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Launchpad

Lecture - 9

Recursion - 2

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Status of Assignment

Any doubts?

Lets look at few more problems to understand recursion better.



Towers of Hanoi!

Find all subsequence of a string

“abc” – “”, “a”, “b”, “c”, “ab”, “ac”, “bc”, “abc”

Before we think about recursive solution lets look at few things:

- I. We need this function to return an array of strings.
- II. But in C++ we know we cannot return array as this would be address of local variable.
- III. Instead we can pass it as argument and expect it to fill this array with the strings.
- IV. We also need to know how many strings in this array were filled by the function so that we can iterate over it and print it.

Lets find recursion in it.

- I. $S("") = []$
- II. $S("c") = ["", "c"]$
- III. $S("bc") = ["", "c", "b", "bc"]$
- IV. $S("abc") = ["", "c", "b", "bc", "a", "ac", "ab", "abc"]$

Figured out?

$S("abc") = S("bc") + \text{copy of all } S("bc") \text{ with 'a' prefixed.}$

Time to code.



Can you map the above approach to get all permutations of the string?

What if the problem statement changed to just **print** all **subseq.** instead of returning.

Time to try?

Lets assume A is 1, B is 2...and Z is 26. Given a number N, print all possible strings based on above.

Test Cases:

123 -> ABC, LC, AW.

199 -> All, SI

101 -> AA, JA

Hint:

You can build this solution by just adding/editing less than 10 lines of previous code.



Rat in A Maze.

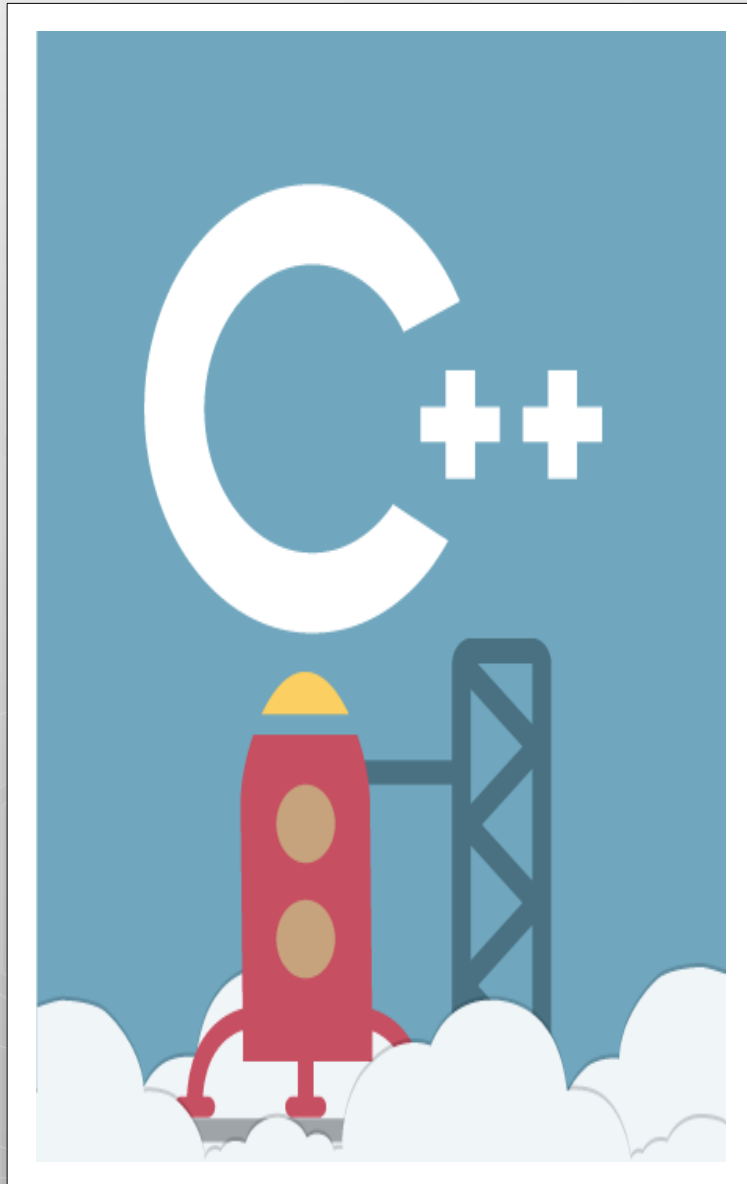
0-1 Knapsack.

Lets discuss few more problems

- I. N Queens
- II. Longest Common Subsequence.

What is next class about?

I. Remaining C++ Constructs



Thank You!

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