ECEC-414: High Performance Computing
Lab 2: Histogram Generation with Pthreads

Prof. Mark Hempstead, ECE Department, Drexel University

January 29, 2014

The lab assignment is due Febuary 7, 2014 at midnight. You must work on this assignment on your own.

Edit the `compute_using_pthreads()` function within the file `histogram.c` to complete the functionality of histogram generation using `pthreads`. You may add multiple functions to the file as needed to achieve this functionality. Do not change the source code elsewhere except for adding timing-related code.

The program provided to you accepts the size of the input data set as an argument. It creates a randomly initialized data set and computes the histograms using both the reference (single threaded) implementation and the multi-threaded implementation. The size of the histogram is set to 500 bins. The solution provided by `pthreads` is compared to that generated by the reference code (in the function `compute_gold()`).

Provide a two/three page report describing: (1) the design of your multi-threaded program (use code or pseudocode to clarify the discussion); and (2) the speedup achieved over the serial version for 2, 4, 8, and 16 threads. You should pick a large enough problem size (millions of items) to measure the difference.

Submit your project to Bb Vista. Provide a copy of your report as a PDF and the files needed to run your code to me as a single file called `lab2.c`.

Resources:

Chapter 4 of *An Introduction to Parallel Programming* covers the detailed syntax of pthreads.

Use the xunil cluster to run your experiments *xunil.coe.drexel.edu* using your Drexel ID and password. xunil-00 can run up to four concurrent threads while xunil-01 and xunil-02 can run up to 16 concurrent threads.