CSCI-7645: Practice Problem Set 3

Fairleigh Dickinson University Vancouver
Fall 2023

Problems

1. Consider the programs `thread_incr.c` (page 632 of the textbook) and `thread_incr_mutex.c` (page 636 – 637 of the textbook) discussed in class. Make the following modifications to both:

   (a) Update the function `threadFunc` so that its input `arg` is not a pointer to an integer (the number of times to increment the global variable `glob`) but rather a pointer to a structure with two fields:
   - A unique identifier, and
   - The number of times to increment `glob`.

   (b) Whenever `threadFunc` increments `glob`, it should print out the following line to screen:

   ```
   THREAD ID: <this thread's identifier>, new value of glob: <value>
   ```

   (c) After incrementing `glob`, the function should also then execute an empty loop such as the following:

   ```
   for(i = 0; i < 1000000; i++){
       /* Do nothing */}
   }
   ```

   so that you can observe context switches between threads without having to increment `glob` and print the updates millions of times. **Make sure to disable compiler optimizations in order to ensure that this happens.**

   Now run both the modified programs redirecting their outputs to two different text files `output_without_mutex.txt` and `output_with_mutex.txt`. Examine their outputs and identify how they are different.