

## Data Parallel Reduction

([Download ZipFile](#))

- 1) Extract the lab template into your SDK projects directory.
- 2) Edit the source files `vector_reduction.cu` and `vector_reduction_kernel.cu` to complete the functionality of the parallel addition reduction on the device. The size of the array is guaranteed to be equal to 512 elements for this assignment.
- 3) There are two modes of operation for the application.

No arguments: The application will create a randomly initialized array to process. After the device kernel is invoked, it will compute the correct solution value using the CPU, and compare that solution with the device-computed solution. If it matches (within a certain tolerance), it will print out "Test PASSED" to the screen before exiting.

One argument: The application will initialize the input array with the values found in the file provided as an argument.

In either case, the program will print out the final result of the CPU and GPU computations, and whether or not the comparison passed.

- 4) Answer the following questions:

1. How many times does your thread block synchronize to reduce the array of 512 elements to a single value?
2. What is the minimum, maximum, and average number of "real" operations that a thread will perform? "Real" operations are those that directly contribute to the final reduction value.

### Grading:

Your submission will be graded on the following parameters.

Demo/knowledge: 25%

- Produces correct result output for test inputs

Functionality: 40%

- Uses an  $O(n)$  operation data-parallel reduction algorithm.

Report: 35%

- Answer to question 1: 15%, answer to question 2: 20%