Lab1 Report
1303296
HanXi Huang

Start Date: Jan 12, 2016
Complete half Date: Jan 15, 2016
Finish Date: Jan 19, 2016

Inspiration sources: 2SI4 Tutorial 1, get help from TAs

- Insert( ) method

In the insertion method, firstly, I create a flag button called "start". When start equals to one, which means the program find the newword in the list, then we can move to the next step.
In the second step, we need to make sure the capacity of the list is long enough, so when size equals capacity, we can enlarge the list capacity by two times. What I was trying to do is to create a new array with two times capacity and copy all the elements from the old array to the new one, which I called it "temp". Then, I assign temp to b because we are always using b to do methods in this program.
As the professor mention in the tutorial, we can use compareTo method to compare the words from the end of the list to the beginning of the list.
Taking the String b as example.

ba	bb	bc	cd	ee					
0	1	2	3	4	5	6	7	8	9

Case I: insert(aa), newword is aa.
In my program, b[k] is ee in the 1st step, aa is smaller than ee, the position of ee is move to b[k+1] which is 5. 2nd step, aa is still smaller than ee, the position of cd move to the next position, which is 4..unitil all the elements in the list excuted. The last step is b[0]=newword=aa

					ee				
0	1	2	3	4	5	6	7	8	9
				cd					
			bc						
		bb							
	ba								
aa									

Case II: insert in the middle, insert(bd)
Bd is smaller than ee,cd, thus ee,cd move to next position. However, bd is greater than bc, BREAK. Then, K value is 2. Thus, b[k+1] is b[3].

ba	bb	bc	bd	cd	ee				
0	1	2	3	4	5	6	7	8	9

Case III: insert in the end, insert (ff)
Ff is greater than ee, the program break, b[size-1+1]=ff, which is b[5]=ff.

ba	bb	bc	cd	ee	ff				

- Remove method

Firstly, we need to make sure if the word in the list by using find method. Find method also helps us to find the position of the word. Then, we already know a word need to be removed, the size should be decrease one.
The remove progress should be done after that position where the word exactly is in.
Sample list

ba	bb	bc	cd	ee					
0	1	2	3	4	5	6	7	8	9

Case I: remove a word in the beginning. Remove(ba)
1)B[0]=b[0+1], the word was in position one become position zero here.
2)I++,i become 1now. B[1]=b[1+1], bc move to position one.
3).....
4)Until i equal to size, which is 3here.

bb	bc	cd	ee						
0	1	2	3						

Case II: remove a word in the middle, remove(cd)
1)find the word in position 3, b[3]=b[4],
2)Ee moves to position 3.

Case III:remove a word in the end, remove(ee)
1)find the word in position 4
2)4 equal size, which is 4 here.
3)B[4]=b[4+1], the null moves to position 4, the ee remove.

- countInRange method

I use binary search in order to get big O(log n).
We need to find the position of init and fin. The first for loop is to find init. For example, we still take b string as sample.

ba	bb	bc	cd	ee					
0	1	2	3	4	5	6	7	8	9

Assume, init is ba.
1)High is 4, Low is 0, mid is 2 now.
2)Ba equals to bc, high=2-1=1 now.
3)high still larger than low, high=1-1=0
4)High still equal to low, high=0-1=-1, now high <low.
5)Return low, which is 0
After we find init, we need to re-initialzed low and high because the values of low and high already changed.
Assume, fin is ee.
1)high is 4, low is 0,mid is 2.
2)ee>bc, low =2+1=3.
3)Mid=3, low =3, high=4.

4)Because ee>bc, low=3+1=4, which equals to high.
5)Then continue the loop, low=4+1, which is 5. The low >high, jump out the loop, which we can get pos2=high=4.
Finally, if we want to count how many numbers between init and fin, we need to use equation: pos2-pos1+1. In our case is, 4-0+1=5.

- The errors I got

1)In public WordList(int capacity)，I initialized the array by using other name, it made “NullPointer Exception” error.
2) public String getWordAt(int i), the statement “ArrayIndexOutOfBoundsException("Invalid operation")” must be the same as the statement in the testfile.
3) In the insert method, after copying b to temp, we must re-named “b=temp”, because every methods in this program is point to b string, not the temp string. Temp just use to enlarge the b string.
4) In the find method, I used another for loop to determine if the word is in the list. In that loop, I return -1 if the word is not in the list. However, it made error, it always return -1 in this method. I know the program stop at that loop and not continue doing the next loop, thus I return -1 after the while loop.
5)In remove method, I try to use “continue” to skip that word, however, in the testfile, I found I cannot skip the word I want to skip. It can’t use continue in this case, because we need to consider there will be more elements in the list to shift to the left. The position should change, not just simply skip.
6)In the sublist method, I got an error which is the capacity doesn’t change. The reason is I used size as my new wordlist capacity, the size will not be changed, it was fixed. Then I tried to count the numbers of word in the list, then enlarge it two times. Another problem I faced is, in the first loop I use “i” to track the number, I need to re-initialized “i” because the value of i already change.
7)In countInRange method, everything is good, we need to consider if we find init, we need to find the first init (eg. aa, ab,ac,dd), but for fin, we need to find the last fin,(eg. Aa,bc,bd). My error is the count equation was wrong.
8) In toString method, Once you initialized the 1st element in the list, b[0], the i in the for loop should be change to 1, because you already have ONE element in the list.