C++

LAUNCHPAD

CODING BLOCKS

Lecture-9

Recursion - 2

- Advanced Problems on Recursion

Prateek Narang

Status of HackerRank

Any doubts?

Inbuilt Sort() Function

Vectors !

<CSTRING>
Inbuilt String Class !

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:

- We need this function to return an array of strings.
- But in C++ we know we cannot return array as this would be address of local variable.
- Instead we can pass it as argument and expect it to fill this array with the strings.
- 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.

- S(“”) – [“”]
- S(“c”) – [“”, “c”]
- S(“bc”) – [“”, “c”, “b”, “bc”]
- S(“abc”) – [“”, “c”, “b”, “bc”, “a”, “ac”, “ab”, “abc”]

Figured out?

S(“abc”) = S(“bc”) + copy of all S(“bc”) with ‘a’ prefixed.

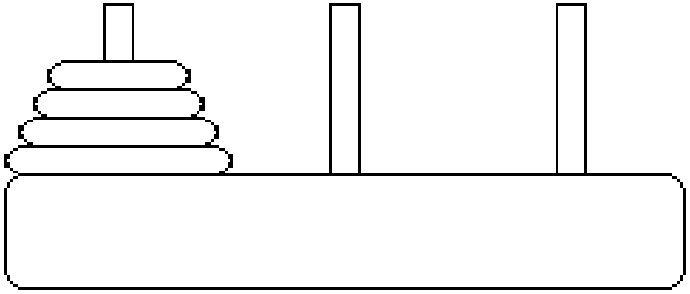
Time to code.

Permutations of a String.

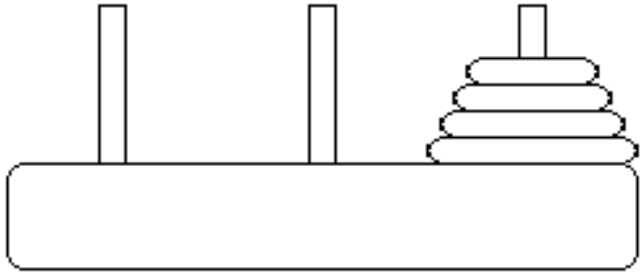
CODING BLOCKS

What if the problem statement changed to just save all permutations instead of printing ?

Towers of Hanoi !

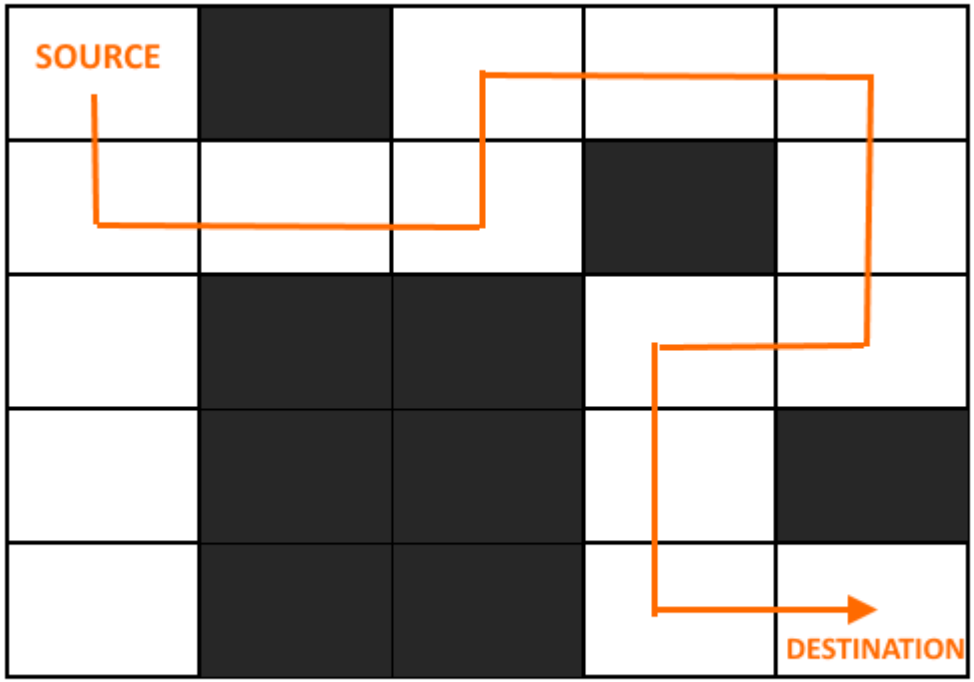


Initial State



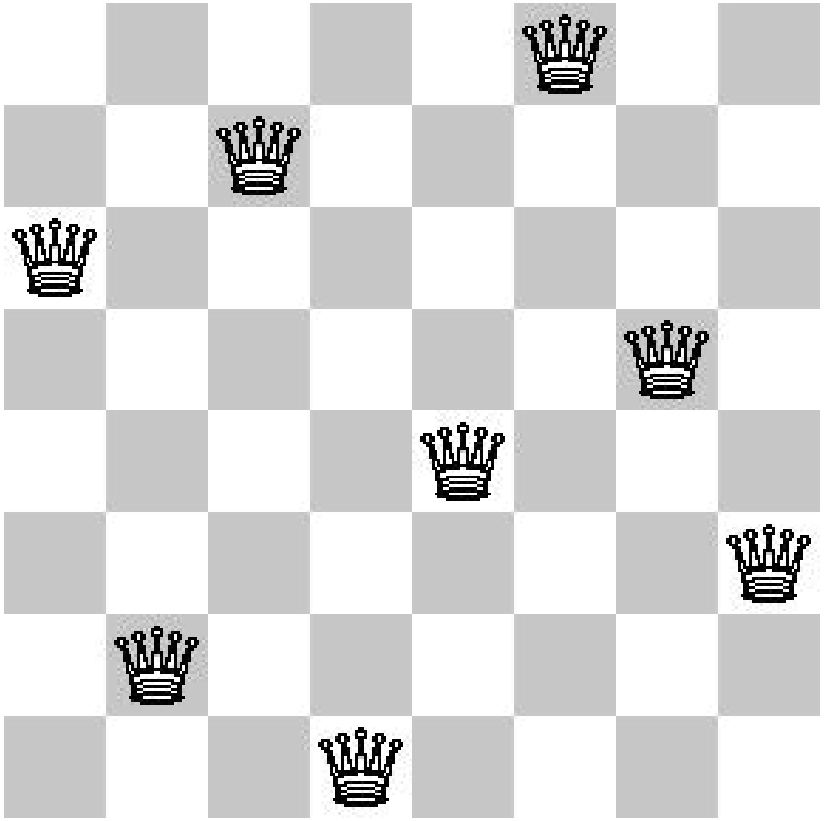
Final State

Rat in a Maze Problem



CODING BLOCKS

N – Queens Problem



CODING BLOCKS

Tug of War - (HomeWork)

Tug of War - Given a set of n integers, divide the set in two subsets of n/2 sizes each such that the difference of the sum of two subsets is as minimum as possible. If n is even, then sizes of two subsets must be strictly n/2 and if n is odd, then size of one subset must be (n-1)/2 and size of other subset must be (n+1)/2.

Quick Sort - (HomeWork)

Read and implement Quick Sort.

What is next class about?

- Space Time Complexity
- Dynamic Allocation

C++ LAUNCHPAD

CODING BLOCKS

Prateek Narang