AlgoExpert Quad Layout C++ 12px Sublime Monokai 00:00:00

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Solution 1 Solution 2 Solution 3

```cpp
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#include <unordered_map>
using namespace std;

int helper(int n, unordered_map<int, int> *cache);

// O(n^2) time | O(n) space
int numberOfBinaryTreeTopologies(int n) {
  unordered_map<int, int> cache{{0, 1}};
  return helper(n, &cache);
}

int helper(int n, unordered_map<int, int> *cache) {
  if (cache->find(n) != cache->end()) {
    return cache->at(n);
  }
  int numberOfTrees = 0;
  for (int leftTreeSize = 0; leftTreeSize < n; leftTreeSize++) {
    int rightTreeSize = n - 1 - leftTreeSize;
    int numberOfLeftTrees = helper(leftTreeSize, cache);
    int numberOfRightTrees = helper(rightTreeSize, cache);
    numberOfTrees += numberOfLeftTrees * numberOfRightTrees;
  }
  cache->insert({n, numberOfTrees});
  return numberOfTrees;
}
```