ALGORITHM DESIGN PROJECT 3

Exercise 40:

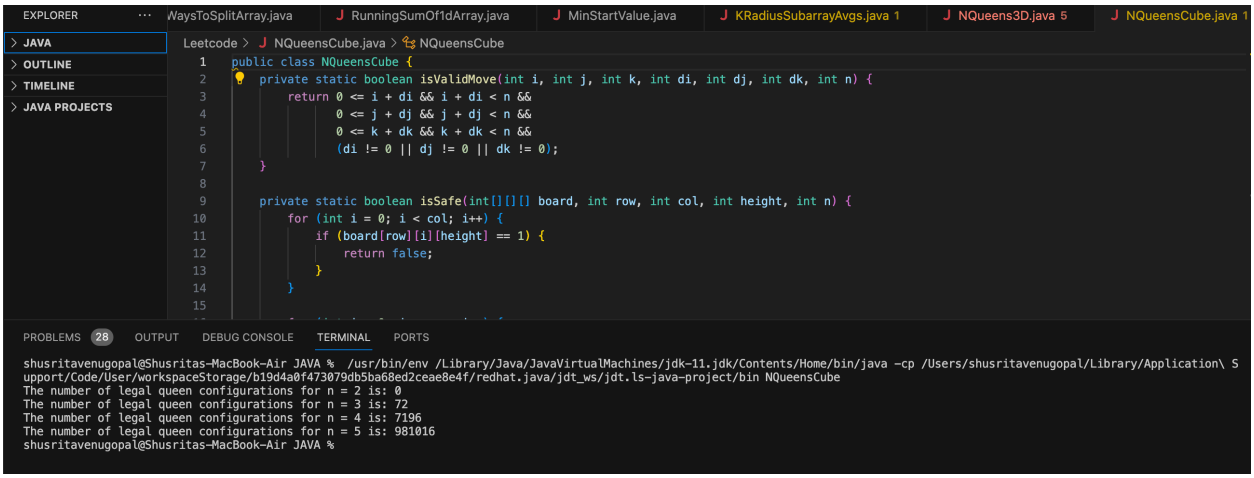
Given an $n \times n \times n$ cube containing n^3 cells, we are to place n queens in the cube so that no two queens challenge each other (so that no two queens are in the same row, column, or diagonal). Can the n-Queens algorithm (Algorithm 5.1) be extended to solve this problem? If so, write the algorithm and implement it on your system to solve problem instances in which $n = 4$ and $n = 8$.

Exercise 40, Additional Exercises, Chapter 5. Your program must print the number of legal queen configurations for n = 2, 3, 4, and 5. For simplicity and clarification, we assume the following rule:

A three-dimensional queen can move in one of the directions from a position (i, j, k), where n-1>=i, j, k>=0, to position (i+mx, j+my, k+mz), where x, y, z ∈ {-1,0,1}, m is an integer, m<=n, and {x, y, z}!={0, 0, 0}.

The number of legal queen configurations for n = 2 is: 0
The number of legal queen configurations for n = 3 is: 72
The number of legal queen configurations for n = 4 is: 7196
The number of legal queen configurations for n = 5 is: 981016

OUTPUT Screenshot:
The number of legal queen configurations for n = 2 is: 0
The number of legal queen configurations for n = 3 is: 72
The number of legal queen configurations for n = 4 is: 7196
The number of legal queen configurations for n = 5 is: 981016


EXPLORER
WaysToSplitArray.java
RunningSumOf1dArray.java
MinStartValue.java
KRadiusSubarrayAvgs.java 1
NQueens3D.java 5
NQueensCube.java 1
JAVA
OUTLINE
TIMELINE
JAVA PROJECTS
Leetcode > NQueensCube.java > NQueensCube
public class NQueensCube {
private static boolean isValidMove(int i, int j, int k, int di, int dj, int dk, int n) {
return 0 <= i + di && i + di < n &&
0 <= j + dj && j + dj < n &&
0 <= k + dk && k + dk < n &&
(di != 0 || dj != 0 || dk != 0);
}
private static boolean isSafe(int[][][] board, int row, int col, int height, int n) {
for (int i = 0; i < col; i++) {
if (board[row][i][height] == 1) {
return false;
}
}
PROBLEMS 28
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
shusritavenugopal@Shusritas-MacBook-Air JAVA % /usr/bin/env /Library/Java/JavaVirtualMachines/jdk-11.jdk/Contents/Home/bin/java -cp /Users/shusritavenugopal/Library/Application\ Support/Code/User/workspaceStorage/b19d4a0f473079db5ba68ed2ceae8e4f/redhat.java/jdt_ws/jdt.ls-java-project/bin NQueensCube
The number of legal queen configurations for n = 2 is: 0
The number of legal queen configurations for n = 3 is: 72
The number of legal queen configurations for n = 4 is: 7196
The number of legal queen configurations for n = 5 is: 981016
shusritavenugopal@Shusritas-MacBook-Air JAVA %