N-QUEENS PROBLEM

PROBLEM STATEMENT

The N-Queens problem is a classic backtracking problem where the goal is to place N queens on an N×N chessboard so that no two queens threaten each other. That means:

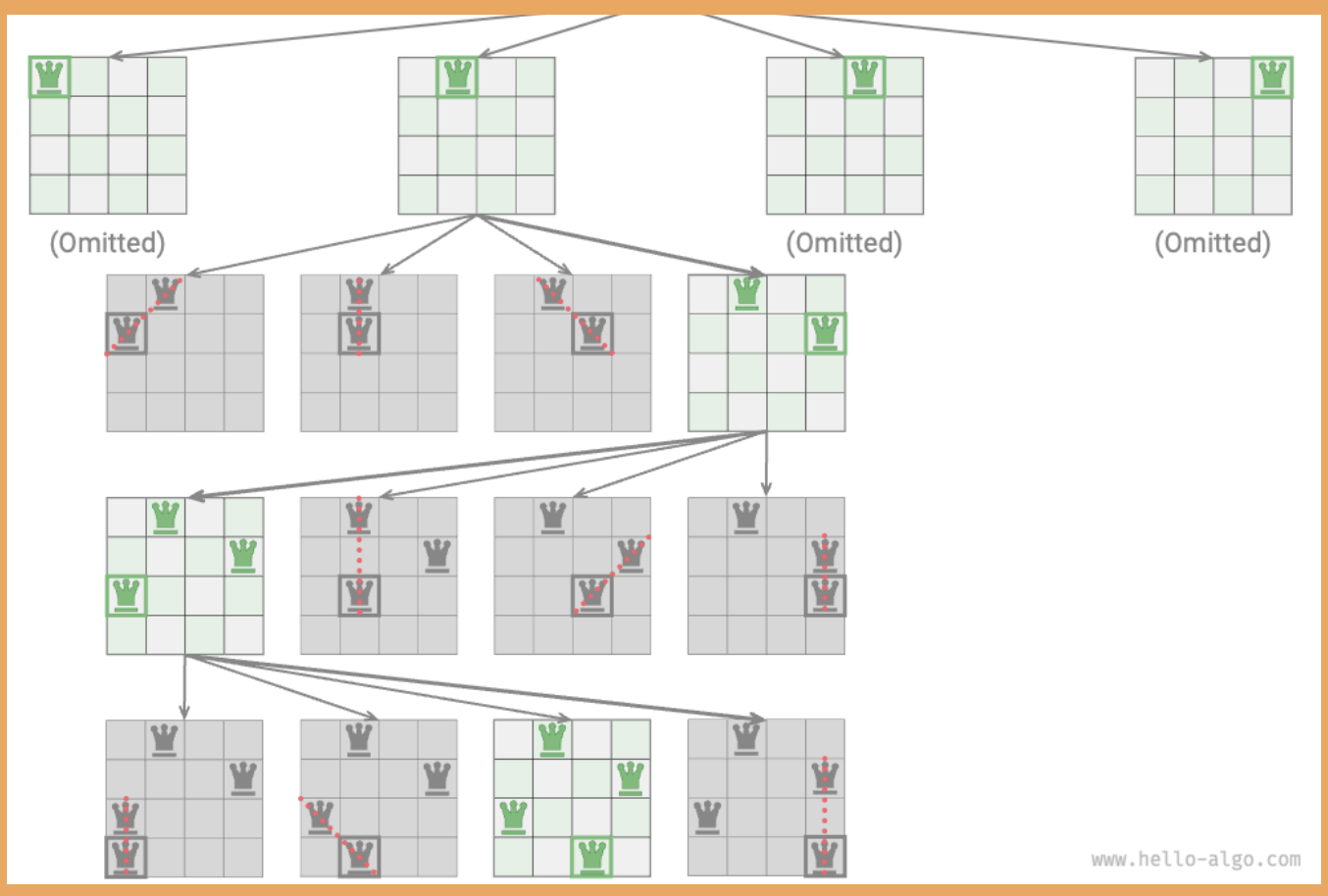
- No two queens share the same row.
- No two queens share the same column.
- No two queens share the same diagonal.

ALGORITHM

Algorithm Backtrack(X[1.....i])
// Gives a template of a generic backtracking algorithm
// input: X[1...i] specifies first i promising components of a solution
// output: All the tuples representing the problems solutions

if X[1...i] is a solution write X[1...i]
else
for each element x ϵ Si+1 consistent with X[1....i] and the constraints do
X[i+1] x
Backtrack(X[1....i+1])

TRACING



TIME COMPLEXITY: O(N!)

- The actual complexity is less due to pruning, but asymptotically it's O(N!) for generating permutations and checking constraints.

SPACE COMPLEXITY: O(N)

- One array of size N is used to store the column positions of queens.
- The recursion stack will go up to depth N.

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