Data Structure Homework2

Pseudo code:

```
Store the sequence of the players and find which player start the game
While(there is a vocabulary) do
    If(the order is clockwise) then
        For(i<length of vocabulary):
            For every player, put backward the letter of vocabulary.
        Output the player who takes the last letter of vocabulary.
        If(the last letter of vocabulary is vowel) then
            Keep the same order of players taking the letter.
        Else
            Change the order to counterclockwise.
    Else
        For(i<length of vocabulary):
            For every player, put forward the letter of vocabulary.
        Output the player who takes the last letter of vocabulary.
        If(the last letter of vocabulary is vowel) then
            Keep the same order of players taking the letter.
        Else
            Change the order to clockwise.
Output the last player and letters.
```

My approach:

I read the whole players with a line and use the **substr** to get every player with link list. Moreover, I can use the iterator to find the first player start the game. For every player, I create a **struct** to store the player number and the letters he take. For every vocabulary, every player take one letter of the vocabulary one another. The player who takes the last letter lose the game, so output the player number and letters he takes. Furthermore, we need to check which the last letter is vowel or not. If it is vowel, the order of taking the letter is the same as the original order(clockwise). On the hand, the order should be changed to counterclockwise. For link list, I can use iterator to control the current position of the list with plus or minus directly. Plus and minus represent the clockwise and counterclockwise respectively. When we erase the player after outputting the player, the iterator shift to the next element.

Problem:

1. How to cut the string?
   Use find() to locate the character that you want to cut and separate the string by substr().
2. How to record the letters every player takes?
   I create a struct that have two variables, one store player number and the other store the letter the player takes.
3. How to implement the clockwise and counterclockwise order?
   I store the players with link list, so the iterator increases means the order is clockwise. However, this is not circular link list. As the iterator is equal to end(), It needs to be assign to begin().
   If the order is counterclockwise, the iterator decreases and it is important to modify the position of the iterator. First, the iterator needs to be change to end()-1 as it is equal to begin(). Later, the iterator need to minus one because the iterator will be at the next element when erasing the current element where it is.

Time Complexity:

There are N players. It needs N-1 vocabularies to have a winner. Also, time complexity depends on the length of every vocabulary. If the maximum length of the picked vocabulary is L, the time complexity is L*(N-1).