

CS 5334/4390 Spring 2017

Lab 1

Due Tuesday, February 7

### **Concurrent Programming using Pthreads**

For this assignment, you will program a solution to a producer-consumer problem in which the producers are cooks and the consumers are dining philosophers. Each cook and each dining philosopher will be represented by a thread. We will assume that each philosopher has her own set of dishes, including silverware, and does not need to share them. Your program should input the number of cooks and numbers of philosophers from the command line. Each cook will take a random amount of time to produce a meal and place it in a FIFO queue on the table. Each philosopher will think a random amount of time, decide to eat and take the oldest meal from the table, and then eat for a random amount of time. A cook should not put a new meal on the table if there are already as many meals waiting on the table as there are philosophers. A philosopher must wait if she wants to eat but there is no meal available. Two or more philosophers should not try to remove the same meal.

Your Pthreads solution should use one or more condition variables to ensure correct access to the queue of meals on the table. See

<https://www.cs.nmsu.edu/~jcook/Tools/pthreads/examples.html> for a solution to the producer-consumer problem with one producer and one consumer. Feel free to use this code as a model but please give credit to the original author if you use some of the code. We will also discuss this problem in class. Be sure to use a thread-safe random number generator.

You should turn in your properly commented code, a Makefile that will build your code on Stampede using the Intel compiler, and a README file that explains how to build and run your code. Please include your name in comments at the top of your code file and in your README file. You should upload your files to a directory named lab1 in your repository for the class. Your code will be tested by the instructor on Stampede.

There will be a help session 3:00-4:20pm on Friday, February 3, but please get started on the assignment right away and ask questions as they arise.