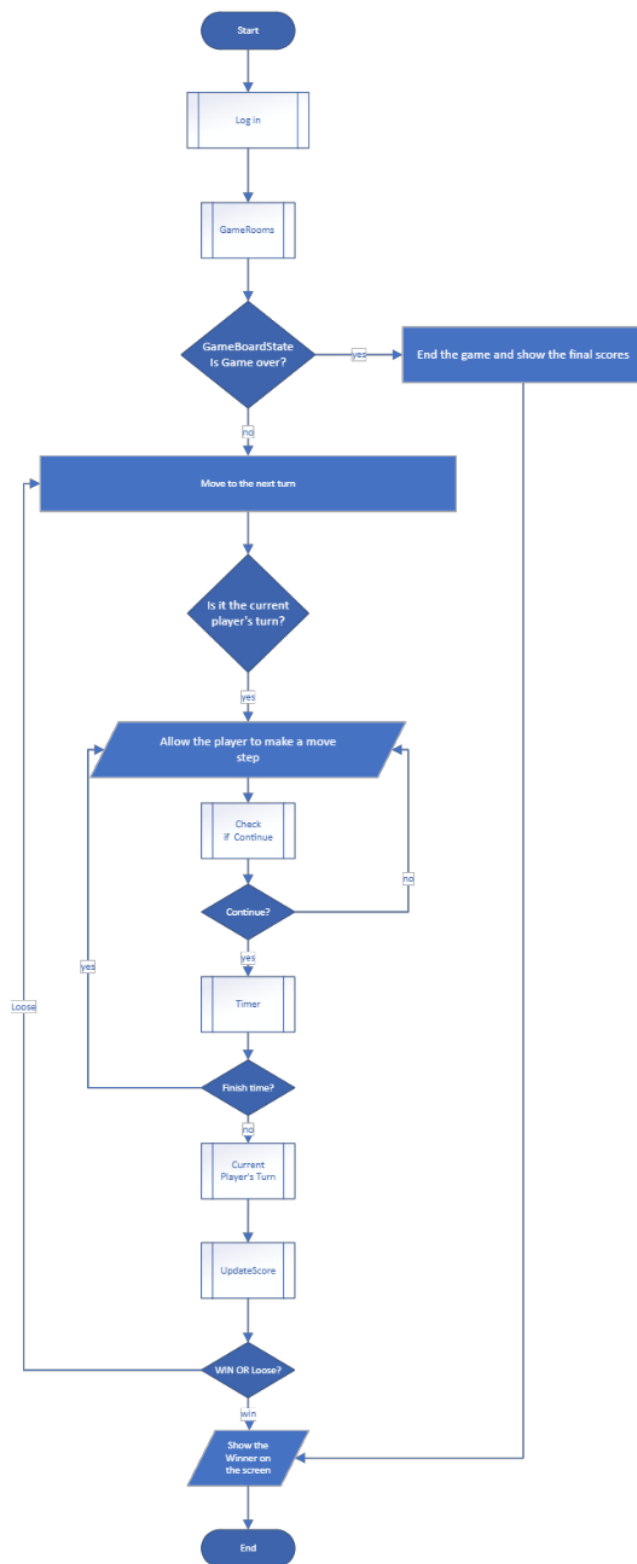
2.2.7 Game History:

GameHistory is a variable or data structure to record and store the history of each game session. It might contain details about the players, their actions, their results, and other pertinent information.

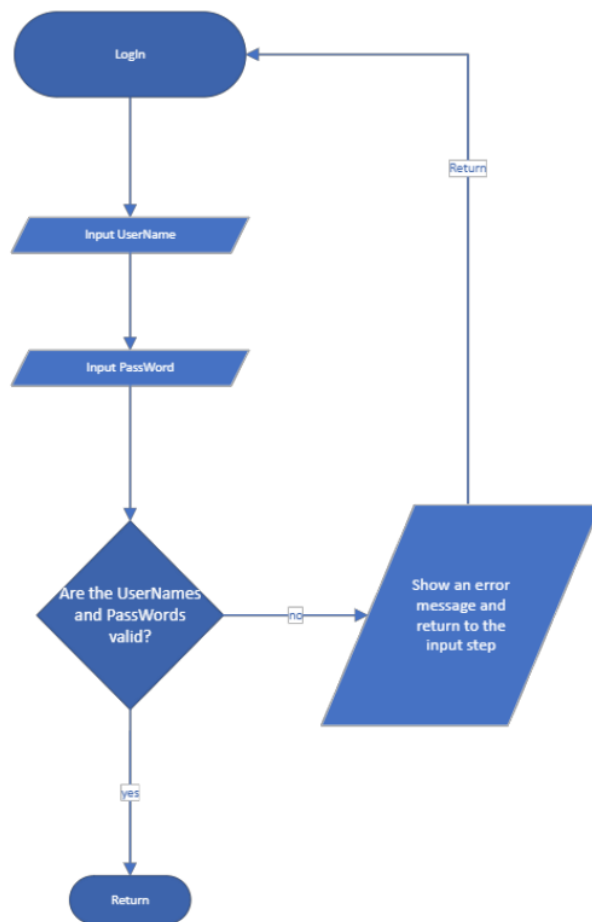
2.2.8 Timer:

Timer is a variable or constant to manage the game timer, if included. It would manage any time-based actions or occurrences in the game and keep track of how much time each player's turn has left.

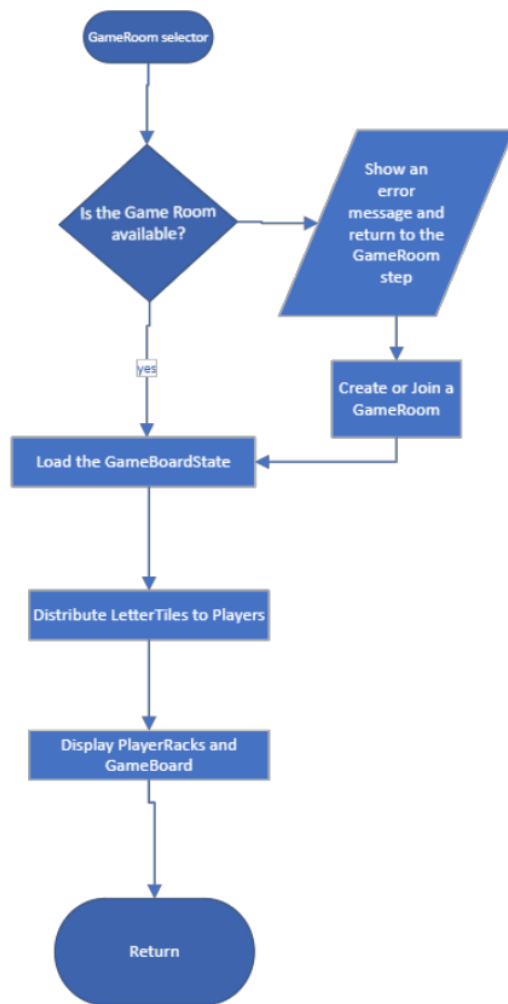
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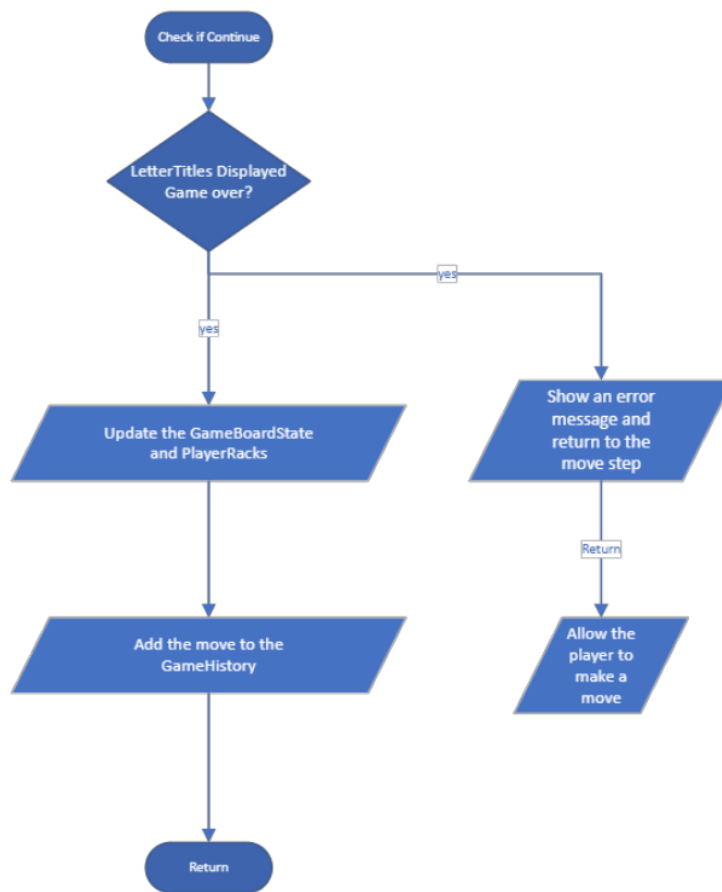


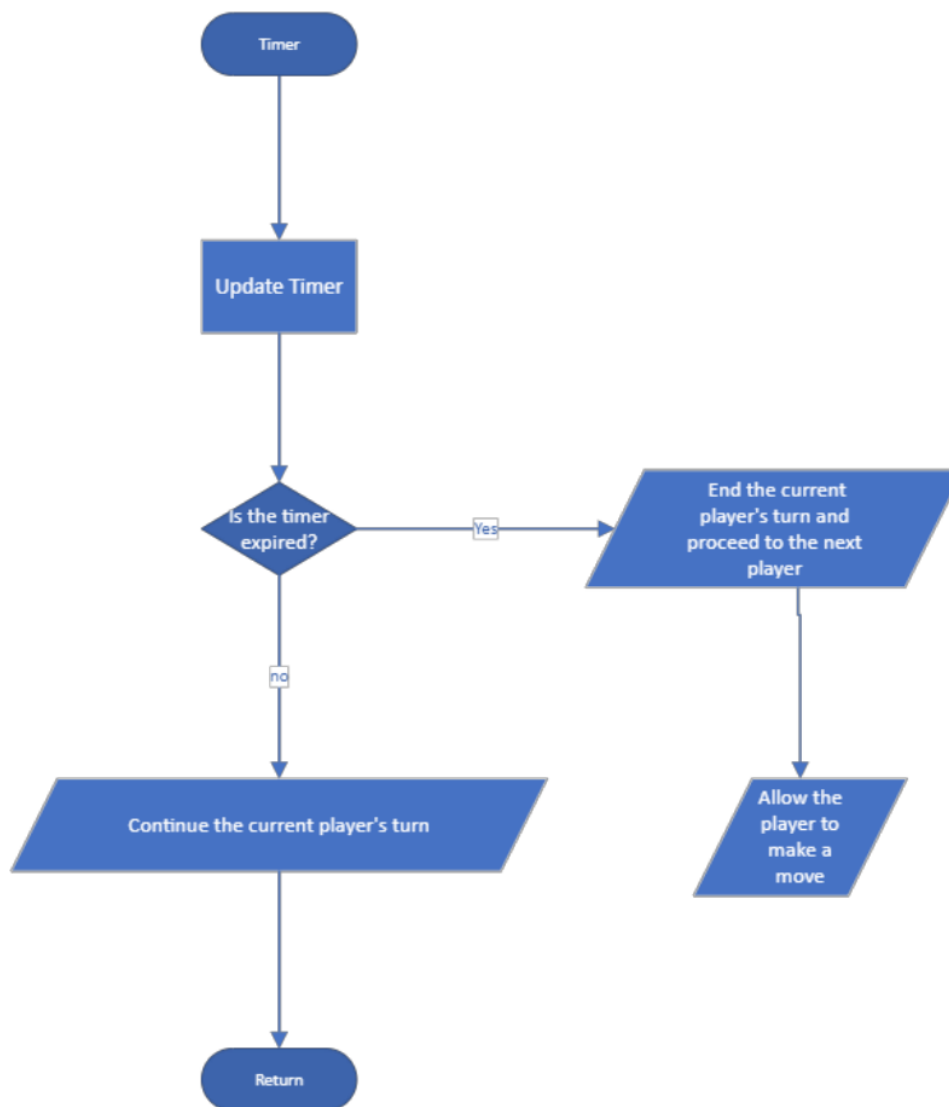
Subprocess

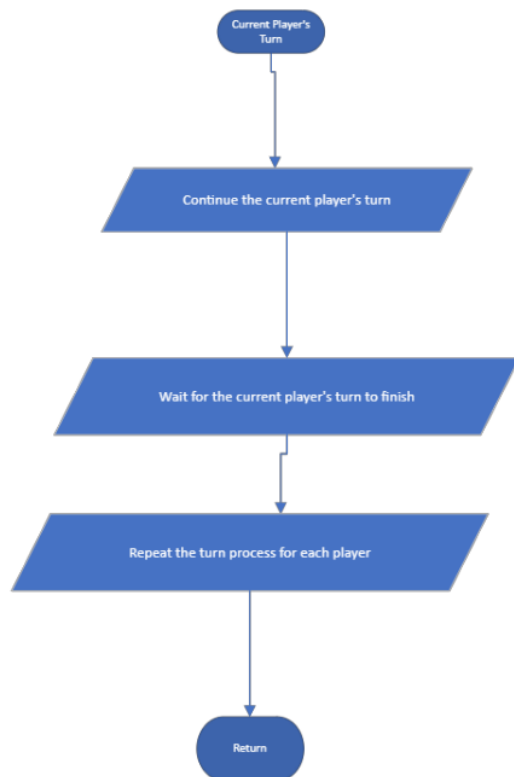


Login-subprocess

*GameRoom-Subprocess*

*ValidationMove-Subprocess*

*Timer-Subprocess*



Current Player's Turn-Subprocess



UpdateScore-subprocess

- II. ¹ Using pseudo code, detail two of the sub processes of your solution.

Pseudocode

LogIn-subprocess

- ⁸ 1. Ask the user to input their username.
2. Ask the user to input their password.
3. Check if the username and password are valid by comparing them to a predefined list of valid usernames and passwords.
4. If the username and password are valid:
5. Move to the next step, which is selecting a game room.
6. If the username and password are not valid:
7. Display an error message on the screen.
8. Return to the input step (step 1) to allow the user to enter their credentials again.
9. Once the user has entered valid credentials and selected a game room, proceed with the rest of the game logic.

Timer-subprocess

1. Implement the logic to update the timer during the game.
2. Check if the timer has expired.
3. If the timer has expired:
4. End the current player's turn.
5. Proceed to the next player's turn.
6. If the timer has not expired:
7. Continue the current player's turn.
8. Allow the player to make additional moves or take other actions.
9. Repeat steps 2 to 6 for each player's turn until the game ends.

Task three. References

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