

Homework 1 (due 1/21/2004)

1. Regular mutexes block when they are already locked and a thread *A* tries to lock them, even if the current holder is the same thread, *A*. In contrast, a *recursive mutex* is one that can be locked multiple times by the same thread and needs to be unlocked the same number of times before other threads can enter the critical section. Using the primitives shown in class (or any equivalent set you are familiar with), implement a recursive mutex. That is, implement:
 - a type `RecMutex`
 - three routines `rec_mutex_lock`, `rec_mutex_unlock`, and `rec_mutex_init` that operate on entities of type `RecMutex` and implement the entry and exit from the critical section protected by a recursive mutex, as well as the initialization of the recursive mutex data.

You may assume a function `CurrentThread()`, returning a unique identifier for the currently executed thread.

2. *Optional, interview-style “tricky” question, just for fun:* For regular (non-recursive) mutexes, we have used a block-structured “Lock” construct (i.e., unlocking the mutex is implicit at the end of the statement/block under the “Lock”). Can you use C macros to define a block-structured “Lock” construct from a pair of `lock/unlock` routines? (C++-style local variable definitions are ok, in case you need them. Alternatively, you may need to change the `lock/unlock` routines slightly to control what they return.)