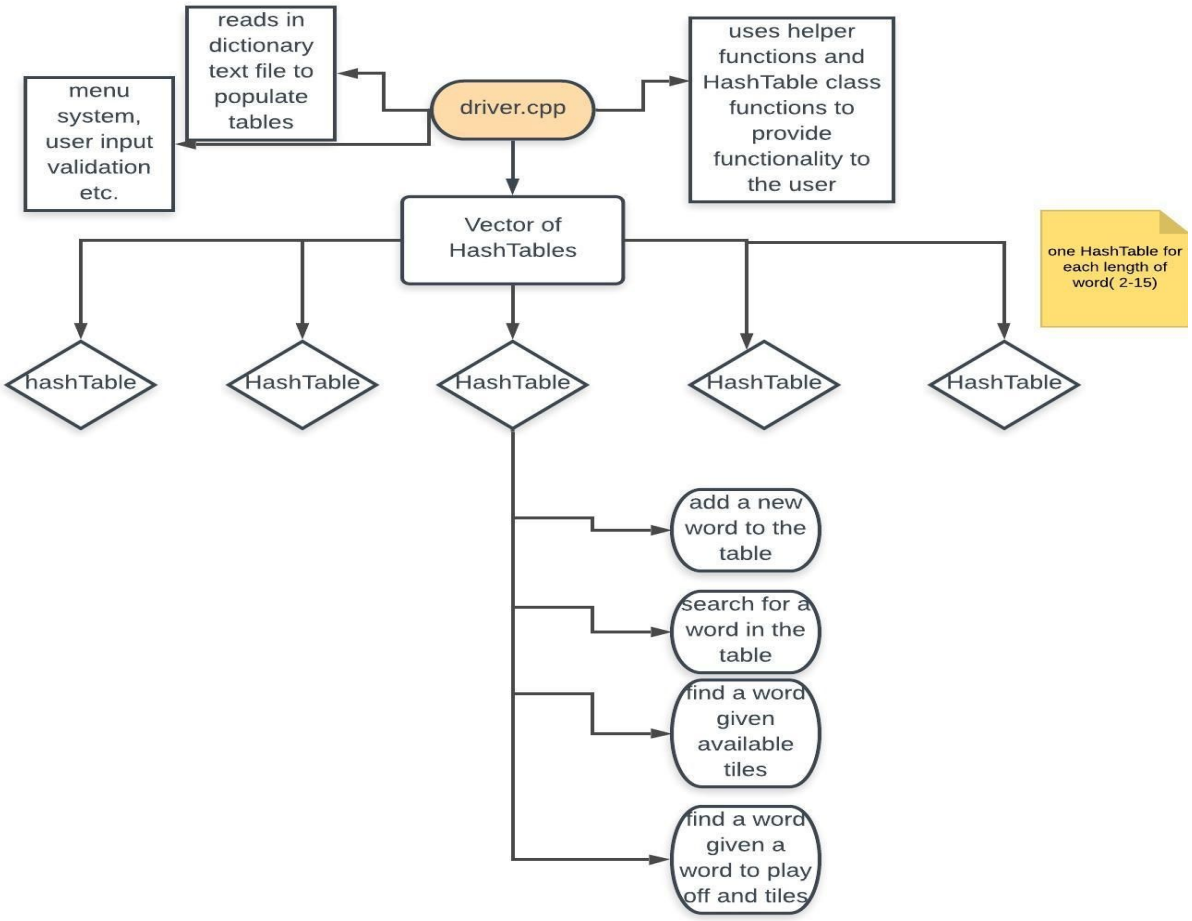
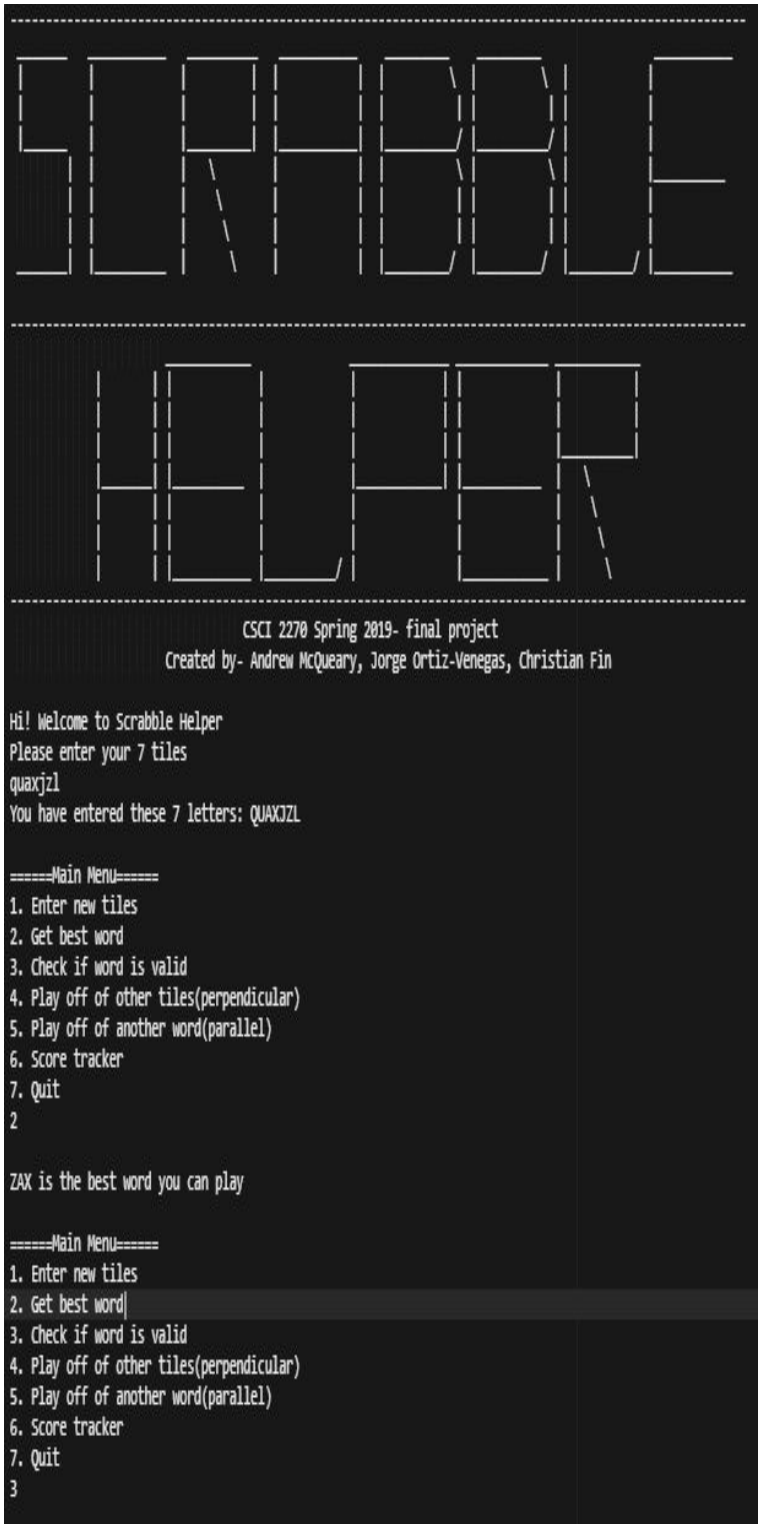
For our project the overall data structure we chose to utilize were hash tables. Our project was focused on being able to utilize a large scrabble dictionary in order to help people make the best moves in scrabble. This led us to a hash table because the primary use of the table is for lookups and well implemented hash tables can have the fastest lookup times. We implemented it by having a vector of hash tables where each index in the vector holds a separate hash table corresponding to a different word length. We chose to have a vector of hash tables because we thought it should reduce collisions since words of different lengths may be more likely get hashed together, and it allows us to lookup length 7 words quicker since using all your tiles is always the best move.

The only code that is not our own was taken here :
https://stackoverflow.com/questions/127704/algorithm-to-return-all-combinations-of-k-elements-from-n
We had to use a combination function to get all combinations of a string.
The poster of the code : Matthieu N. credits a http://marknelson.us



Example output :



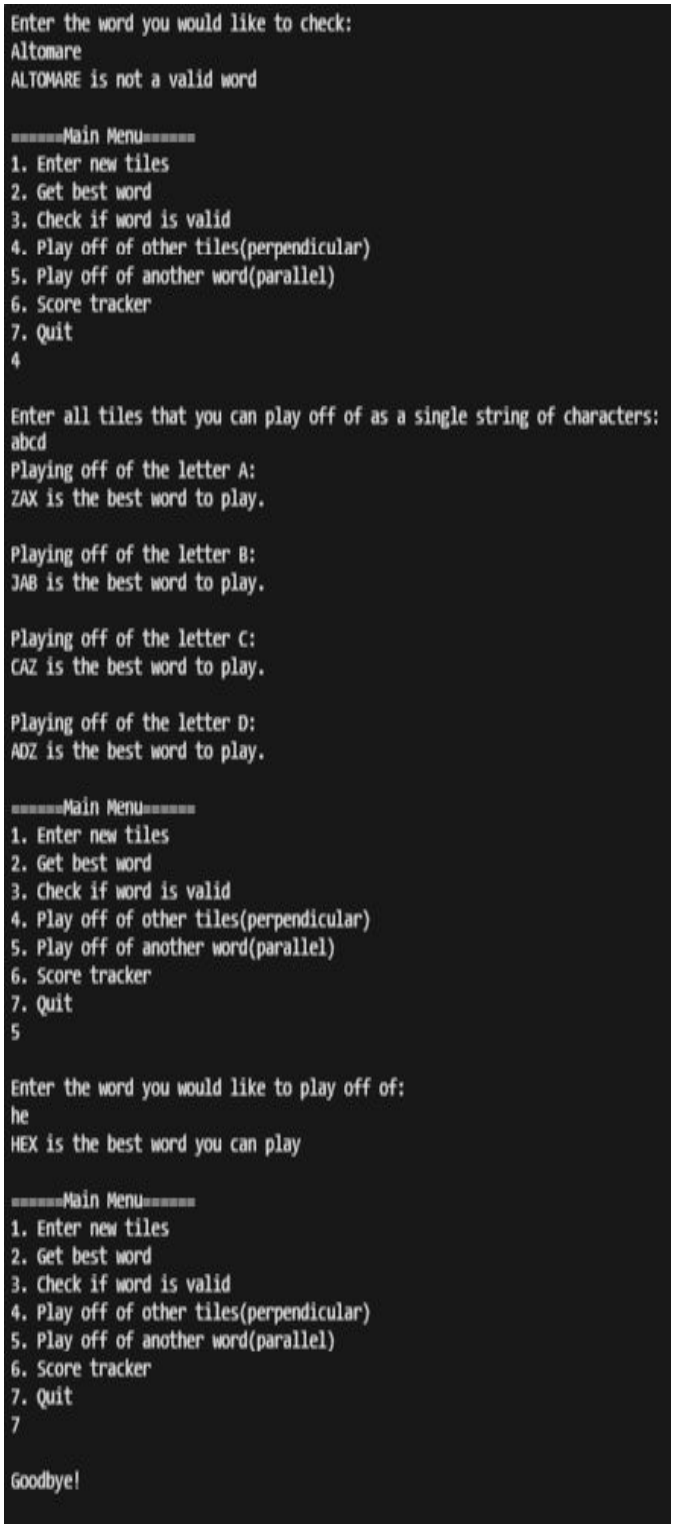
```
                    CSCI 2270 Spring 2019- final project
                Created by- Andrew McQueary, Jorge Ortiz-Venegas, Christian Fin

Hi! Welcome to Scrabble Helper
Please enter your 7 tiles
quaxjzl
You have entered these 7 letters: QUAXJZL

=====Main Menu=====
1. Enter new tiles
2. Get best word
3. Check if word is valid
4. Play off of other tiles(perpendicular)
5. Play off of another word(parallel)
6. Score tracker
7. Quit
2

ZAX is the best word you can play

=====Main Menu=====
1. Enter new tiles
2. Get best word
3. Check if word is valid
4. Play off of other tiles(perpendicular)
5. Play off of another word(parallel)
6. Score tracker
7. Quit
3
```



```
Enter the word you would like to check:
Altomare
ALTOMARE is not a valid word

=====Main Menu=====
1. Enter new tiles
2. Get best word
3. Check if word is valid
4. Play off of other tiles(perpendicular)
5. Play off of another word(parallel)
6. Score tracker
7. Quit
4

Enter all tiles that you can play off of as a single string of characters:
abcd
Playing off of the letter A:
ZAX is the best word to play.

Playing off of the letter B:
JAB is the best word to play.

Playing off of the letter C:
CAZ is the best word to play.

Playing off of the letter D:
ADZ is the best word to play.

=====Main Menu=====
1. Enter new tiles
2. Get best word
3. Check if word is valid
4. Play off of other tiles(perpendicular)
5. Play off of another word(parallel)
6. Score tracker
7. Quit
5

Enter the word you would like to play off of:
he
HEX is the best word you can play

=====Main Menu=====
1. Enter new tiles
2. Get best word
3. Check if word is valid
4. Play off of other tiles(perpendicular)
5. Play off of another word(parallel)
6. Score tracker
7. Quit
7

Goodbye!
```