|  |  |
| --- | --- |
| **Catalan in C++** | |
| #include <iostream>  using namespace std;  int main() {      int n = 6;      int dp[n];      dp[0] = 1;      dp[1] = 1;      for (int i = 2; i < n; i++) {          dp[i] = 0;          for (int j = 0; j < i; j++) {              dp[i] += dp[j] \* dp[i - j - 1];          }      }      for (int i = 0; i < n; i++) {          cout << dp[i] << " ";      }      return 0;  } | **Step-by-Step Execution**  **Initialization:**  dp[0] = 1;  dp[1] = 1;  **Iteration Table for dp[2] to dp[5]**   | **i** | **j** | **Computation** | **dp[i]** | | --- | --- | --- | --- | | 2 | 0 | dp[0]×dp[1]=1×1=1 | 1 | | 2 | 1 | dp[1]×dp[0]=1×1=1 | **2** |   **Final:** dp[2] = 2   | **i** | **j** | **Computation** | **dp[i]** | | --- | --- | --- | --- | | 3 | 0 | dp[0]×dp[2]=1×2=2 | 2 | | 3 | 1 | dp[1]×dp[1]=1×1=1 | 3 | | 3 | 2 | dp[2]×dp[0]=2×1=2 | **5** |   **Final:** dp[3] = 5   | **i** | **j** | **Computation** | **dp[i]** | | --- | --- | --- | --- | | 4 | 0 | dp[0]×dp[3]=1×5=5 | 5 | | 4 | 1 | dp[1]×dp[2]=1×2=2 | 7 | | 4 | 2 | dp[2]×dp[1]=2×1=2 | 9 | | 4 | 3 | dp[3]×dp[0]=5×1=5 | **14** |   **Final:** dp[4] = 14   | **i** | **j** | **Computation** | **dp[i]** | | --- | --- | --- | --- | | 5 | 0 | dp[0]×dp[4]=1×14=14 | 14 | | 5 | 1 | dp[1]×dp[3]=1×5=5 | 19 | | 5 | 2 | dp[2]×dp[2]=2×2=4 | 23 | | 5 | 3 | dp[3]×dp[1]=5×1=5 | 28 | | 5 | 4 | dp[4]×dp[0]=14×1=14 | **42** |   **Final:** dp[5] = 42  **Final DP Array:**  dp[] = {1, 1, 2, 5, 14, 42}  **Final Output:**  1 1 2 5 14 42 |
| Output:- 1 1 2 5 14 42 | |