High Performance Computing
Assignment 4

Sripranav Suresh Kumar
ss14432

The code for all the questions can be found at
https://github.com/SripranavSureshKumar/HPCSpring2022/tree/main/homework4

Question 1

Vector Vector Multiplication (N = 2^25)

Machine	**Bandwidth (GB/s)**	**Error**
CPU (on cuda1)	22.178022	
cuda1	132.159898	0.000000
cuda2	281.832212	0.000000
cuda3	593.779978	0.000000
cuda5	108.561739	0.000000

Matrix Vector Multiplication (N = 2^10)

Machine	**Bandwidth (GB/s)**	**Error**
CPU (on cuda1)	1.770986	
cuda1	25.665636	0.000000
cuda2	55.232165	0.000000
cuda3	81.902430	0.000000
cuda5	19.571795	0.000000

Question 2

2D Jacobi (N = 2^7)

Machine	**Time (s)**	**Error**
CPU (on cuda1)	0.452512	
cuda1	0.007730	0.000812
cuda2	0.005319	0.000842
cuda3	0.003457	0.000897
cuda5	0.010404	0.000814

The errors have been calculated by comparing the updated u matrix created at the end of 1000 iterations and the marginal errors are due to floating point operations.

Question 3

TOPIC: **Parallel Fraudulent Transaction Detection in Ethereum Blockchain data using MPI**

Proposed Steps:

1) Setup of Greene Cluster. - **COMPLETED**
2) Data sourcing, parsing and transformation - **COMPLETED**
    a) Parallel read of dataset by multiple processors - **COMPLETED**
3) Distributed Transaction Graph construction:
    a) Parallel Sort to globally sort addresses using processor communication - **COMPLETED**
    b) Mapping addresses to global id of sorted addresses using processor communication - **COMPLETED**
    c) Grouping transactions to form adjacency lists - **TO BE COMPLETED**
4) Distributed Blacklisted Node Trace Forest Creation
    a) Local operations within the processor - **COMPLETED**
    b) Communication between processors - **TO BE COMPLETED**
    c) Cumulative Forest - **TO BE COMPLETED**