Report of Exercise 1

1.Linked List

- The time complexity of Linked List is O(n^2). All of the words in the book should be run in n times, and when searching the word, the whole linked list should be went through until finding the word, going through the linked list should take n times, so the time complexity of searching a word in Linked List is O(n), and the whole complexity for searching the book in Linked List is O(nlogn).
- The time it takes to insert each word in the linked list sets as can be shown in Fig 1-1.
- The time it takes for searching is about 425794 in average. The worst case for searching is 1000, and the best case for searching is 3402000.

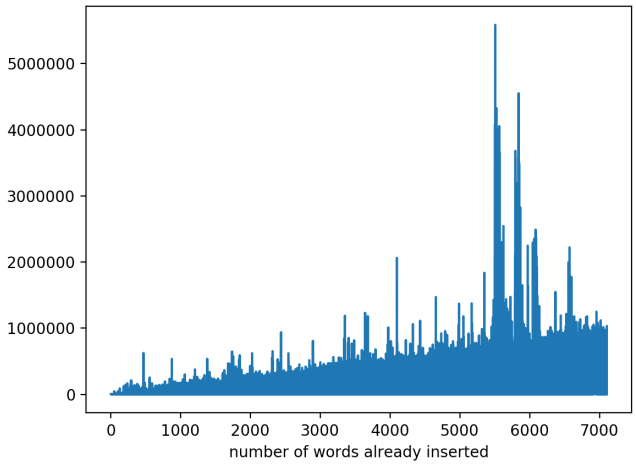

Fig 1-1 LinkedList

2.Binary Search Tree

- The time complexity of Binary Search Tree is O(nlogn). All of the words in the book should be run in n times, and when searching the word, the value of the word will be compared with the root's value, if the word's value is less than the root's value, it will continue to traverse the left child, otherwise it will traverse the right child, so the time complexity for searching a word in Binary Search Tree is O(logn), and the whole complexity for searching the book in Binary Search Tree is O(nlogn).
- The time it takes to insert each word in the Binary Search Tree sets as can be shown in Fig 1-2.
- The time it takes for searching is about 7011 in average. The worst case for searching is 1000, and the best case for searching is 124000.

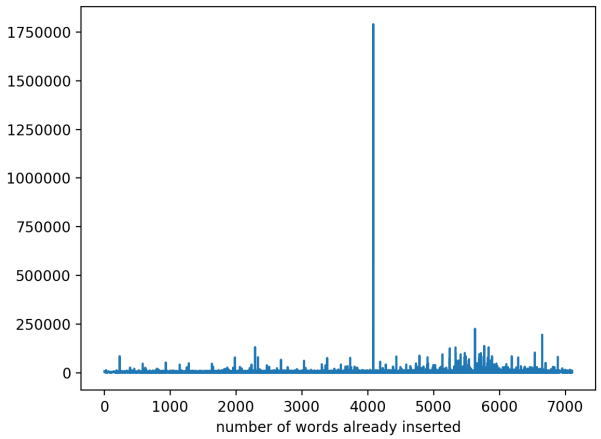

Fig 1-2 Binary Search Tree

3.Hash Map

- The time complexity of Hash Map is O(n). All of the words in the book should be run in n times, and when searching the word, the word will be calculated in hash function, and find its place directly, so the time complexity for searching a word is O(1) in hash map, and the whole complexity for searching the book in Hash Map is O(n).
- The time it takes to insert each word in the Hash Map sets as can be shown in Fig 1-3.
- The time it takes for searching is about 6626 in average. The worst case for searching is 1000, and the best case for searching is 114000.

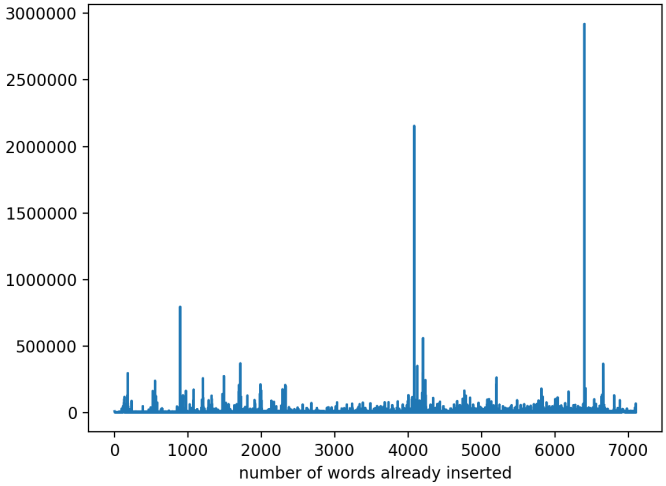

Fig 1-3 Hash Map