

# FIT2004 Assignment 3

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## Task 1

The function query has many tasks, the first of which is to read a file and input into a list, easily done in  $O(NM)$  time and space complexity. The next part of the function is creating 2 Tries, one for Surnames/Last names, and one for identification numbers, this was done by having many lists of lists. The space complexity of these Tries is  $O(T)$ , as the length of the lists is simply 0-9 and A-Z-a-z, which is constant in terms of complexity. Note that an extra slot for \$ was added, and any index which used that a list at any point would add a counter to that point, this does not exceed the complexity. The next part of the function was the find which indexes matched the prefix, this was simply done by going to that list in the point in the try and getting the last element which stored all the indices that went through that point, this took  $O(k + l)$  time complexity. Then a count list method was used to find overlap. A list of size of the largest index was made filled with zeros, then, when an index was found, the element in the list was incremented by 1. After both lists were traversed,  $O(n_k + n_l)$  time complexity, any spot which had equalled 2 meant that the index at that point satisfied both prefix requirements.

## Task 2

Like task 1, the first 2 parts were to input a file and create a trie based on the input, in this case a suffix trie was made with the string within the file, taking  $O(K*K)$  time complexity to do so. Then all possible substrings with a length greater than 1 were made, also taking  $O(K*K)$  time complexity. Then goes substring by substring, reverses them, and checks if they exist within the suffix trie, testing all the substrings overall yields  $O(P)$  time complexity.