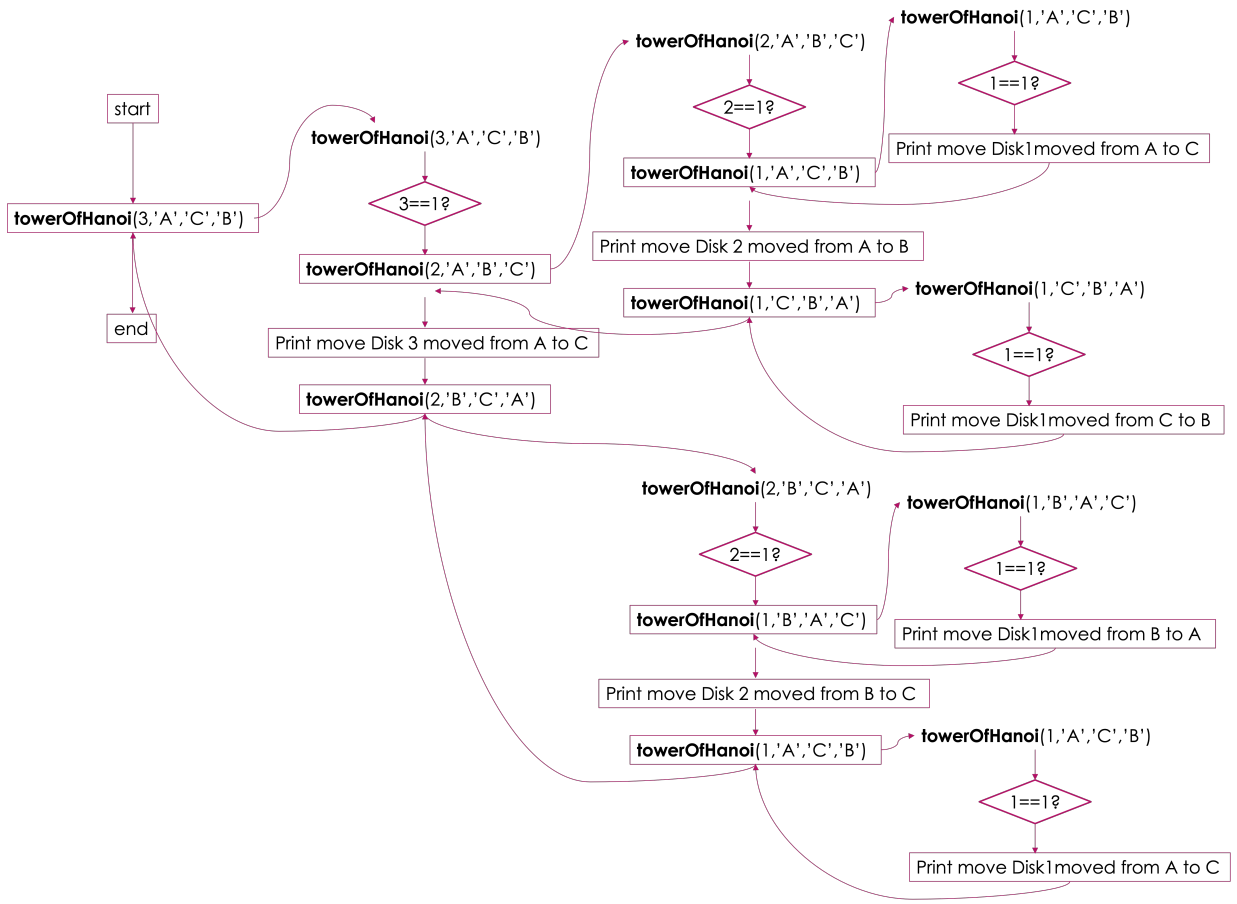
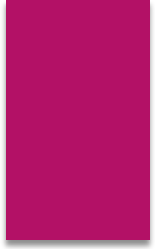
The Solution of Recursion Practice

YAO ZHAO

Practice: trace the computation for the tower of Hanoi like P.3?

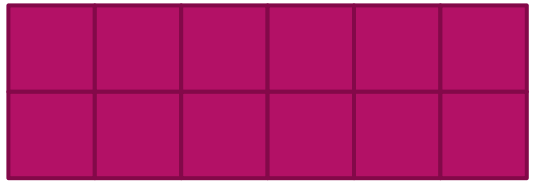




Practice:

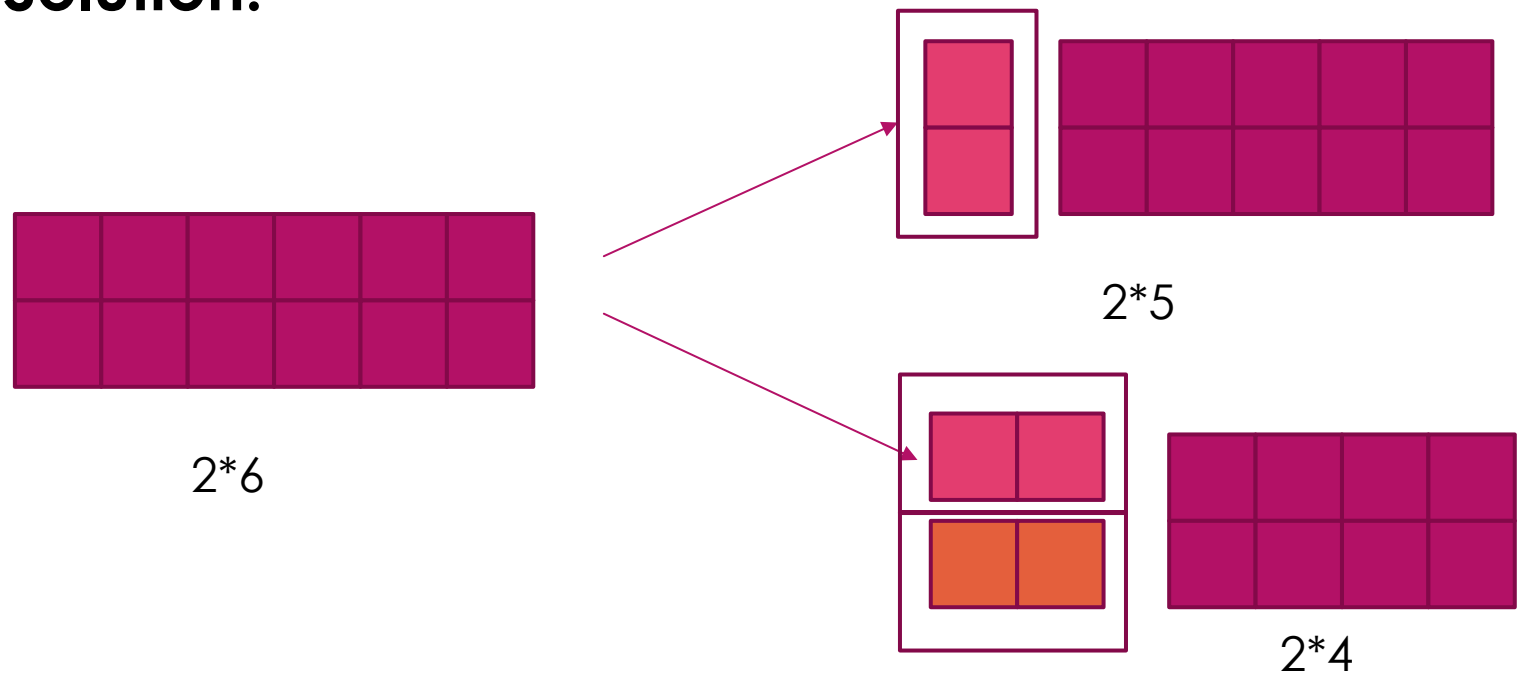
1. Find the number of ways a 2*n rectangle can be tiled with rectangular tiles of size 2*1.

2*1



2*6

Solution:

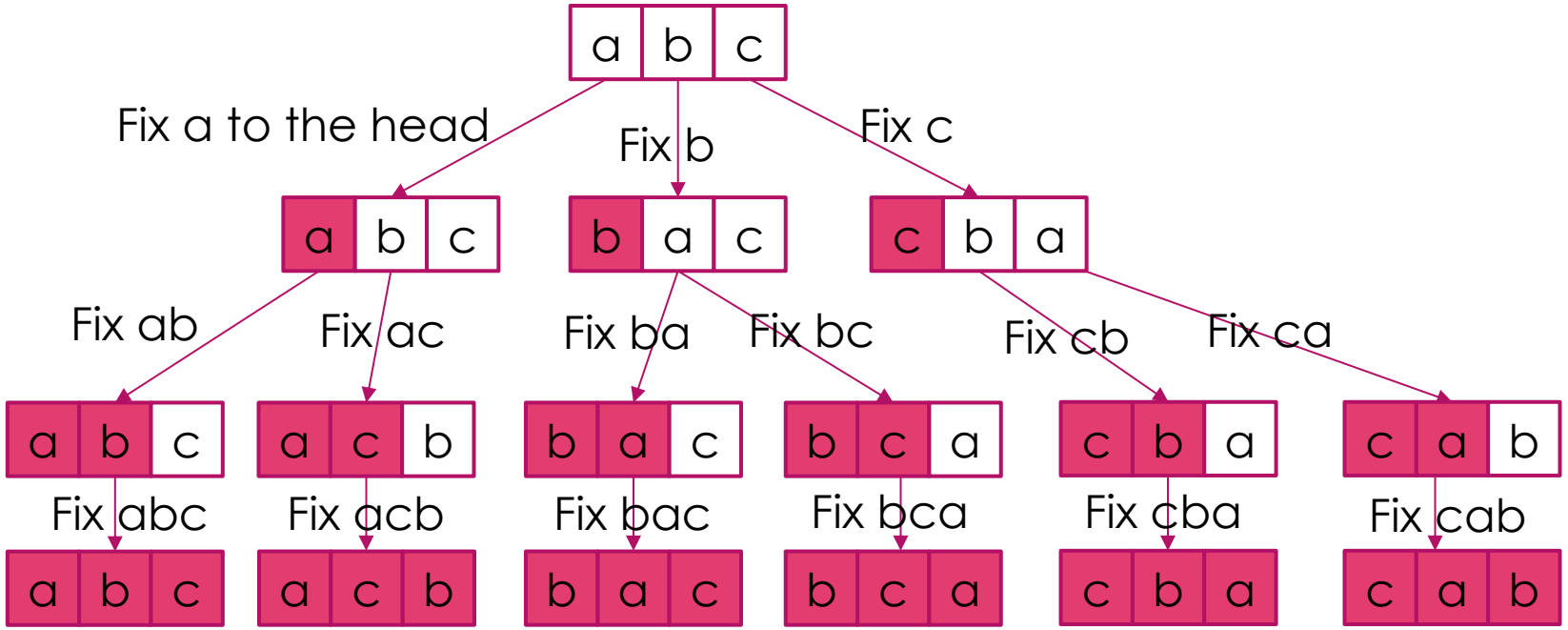


F(n) = F(n-1)+F(n-2)
F(1) = 1
F(2) = 2
Same problem as climbing stairs.

Practice:

2. Enter a string and print out all permutations of the characters in the string.
Example:
Input: abc
Output: abc, acb, bac, bca, cab, cba

Solution:

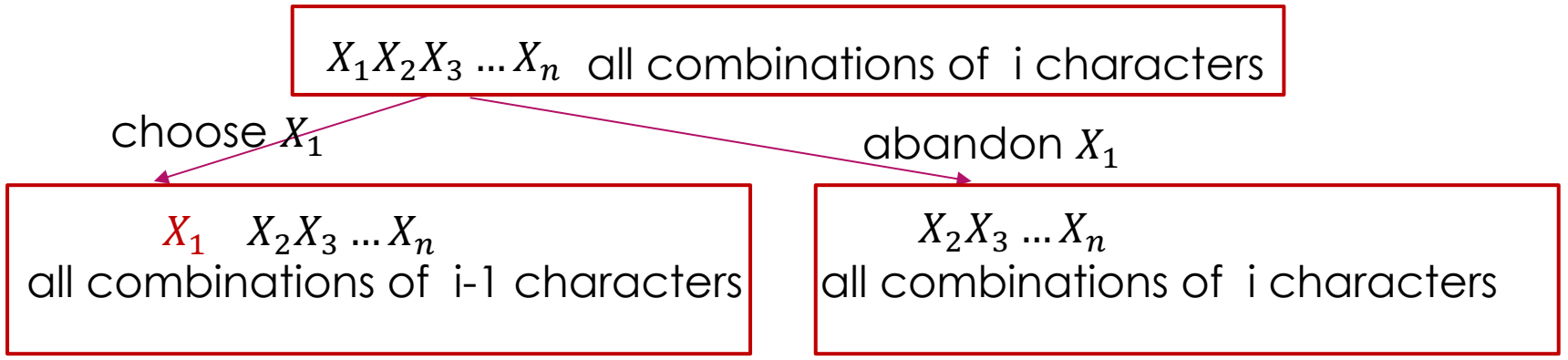


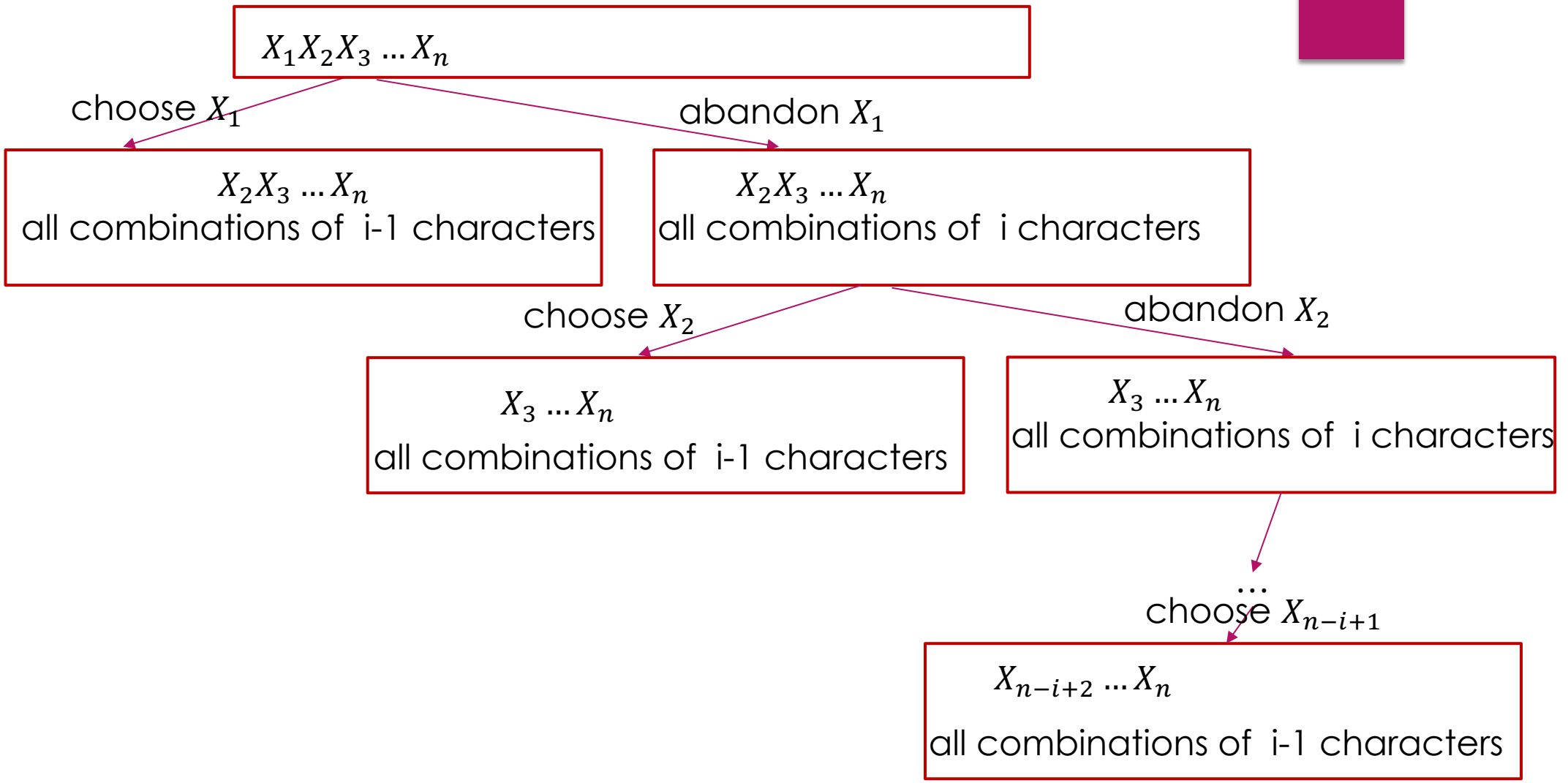
Practice:

3. Enter a string and print out all combinations of the characters in the string.
Example:
Input: abc
Output: a, b, c, ab, bc, ac, abc

Solution:

Output number = $C_n^1 + C_n^2 + C_n^3 + \cdots + C_n^n$
If we want to print out all C_n^i strings,




$X_1X_2X_3 \dots X_n$
choose X_1
abandon X_1
$X_2X_3 \dots X_n$
all combinations of i-1 characters
$X_2X_3 \dots X_n$
all combinations of i characters
choose X_2
abandon X_2
$X_3 \dots X_n$
all combinations of i-1 characters
$X_3 \dots X_n$
all combinations of i characters
…
choose X_{n-i+1}
$X_{n-i+2} \dots X_n$
all combinations of i-1 characters