Character array $\longrightarrow$ C

String $\qquad \longrightarrow$ C++

Problem 1: Given 1st string, $\underline{S}$

Given 2nd String, $\underline{\underline{S_2}}$ 　　　　　 Sub-string

S = helloworld 　　　 S_2 = ell 　 Yes

　　 ↑ Sub-sequence 　　 S_2 = eo 　 No

elloodh 　　　　　 S_3 = ello 　 Yes

lelood ⓧ 　　　　 S_4 = h llo 　 No

Sub-Sequence

S: | a | a | b | c | d | b | z | x | y | P | S | z | $\longrightarrow$ N

indices: 0 1 2 3 4 5 6 7 8 9 10 11

S_2: | y | P | S | $\longrightarrow$ M

indices: 0 1 2
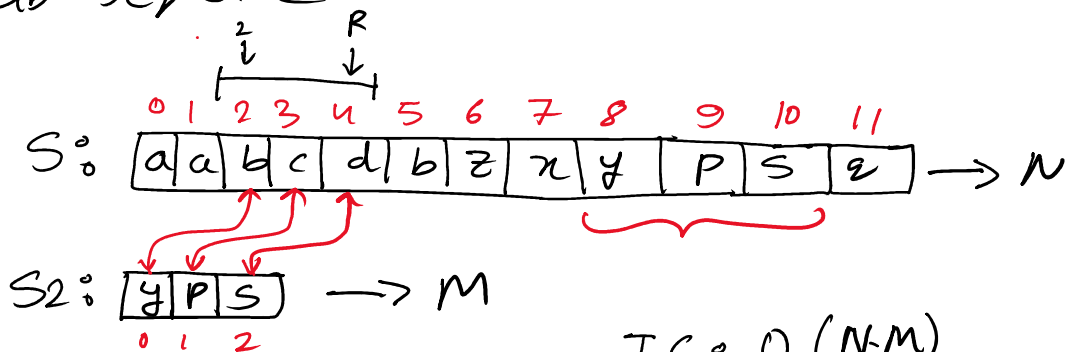
T.C: $O(N \cdot M)$

M.C: $O(N+M)$

Hard Version:

S: | | | | | | | | | 　　　 $N \leq 10^5$

Sub$_1$ $\longrightarrow$ Yes 　　　 $M \leq 10^5$

Sub$_2$ $\longrightarrow$ No

Sub$_3$ $\longrightarrow$ No 　　　 $\sum C_{i,j} \leq 10^6$

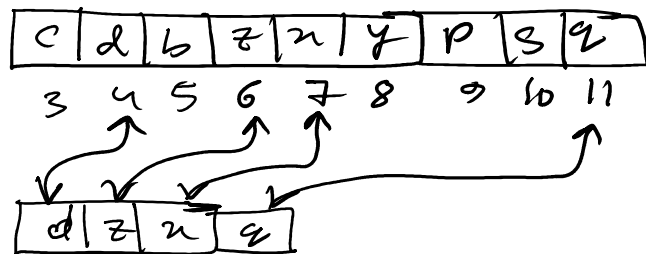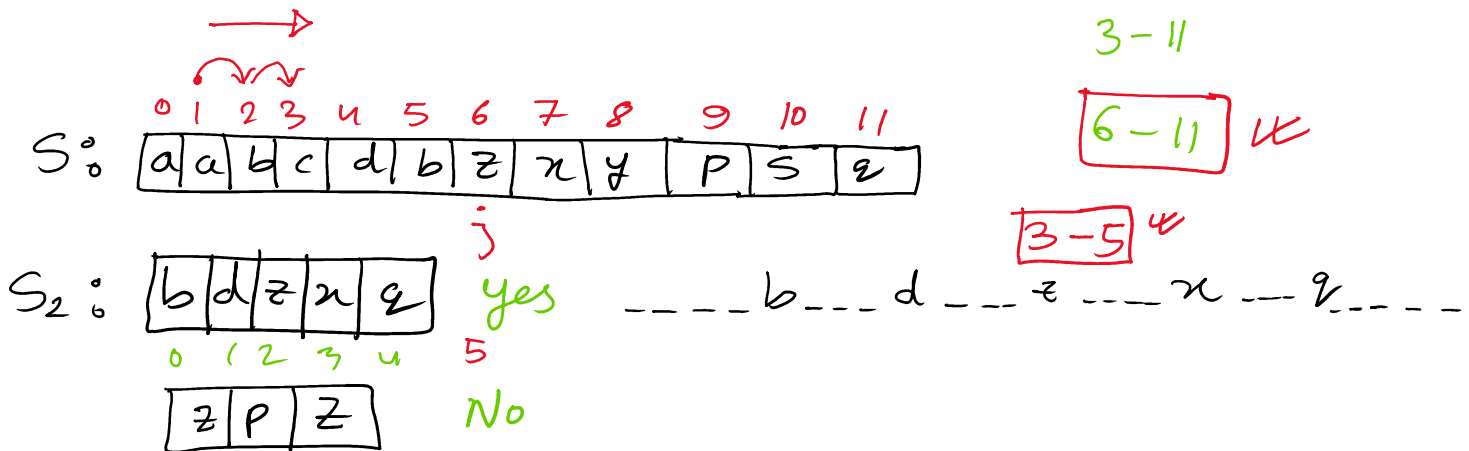$Sub_3 \longrightarrow No$

$Sub_4 \longrightarrow Yes$
⋮

$2 \leq i, j \leq 10$

Hashing Technique

Problem 2:

$S \longrightarrow$ Main String

$S_2 \longrightarrow$ Secondary String

(Subsequence ?)

3 - 11

| 6 - 11 | ✗

$S:$

	0	1	2	3	4	5	6	7	8	9	10	11
	a	a	b	c	d	b	z	x	y	P	S	q

j

| 3 - 5 | ✓

$S_2:$

b	d	z	x	q
0	1	2	3	4

Yes   5

_ _ _ _ b _ _ _ d _ _ _ z _ _ _ x _ _ q _ _ _ _ _

z	P	Z

No

c	d	b	z	x	y	P	S	q
3	4	5	6	7	8	9	10	11

d	z	x	q

T.C: $O(N + M) \approx O(Max(N, M))$

$\longrightarrow$ S·Size

$\longrightarrow$ S2·Size

Problem 3

P $\longrightarrow$ Palindromic String

$\overrightarrow{MADAM}$ $\overrightarrow{DADA}$ Ⓧ
$\longleftarrow$ $\longleftarrow$

$\longleftarrow$ L,R $\longrightarrow$

A I B O H P H O B I A

$\hookrightarrow$ fear of palindromes

Given a String S

Find largest Palindromic Sub-string of S

L O T O A

L	O	T	O	A
L O	O T	T O	O A	
L O T	O T O	T O A		
L O T O	O T O A			
L O T O A				

L = 0,   R = 0, 1, 2, 3, ---- len

L = 1,   R = 1, 2, 3, - --- len

L = 2,   R = 2, 3, 4 ----- len

$O(N^3)$

5×2 = 10

[a b a a c a a d a b c d

$$O\left(\textcircled{2}\times len \times len\right)_{\textcircled{2}} = O(len^2) = O(N^2)\quad L, R$$

$$length = \cancel{1} \cancel{2} 5$$

T O Y O T A

Problem 4

Anagram

X : a a b a c c
Y : a c a b a c

$$O\left(|x| + |y|\right)$$

$$cnt["a"] = 3 \qquad cnt["d"] = 0$$

$$cnt["b"] = 1$$

$$cnt["c"] = 2$$

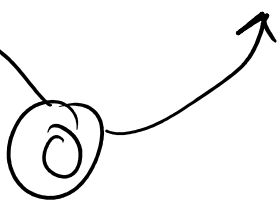① Hashing

Kona Card → Visa

MasterCard

South Korea

Samsung

Android —→ Java

Tizen ——→ C++

Java

Springboot
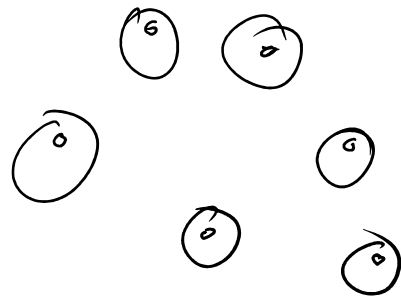
Kona Card

Kona OS

Nagad and Rocket Transaction System

Kona Plate

KIP

Mass layoff

Project x

Google next 10 months Salary

Bank