ELE709 - Real-Time Computer Control Systems
Lab 4 - Resource Sharing and Coordination

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1. **Exercise 4.1:**

   (a) Explain why the example program `lab4.c` didn't work correctly?

   Each thread's function will run correctly if the code in the while loop is not interrupted until the while loop condition is being checked. Each thread is intended to interact with the string_index variable only after the previous thread finishes updating the value of the string_index variable, which occurs between passes of the while loop. The operating system may interleave the execution of all threads such that each thread interacts with the string_index variable before the other threads are done updating its value.

   (b) A mutex was suggested as a way to make the example program work correctly. What is the purpose for using the mutex in this case? In particular, what is being protected by this mutex?

   The purpose of the mutex is to ensure only one thread at a time reads and increments the string_index variable until one pass of its while loop has finished.

2. **Exercise 4.2:** Explain the logic of your program for this exercise. In particular, what are the predicates (associated with the condition variable) for Thread A and Thread B?

   Thread A waits until string_index is even.
   Thread B waits until string_index is odd.