Parallel Sudoku Solver

MINI-PROJECT (HPC)

Objectives:

- To understand difference between parallel computing and serial computing.

- Implementing Sudoku Solver so as to check computation of serial and parallel programming.

- Calculating time required for both to solve sudoku serially and parallelly.

Software and Hardware Requirements:

- Software Requirements:
  - Cuda Compiler
  - G++ Compiler

- Hardware Requirements:
  - GPU Hardware Component

- System:
  - 64-bit Ubuntu System

Program Flow

Serial way -->

Start

Get input (Sudoku)

While (!Solved):
- Find UnAssigned cell
- Choose a number
  - Condition (!InSubCells && !InRow && !InColumn)
  - If True (Add the number) else (Go for next number)

Print Sudoku Solved

Print Time Required

Stop

Program Flow

Parallel Way -->

Start

Get input (Sudoku) //CPU

While (!Done flag): //GPU
- Assign each cell to a thread
- For each cell check unassigned
- If found process Else exit

Print Time Required //CPU

Stop

Time Calculations

Serial Program:
- Input: 1 Sudoku Unsolved (9*9)
- Output: Solved Sudoku
- Time Required:
  - 0.0023 sec

Parallel Program:
- Input: 95 Sudokus Unsolved (9*9)
- Output: Solved Sudokus
- Time Required:
  - 0.0021 sec

Output

!nvcc -arch sm_35 -rdc=true -o sudokusolver sudokusolver.cu

!./sudokusolver inp.in

```
0.000012          0.001826
Block=20000,threads=96 starting
0.000012          0.001838
no active blocks...terminating
Block=20000,threads=96 starting
0.000021          0.001859
Block=20000,threads=96 starting
0.000017          0.001876
Block=20000,threads=96 starting
0.000016          0.001892
Block=20000,threads=96 starting
0.000012          0.001904
Block=20000,threads=96 starting
0.000011          0.001915
Block=20000,threads=96 starting
0.000012          0.001927
Block=20000,threads=96 starting
0.000016          0.001943
no active blocks...terminating
Block=20000,threads=96 starting
0.000017          0.001960
Block=20000,threads=96 starting
0.000016          0.001976
no active blocks...terminating
Block=20000,threads=96 starting
0.000020          0.001996
```