Name: _____ (First name first) **Score:** ____

COSC 6360 **QUIZ #2** **OCTOBER 3, 2011**

Closed book. You can have with you one single-sided 8½ by 11 sheet of notes. UH expels cheaters

1. What must a programmer do to ensure that a given program will execute ***correctly*** on ***TreadMarks***? (10 points)

All access to shared data must be preceded by a Tmk_lock_acquire() and followed by a Tmk_lock_release().

2. What is the main advantage of ***TreadMark lazy release*** policy compared to ***Munin eager release*** policy? (10 points)

It reduces the communication overhead of the DSM.

3. What is ***inheritance*** in Mach? (5 points) At which level is it defined? (5 points) Explain how Mach uses it to support both ***regular*** and ***lightweight*** processes. (10 points)

- Inheritance defines what happens to a range of addresses when a process forks.
- Inheritance is defined at the level of address ranges containing all addresses mapped by a specific . memory object.
- Mach specifies the inheritance attribute of its data segment to be COPY when it performs a regular UNIX fork() and SHARED when it forks a lightweight process.

Total: ____/40

4. Consider an ARC cache with a total capacity of 512 pages and assume that size(T1) = target_T1 =128 pages. How these two parameters would be affected if:

a) A page already present in T1 is referenced a second time? (2×5 points)

New size(T1) = 127 **New target_T1 =** 128

b) A page that has never been accessed before is brought into the cache? (2×5 points)

New size(T1) = 128 **New target_T1 =** 128

5. What is the main issue raised by ***dirty superpages***? (10 points) How do Navarro *et al.* propose to solve it? (10 points)

- Since each superpage only has a single dirty bit, the page replacement policy has no way to know which base pages are dirty—and must be flushed out when the superpapge is expelled from main memory and which base pages are still clean.

- Navarro et al. propose to avoid this issue by disbanding superpages the first time one of their base pages gets modified.

6. What is the main advantage of ***MCS locks***? (10 points) When does it result in a much better system performance? (5 points) When does it not? (5 points)

- MCS locks have a much lower contention overhead than conventional spinlocks (because waiting processes are put on a queue).

- They perform much better than spinlocks at high contention rates.

- They often perform worse than spinlocks at very low to low contention rate (because entering the queue takes more time than going through very few spinlock cycles).

Total: ____/60