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Topic : **Implementation of CSP Problem**

Code :

import java.util.ArrayList;

import java.util.List;

class CSP {

    private int boardSize;

    private List<Integer> queensPlacement; // Current placement of queens in each row

    public CSP(int boardSize) {

        this.boardSize = boardSize;

        queensPlacement = new ArrayList<>();

    }

    // Check if a queen can be safely placed in the current row and column

    private boolean isSafe(int row, int col) {

        for (int prevRow = 0; prevRow < row; prevRow++) {

            int prevCol = queensPlacement.get(prevRow);

            if (prevCol == col || prevCol - prevRow == col - row || prevCol + prevRow == col + row) {

                return false;

            }

        }

        return true;

    }

    // Backtracking search to solve the CSP

    private boolean solve(int row) {

        if (row == boardSize) {

            return true; // All queens placed successfully

        }

        for (int col = 0; col < boardSize; col++) {

            if (isSafe(row, col)) {

                queensPlacement.add(col);

                if (solve(row + 1)) {

                    return true; // Found a valid solution

                }

                queensPlacement.remove(queensPlacement.size() - 1); // Backtrack

            }

        }

        return false; // No solution in this branch

    }

    // Public method to solve the CSP and print the solution

    public void solve() {

        if (solve(0)) {

            System.out.println("Solution found:");

            for (int row = 0; row < boardSize; row++) {

                for (int col = 0; col < boardSize; col++) {

                    if (queensPlacement.get(row) == col) {

                        System.out.print("Q ");

                    } else {

                        System.out.print(". ");

                    }

                }

                System.out.println();

            }

        } else {

            System.out.println("No solution found.");

        }

    }

    public static void main(String[] args) {

        int boardSize = 8; // Change boardSize to the desired board size

        CSP csp = new CSP(boardSize);

        csp.solve();

    }

}