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| Edinburgh Napier University |
| SET10108 – Concurrent and Parallel Systems (Coursework 2) |
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# Introduction

The purpose of this coursework is to solve the N-Queens problem – the problem of placing chess queens on an N x N chessboard in such a way that no two queens are a threat to another. This means that no queen can share a row, column or a diagonal space. Given the implementation provided, the task is to modify the existing serial program so that it is non-recursive and then to implement the non-recursive solution in parallel. It is important to ensure that the recursive elements are removed, as parallelisation through OpenMP and using the GPU does not play will with recursive code.

The parallelisation should be done twice; once in OpenMP and then again using the GPU using CUDA or OpenCL, and should run for N values between 4 and 10 – with the option to increase the threshold should the Laptop have the ability to handle it.

## Hardware Specs

The machine used for the creation of this program as well as running the experiments are an ASUS TUF F15 with the following specs:

* CPU – 11th Gen Intel(R) Core(TM) I5 11400H @ 2.70GHz (6 cores, 12 logical processors)
* RAM – 16GB DDR4 3200mhz
* GPU – NVIDIA GeForce RTX 3050 Ti Laptop GPU (4GB)
* OS – Windows 11 Home (Build 22000.1098)

# Serial

## Recursion Problem

## New Solution

## Serial Performance Results

# Parallel – OpenMP

## Method of Parallelisation

## OpenMP Performance Results

# Parallel – GPU (CUDA)

## Method of Parallelisation

## OpenMP Performance Results

# Comparison

# Conclusions