CS6023: GPU Programming

Assignment 4 (13 marks)

Due `October 15, 2017 by 23:55` on Moodle

Problem Specification

Implement N-Queens Solution Checker using Thrust library.

N-Queens Solution Checker. Given an $N \times N$ matrix, check if it is a valid solution to an N-Queens problem. Output YES if it is a valid solution, NO otherwise. In case of NO, print also a pair of attacking queens (each queen is represented with its position in the matrix as: *row column*).

Example 1:
Sample Input:
4
0 1 0 0
0 0 0 1
1 0 0 0
0 0 1 0
Sample output:
YES

Example 2:
Sample Input:
3
0 1 0
0 0 1
1 0 0
Sample output:
NO
0 1
1 2

Note:

1 All the functionality must be implemented using thrust library; there should be no kernels implemented.

2 Input will be provided in a file with first line indicating N and remaining lines representing the $N \times N$ matrix. Bits 1 and 0 in the matrix show the presence and absence of a queen respectively.

3 Output in the case of an invalid solution should be printed in three different lines. First line with a NO, second line and third line with positions (in matrix) of a pair of attacking queens.

N-Queens Problem. The N-Queens problem places N queens on an $N \times N$ matrix such that no two queens attack each other. Two queens *attack* each other if they are in the same row, the same column, or the same diagonal.

Illustrative examples are shown in Figure. 1 and Figure. 2.

Submission Instructions

When ready to submit,

1. You should submit a single file ROLL_NUMBER.cu.
   For example, if your roll number is `CS16D004`, your file should be called `CS16D004.cu`
2. Upload ROLL_NUMBER.cu on moodle: `https://courses.iitm.ac.in/course/view.php?id=837`
3. Download your file, and make sure it was the one you intended to submit.

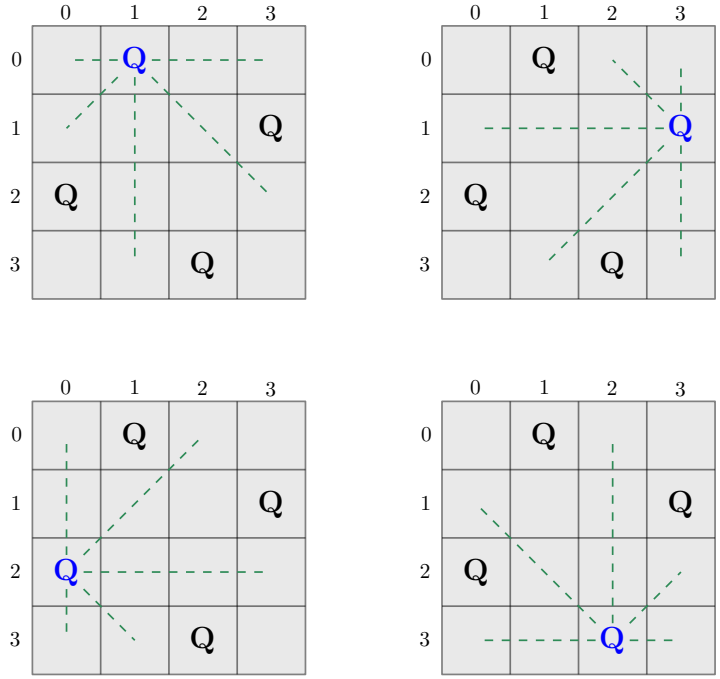

Figure 1: A configuration for $N = 4$. No two queens attack each other. Safety is indicated by green lines. This is a *solution* for $N = 4$.

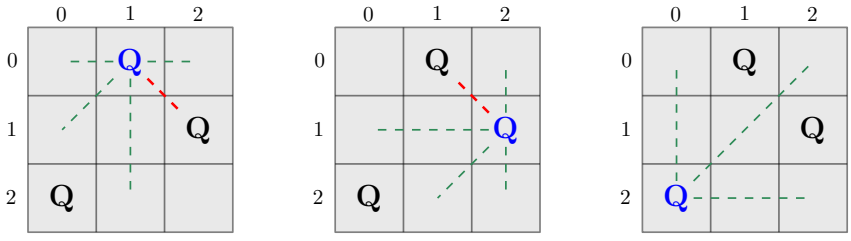

Figure 2: A configuration for $N = 3$. $Q_{(0,1)}$ and $Q_{(1,2)}$ attack each other. Attack is indicated by red lines. This is *not a solution* for $N = 3$.