

3. → Create a hash map of 45 buckets.
- The keys should start from 1 and end at 45.
  - Loop the list and for each word find the length.
  - add the word to the key in the map which equals its length.
  - The values of the hash map should be list so that multiple strings of the same length can be stored.
  - merge all the values starting from in the ascending order of the ~~keys~~ corresponding keys.

Analysis

- Creating a hash map :  $O(1)$  because number of keys is constant
- Loop  $O(N)$ 
  - find length  $O(1)$
  - add word  $O(1)$
- Merge buckets  $O(N)$   
(Buckets can be merged in the right order by accessing keys starting from 1 to 45 and appending their values to a list if not empty)

Thus, worst case runtime is  $O(N)$