



# DP Concepts

video  
21

&

# Questions



हाथ  
(Motivation)

“Always take out some time for other important topics → System Design ✓  
→ OOPS ✓  
→ Design Patterns ✓”

“Market has started to expect these from 1-2 years exp. as well”

cs with MIK → Twitter

Facebook

Instagram

→ code story with MIK

whatsapp → code story with MIK

Done

• 1-D based DP

• 2-D based DP

Progress

• String based DP

• Grid based DP

• Game Strategy

We'll do:-

(..) RECURSION  
+  
MEMOIZATION  
(Top Down)

(..) Bottom UP .

(..) Time & Space

## DP on Strings :-

✓✓✓ Longest Common Subsequence (LCS)

✓✓✓ Print LCS

→ Edit Distance

✓✓✓ Shortest common Supersequence (SCS) ✓✓

→ Print SCS

→ Longest Palindromic Subsequence

→ More coming ..... 😊

(Hard Qns → Easy) many more...

# Print Shortest Common Supersequence ...

## 1092. Shortest Common Supersequence

Hard Topics Companies Hint

Given two strings `str1` and `str2`, return the shortest string that has both `str1` and `str2` as **subsequences**. If there are multiple valid strings, return **any** of them.

A string `s` is a **subsequence** of string `t` if deleting some number of characters from `t` (possibly 0) results in the string `s`.

Example :-  $s_1 = \text{"abac"}$   
 $s_2 = \text{"cab"}$

Output = "Cabac"  $s_1 s_2$

Diagram illustrating the construction of the shortest common supersequence "Cabac" from the input strings  $s_1 = \text{"abac"}$  and  $s_2 = \text{"cab"}$ . The string "Cabac" is enclosed in a green box. Arrows indicate the mapping of characters from the input strings to the supersequence: 'c' from  $s_2$  to the first 'c', 'a' from  $s_1$  to the first 'a', 'b' from  $s_2$  to the 'b', 'a' from  $s_1$  to the second 'a', and 'c' from  $s_1$  to the final 'c'.

(.) You can also watch "Print Longest Common Subsequence".

**DP CONCEPTS & QNS**  
NOW, YOU WILL ALSO BE ABLE TO SOLVE  
DP QNS  
IT'S MY GAURANTEE

**DP ON STRINGS**

**3 APPROACHES**

**SHORTEST COMMON SUPERSEQUENCE**

VIDEO-20  
C++  
JAVA

53:06

Shortest Common Supersequence | 3 Approaches | DP On Strings | DP Concepts & Qns 20 | codestorywithMIK

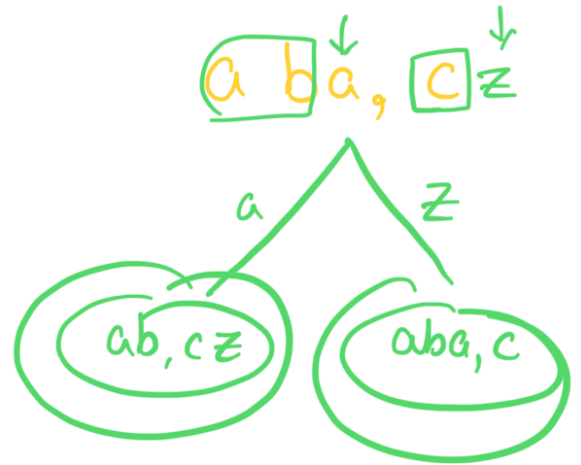
codestorywithMIK

Bottom UP

```
class Solution {
public:
//Function to find length of shortest common supersequence of two strings.
int shortestCommonSupersequence(string s1, string s2, int m, int n) {
    vector<vector<int>> t(m+1, vector<int>(n+1));

    for(int i = 0; i < m+1; i++) {
        for(int j = 0; j < n+1; j++) {
            if(i == 0 || j == 0) {
                t[i][j] = i+j;
            } else if(s1[i-1] == s2[j-1]) {
                t[i][j] = 1 + t[i-1][j-1];
            } else {
                t[i][j] = 1 + min(t[i-1][j], t[i][j-1]);
            }
        }
    }

    return t[m][n];
}
};
```



State :  $t[i][j]$  = SCS of  $s1$  of length  $i$  &  $s2$  of length  $j$ .

		c	ca	cab
	0	1	2	3
0	0	1	2	3
a	1	2	2	3
ab	2	3	3	3
aba	3	4	4	4
abac	4	4	5	5

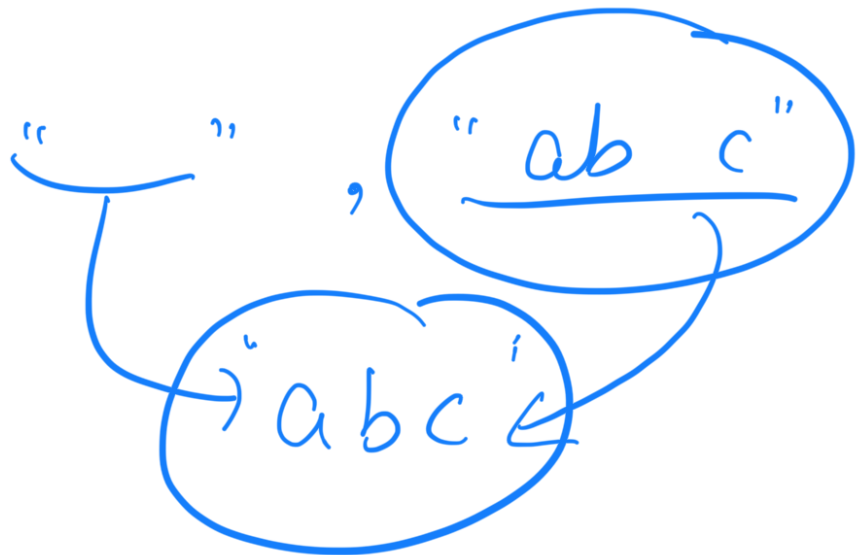
$m \leftarrow s1 = \underline{abac}$

$n \leftarrow s2 = \underline{cab}$

$i = m$  ,  $j = n$

$i$  ↓  
 $j$  ↓

cabac  
↓  
cabac



(abc) ← "" "abc" → [0] [3]

(abc) ← "abc" "" → [3] [0]

while (i > 0 & j > 0) {

if (s1[i-1] == s2[j-1]) {

result.push\_back(s1[i-1]);

i--; j--;

} else {

if (s1[i-1][j] < s1[i][j-1]) {

result.push\_back(s1[i-1]);

i--;

} else {

resultp-- (sz[j-1]);

j--;

}

}

while (i > 0) {

resultp-- (sl[i-1]);

i--;

}

while (j > 0) {

sl. sl. (sz[j-1]);

j--;

}

reverse (res);

in result;

}

result





the 1990s, the number of people in the world who are under 15 years of age has increased by 1.2 billion (United Nations 1999).

There is a growing awareness of the need to address the needs of children in the 21st century. The United Nations Convention on the Rights of the Child (1989) has been signed by 112 countries, and the United Nations Millennium Declaration (2000) has set out a commitment to 'ensure that all children, everywhere, have access to primary education'.

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