

Name: _____ (First name first)

Score: _____

COSC 6360

QUIZ #1

SEPTEMBER 13, 2010

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

1. Consider a Unix FFS system with a block size of 4 KB. How many file blocks can be accessed
 - a. Directly from the i-node using the 12 direct block addresses? (5 points) 12 blocks
 - b. With one level of indirection? (5 points) 4K/4= 1K=1,024 blocks
 - c. With two levels of indirection? (10 points) 4G/4K-(1,024+12) blocks

Briefly explain your answer:

Each indirect node contains $4,096K/4 = 1,024$ block addresses and file size is limited to 4GB.

2. What is the difference between a *partial subblock* and a *superpage*? (20 points)
 All blocks of a superpage are brought in and expelled from main memory together while the blocks of partial subblock are brought in and expelled from main memory individually.
3. What is the purpose of the UNIX *mount* system call? (20 points)
 The UNIX mount system lets a directory tree in a given disk partition to be accessed as it was a subtree of the directory tree of another disk partition. Its main use is to merge the trees of multiple disk partitions into a single system-wide directory hierarchy.
4. Consider a Mach process that has a code segment, a data segment, and a mapped file. What are the normal *inheritance attributes* of these three entities?
 - a. Code segment? (7 points) **executable file** share
 - b. Data segment? (7 points) **swap area** copy
 - c. Mapped file? (6 points) **file on disk** share

5. Consider a UNIX virtual memory system using a two-handed page replacement policy? Assuming that the two hands form an angle of $\pi/6$ radians, what are the minimum and maximum times a page will survive in main memory after it was referenced for the last time? (2x10 points)
 (*Hint: convert first angles into fractions of 2π .*)

The page will survive in main memory for at least 1/12 and at most 13/12 rotations of the hands after it was referenced for the last time.

Explanation: a page that is referenced last just before the marking hand touches it is expelled much quicker than a page that is referenced last just after that.