Word Game in C

Project Overview

This project was undertaken as an assignment for a programming subject. The aim of the project was to create a scrabble-like game in C adhering to the ANSI C90 standards. This project has a technical focus and the game play aspect is secondary to the core principles of C memory management, data structures and creating a multi file project using standard C libraries. The following contains a brief overview of some of the core components as well as screenshots of the core operations.

Core Components

Data structures

The game utilised various data structures to store information such as the game board, letters, words and player information. The main game structure contains pointers to other core components.

Memory Management

Memory allocation is performed for all required components and freed when the application is closed. The Valgrind memory debugging tool was utilised to ensure this requirement was met.

File Operations

The application is provided with two command line arguments at startup which are filenames of the letters to be loaded (A bag of scrabble tiles containing the quantity of each letter and associated score value) and the dictionary file that users can check words against. The dictionary functionality also allows for players to add or delete words in the dictionary and save changes.

Game Play

Initialising players and game board

The player/players are presented with a prompt to enter the board size and their names. Once this information is input each player is randomly dealt a hand and the board is printed.

Command interface

A vim like command interface is included, players can type :help for a full list of commands. This includes commands for checking, adding and deleting words in the dictionary.

Playing words

Players can enter any word that is made up of letters in their hand, they are then prompted for the row and column they wish the word to start from as well as the orientation.

Scoring

Players words are stored against the 2d array that makes up the game board. To calculate a players score all tiles associated with the player have their score added up to give a total score for that player.

Screenshots

The game is started and player names entered as well as board size. Players are randomly assigned a colour and a "coin" is tossed to decide who starts.

```
Enter name for player 1:Jack

Enter name for player 2:John

Please enter board width:5

Please enter board height:5

Welcome to Word Game in C. For list of commands type :help

          |   1  |   2  |   3  |   4  |   5  |
    --------------------------------------------------
    1   |      |      |      |      |      |
    --------------------------------------------------
    2   |      |      |      |      |      |
    --------------------------------------------------
    3   |      |      |      |      |      |
    --------------------------------------------------
    4   |      |      |      |      |      |
    --------------------------------------------------
    5   |      |      |      |      |      |
    --------------------------------------------------

John's Turn. This is your color. Current score: 0
Your hand contains:
    E   |   U  |   S  |   H  |   K  |

Please enter a new word:
```

Player 2 (John) plays the word HUE from their hand, the letters are removed from their hand and placed on the board and new letters are randomly dealt to replace the letters they used. If there are no letters left in the "bag" then they will not be dealt new letters.

```
Please enter a new word:HUE

Please enter the row number for this word:1

Please enter the column number for this word:2

Please enter the orientation for the word, h for horizontall, v for vertical:v
Score: 6
Well done, that move was successful! John's new score is 6
```

The board is re printed and it is now Player 1's turn.

```
         |  1  |  2  |  3  |  4  |  5  |
------------------------------------------
   1  |     |  H  |     |     |     |
------------------------------------------
   2  |     |  U  |     |     |     |
------------------------------------------
   3  |     |  E  |     |     |     |
------------------------------------------
   4  |     |     |     |     |     |
------------------------------------------
   5  |     |     |     |     |     |
------------------------------------------

Jack's Turn. This is your color. Current score: 0
Your hand contains:
   I  |  J  |  Q  |  H  |  M  |

Please enter a new word:
```

Player 1 plays the word HIM using the H that is already on the board. Only the I and M are used from their hand.

```
Please enter a new word:HIM

Please enter the row number for this word:1

Please enter the column number for this word:2

Please enter the orientation for the word, h for horizontall, v for vertical:h
Score: 8
Well done, that move was successful! Jack's new score is 8
```
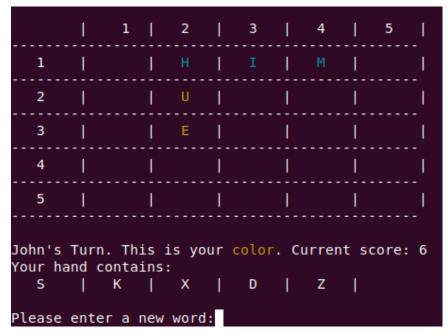
The board is re printed and the colours changed to reflect the owners of the letters on the board. The game play loop continues until no word can be placed or the game runs out of letters.

```
         |  1  |  2  |  3  |  4  |  5  |
------------------------------------------
   1  |     |  H  |  I  |  M  |     |
------------------------------------------
   2  |     |  U  |     |     |     |
------------------------------------------
   3  |     |  E  |     |     |     |
------------------------------------------
   4  |     |     |     |     |     |
------------------------------------------
   5  |     |     |     |     |     |
------------------------------------------

John's Turn. This is your color. Current score: 6
Your hand contains:
   S  |  K  |  X  |  D  |  Z  |

Please enter a new word:
```

Results of the :help command

```
Please enter a new word::help

----------------- Game Help ------------------------
To play a word simply type the word and press enter.
To exit press enter on an emptyline or CTRL-D
----------------- Commands -----------------------
Please note 'word' is your input after the command.
To check if a word is in the dictionary type :check word
To add word to dictionary type :add word
To delete a word from dictionary type :delete word
To save the dictionary type :save filename
To access this help info again type :help
:
```

Checking a word against the dictionary file

```
Please enter a new word::check beam

The word 'BEAM' is in the dictionary.
```

Checking a word that is not in the dictionary and then adding it in

```
:check gold

The word 'GOLD' is not in the dictionary
:add gold

Word added to dictionary.
:check gold

The word 'GOLD' is in the dictionary.
```

When the game is excited by pressing CTRL-D the players scores are displayed

```
EOF Detected

Player with the highest score wins
Jack's Score: 8
John's Score: 6
```