**Homework 5: One program – three ways.**
**CIS450**

**Program description**: Write a program to generate two million 16-character random alphabetic strings (all lowercase) serially, then count the various characters in parallel.

**Mechanics**: Use the maximum number of cores you can – 4 on cislinux, and all the cores on the CUDA-compatible GPUs on the machines in Nichols 126. Run the first two programs on cislinux using four cores, then the third on a machine in N126 with a CUDA-compatible graphics card. Make sure you handle synchronization properly!

Submit the source code for your various programs and a brief writeup explaining your results via KSOL.

Write the program in C/C++ using three different techniques:

1. pthreads – use the pthreads standard to write a multithreaded application to solve this task.
2. MPI – modify your program to use MPI rather than pthreads.
3. CUDA – rewrite your program to use the GPUs in Nichols 126. There is a guide to getting programs running posted on KSOL to help you get started.