

Given  $N$  words &  $M$  queries, calculate no. of prefix of words are same as Substring starting at  $i^{th}$  position of query.

Words	Store string	Queries
draw		st - 6
drew	list	lp - 3
dark ✓	linked	dr - 5
algorithm	link	da - 3
Stack	stamp	dat - 1
structure	sound	dark - 1
struct	drunk	dr - 0
drake	draped	do - 0
damp ✓		

Solutions

① For every query compare all strings prefix

$$TC: O(N \times M) SC: O(1)$$

② Sort strings &amp; apply BS for each query.

$$TC: (N \log N) + (M \log M) + (BS)$$

to compare 2 strings

algo  
damp  
dark  
data  
drake  
drawdrift  
drunk  
do

) Can we get first word which contains dr as prefix using BS

) Can we get last word which contains dr as prefix using BS

draw →  $P_2 - P_1 + 1$  BS pseudoCode

$$l = 0, h = N-1$$

while ( $l <= h$ ) {

$$\text{int } m = (l+h)/2$$

// string with query

$$TC: (N \log N) + (M \log M) \text{ of For a single query}$$

## ③ Approach [ Given strg → Int ]

data (Rolling hash)

$$d = d \times p^0$$

$$da = d \times p^0 + a \times p^1$$

$$dat = d \times p^0 + a \times p^1 + t \times p^2$$

$$data = d \times p^0 + a \times p^1 + t \times p^2 + r \times p^3$$

$$H(s_m) = \sum_{i=0}^{n-1} s[i] \times p^i$$

Note: In general for every string pt's hashval is unique, collision is possible.

Idea: for every string calculate hash function for all prefix

String &amp; insert in hashmap.

Time

&lt;int&gt; &lt;int&gt;

$$h(da) = 4$$

$$h(da) = 3$$

$$h(dam) = 1$$

$$h(damp) = 1$$

$$h(data) = 1$$

$$h(dr) = 1$$

$$h(dra) = 1$$

$$h(draw) = 1$$

$$h(drawn) = 1$$

$$h(drawn) = 1$$

$$h(draw) = 1$$