

Scrabble Assignment

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**Level 4 CERTHE Computing Skills for
the workplace**

**Analysing and Solving Problems
(ACCA4019_BIRM)**

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In this assignment, I will be describing the computer version of the game scrabble including its features, requirements etc. I will also analyse these requirements and describe the implementation and variables used in my flow chart and pseudocode.

Task 1:



5 Scrabble is a word game in which players form words and strategically place tiles on the board to score points. The rules of scrabble include the gaming setup which involves the players having a rack of 7 letter tiles being randomly chosen by players and the starting letter is placed in the centre. Players take turns in a clockwise direction. To form the words, the players place one or multiple tiles on the board either horizontally or vertically. The first word is placed in the centre and any new words created by players are placed next to existing words on the board to create the crossword 'pattern'. The points used to help players win are based on how rare and difficult to use the letter tile is. Players gain points for letters placed on the board and also has other opportunities for players to gain extra points through premium squares (double letter, triple letter, double word, and triple word) that multiply the tile or word scores. After placing the tiles on the game board to create a word, the players then choose more tiles from the bag continuing this cycle until all tiles are places, or if one player runs out of tiles or if there are no valid moves left. Some rules allow players to ensure the game is played fairly by allowing players to challenge a word if they feel that it is invalid and if the word isn't included in the official dictionary for Scrabble, the challenger will win in that round whilst the player loses as the incorrect word is taken out of the game board. 1 The game ends when all players pass

their turn consecutively, the tile bag is empty, and one player uses all their tiles. ⁴ The player with the highest score wins.

The following requirements are used for a Scrabble computer game:

1. Interactive User Interface: Players should be able to readily interact with the game board and other features thanks to an intuitive and visually appealing user interface.
2. Game Board and Tile Management: Players should be able to arrange tiles on a virtual game board to create words in the computer-based game. Additionally, it must maintain the tiles, replenish player racks automatically, and update the game state following each move.
3. Dictionary Integration: To ensure that only legitimate words are recognised, the game must contain a thorough dictionary of acceptable words to validate the words played by each participant.
4. Scoring System: Using letter values, premium squares, and a variety of other factors, the computer-based system should reliably calculate and show scores.
5. Multiplayer Support: The game needs to have multiplayer features so that players can compete against one another locally or online.
6. AI Opponent: If no human players are present, the game could optionally have an AI opponent, enabling single-player mode.
7. Turn Timer: To keep the game moving along and avoid lengthy delays, an optional turn timer might be used to make sure participants perform their movements within a set period of time.
8. Rules That Can Be Changed: Giving players the option to alter certain rules, such as time restrictions, dictionary options, or board layouts, will increase the game's adaptability.
9. Score Tracking and scoreboard: The answer might have a feature that keeps track of players' scores across different games and shows a scoreboard of the best players.

10. In-Game Chat: The inclusion of a chat element permits players to interact with one another while playing Scrabble, strengthening its social component.

11. Tutorial and Help: It would be helpful to offer a tutorial or help area for new players to master the features of the game.

12. Cross-Platform Compatibility: The game may be made to work on a variety of hardware and software, including smartphones, tablets, and PCs.

Task 1.1 Requirements Analysis

Calculate score- after each turn to keep a count for each player

Players- how many players are playing and pick which order players would like to go in for the game

Tiles- players choose 7 tiles randomly at the beginning of the game

Board- A tile for the starting is kept in the centre of the game board. Has features allowing players to gain extra points

Internet- Requires internet to play using app

Save game features- to help players save record and also their level for the game depending on how easy/difficult they would prefer

Identifying inputs and outputs

History record

Each player different accounts- Can add other players as friends and play with each other from different places even if they are not physically next to each other using their accounts on the app

AI opposition capability

Win/Loss history record

Each player accounts.

Break- so players can be fresh to carry on. Helps players assess how they can improve by understanding their weaknesses and understanding which strengths would be beneficial to use in the game

Snacks- for refreshment

Logins- - having unique logins so other people are unable to access the game

Languages- depending on the language players speak

Timer- if players take too long- keeping a set time for the game so users don't get bored

Prizes- winner gets a trophy, cash

Must have: critical

Should have important.

Could have nice to have. Not necessary can do without

Won't need to have don't need to have. Not necessary

Must have	Should Have	Could Have	Wont need to have
Tiles	Logins	Break	Snacks
Board	Timer	Different Language	Prizes
Internet	Save game		
History records			
Win/Loss			
Each player records			
Players			
Calculate score			

Task 1.3 Must Haves

Calculate score: You will need to calculate score. So all players know there score and a record will be kept.

Internet: You will need internet so you can play with more than 1 player. A good internet connection is required so you don't lose connections.

Win/Loss: The computer needs to keep a record of who wins and who loses. It will need to calculate the scores and then state the winner based on scores.

Task 2 : Implementation

2.1- identify the variables.

In my solution, the variables used is the player. I explored how 2 players would be able to play the game and how we can show whether they win/lose at the end of the game. I talked about this in logical steps and if there wasn't a winner by the ¹end of the game, the game would continue the cycle. We have also talked about the variable of a difficult player in the game by using the solution of choosing the order players can go in by doing this in alphabetical order. I also used Pascal as it is more meaningful in the game and can highlight key words compared to camel which doesn't really show the importance of instructions which means that some instructions can be missed.

Based on 2 players playing (Pascal)

Player1- player 1 will take his turn

Player1Score- the computer will calculate the score

Player2- player 2 has his turn

Player2Score- computer calculates the score

Racks- players choose their new rack of tiles when finishes

LetterValue- points are given based on the value of letters

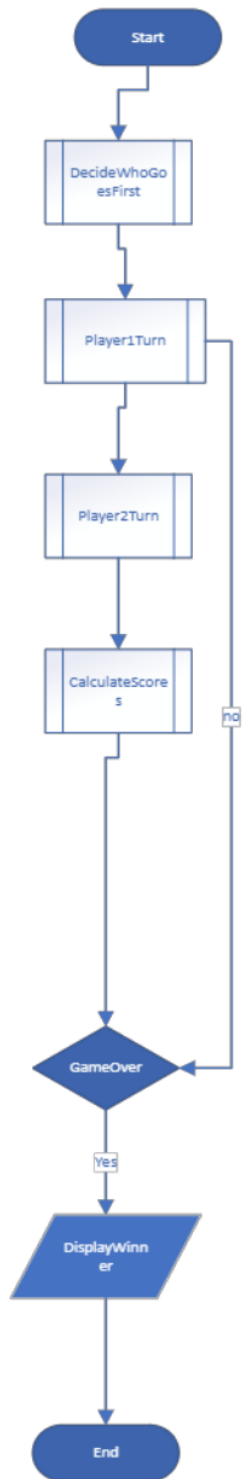
SetOfValues- players can get double points etc. depending on the value of the position on game board and tile

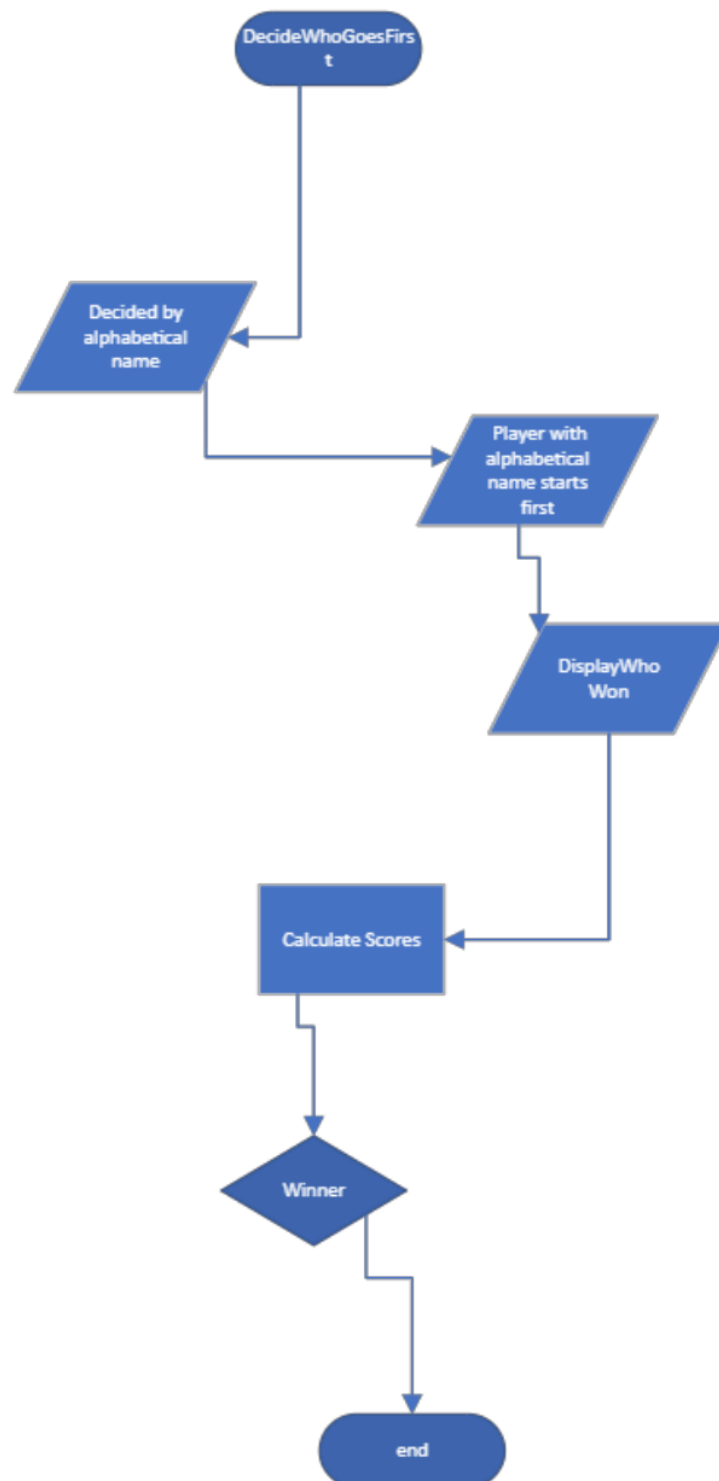
Win/Lose- computer assesses who has won and notifies the players

Racks: players choose 7 tiles from the bag at beginning of game and continue choosing these tiles randomly when they finish. After placing the tiles on the game board to create a word, the players then choose more tiles from the bag continuing this cycle until all tiles are places, or if one player runs out of tiles or if there are no valid moves left.

²
LetterValue The full set of 100 x **SCRABBLE** letters has a total face value of 187 points. The points value of each individual letter is

¹
SetOfTiles 100 Letter tiles: There are 98 tiles with letters of the alphabet and two blank tiles. Each of the letter tiles has score values indicated by the number to the bottom right of the letter. The two blank tiles have no score value, and can be used as any letter desired.





Pseudocode

1. **Display** "who goes first".
2. **Decide** who goes first
3. Input Player1Turn
4. **Display** numbers
5. **Display** Player2Turn
6. **Display** numbers
7. Set TotalScores
8. **Display** "who won"
9. **Display** "winner"

Output Pseudocode

Player 1 score

6 [Enter]

Player 2 score

5 [enter]

Highest number player winner wins is:

Player 1

6

To conclude, scrabble is an computer game based application that can benefit from my solution given in the flowchart and pseudocode. The game can continue the cycle until there is a definite player who either wins/loses. My flowchart and pseudocode can be beneficial for the programmer to use to provide solutions to the game and work on its weaknesses.

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Liu Xinyue, Fu Luping, Mohd Nor Akmal Khalid, Hiroyuki Iida. "Finding appropriate settings for fairness and engagement of a newly designed game: A case study using Japanese crossword game 'MyoGo Renju'", Entertainment Computing, 2020

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