

Climbing Stairs

Result

$n=1 \rightarrow \underline{1 \text{ way}} - \underline{1 \text{ step}}$

$n=2 \rightarrow \underline{2 \text{ ways}} \begin{cases} \underline{1 \text{ step} + 1 \text{ step}} \\ \underline{2 \text{ step}} \end{cases}$

$n=3 \rightarrow \underline{3 \text{ ways}} \begin{cases} \begin{matrix} 1 \text{ step} + 1 \text{ step} + \\ 1 \text{ step} \end{matrix} \\ \underline{2 \text{ step} + 1 \text{ step}} \\ \begin{matrix} 1 \text{ step} + \\ 2 \text{ step} \end{matrix} \end{cases}$

$n=4 \rightarrow \underline{5 \text{ ways}} \begin{cases} \begin{matrix} 1 \text{ step} + 1 \text{ step} + \\ 1 \text{ step} + 1 \text{ step} \end{matrix} \\ \underline{1, 2, 1} \\ \underline{2, 1, 1} \\ \underline{1, 1, 2} \\ \underline{2, 2} \end{cases}$

1	2	3	5	8	13	21	34
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1 2 3 4 5 6 7 8
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 numWays(n)

$T(n)$
 Recursion

① Base case condition

if ($n == 1$ or $n == 2$)
 return n;

② Recursive function call

$T(n-1)$

return $\text{numWays}(n-1) +$
 $\text{numWays}(n-2);$

✓

$$T(n) = T(n-1) + T(n-2) + c$$

$$= O(2^n)$$

Exponential

time

complexity

