UCS 645 : Parallel & Distributed Computing

Lab Exercise #4

Learning Outcomes:

- **Understand how to launch CUDA kernels**
- **Understand and demonstrate how to allocate and move memory to and from the GPU**
- **Understand CUDA thread block layouts**

Problem 1: Write a program using CUDA, in which all the threads are performing different tasks. These task are as follows:

a. Find the sum of first n integer numbers. (you can take n as 1024. Do not use direct formula but use iterative approach)

b. Find the sum of first n integer numbers. (you can take n as 1024. You can use direct formula not the iterative approach)

Steps:

1. Define the value of N (Number of Integers)
2. Create two arrays: One for input and another for output
3. Allocate memory on device for the data
4. Fill the array with first N integers
5. Copy the data from host to device
6. Define block and grid sizes
7. Create the kernel for adding the first N Integers and call it from host.

Problem 2: Implement merge sort to sort the element of an array of the size n=1000.

a. To implement parallelization use pipelining.

b. Now implement the parallel merge sort using CUDA.

c. Compare the performance of both (a) and (b) methods.