

Name: \_\_\_\_\_ (First name first)

Score: \_\_\_\_\_

**COSC 6360**

**QUIZ #1**

**SEPTEMBER 14, 2009**

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

1. Under which circumstances will the following program print twice "Child successfully created"? (10 points)

```
main() {
    int pid;
    if ((pid = fork()) == 0)
    .   exec(<some program>);
    .   printf("Child successfully created\n");
} // main
```

If the `exec()` fails. \_\_\_\_\_

2. In a 32-bit UNIX file system, what is the **minimum block size** that would allow accessing the whole contents' of a 64 MB file using a **single level of indirection**? (10 points)

**Answer:**   16   KB

**Explanation:** Let  $x$  be that minimum block size. One block of indirect addresses of that size would contain  $x/4$  block addresses. Negelecting the relatively small impact of the 12 direct blocks, we would have

$$x \cdot x/4 = 64\text{MB} = 2^{26} \text{ B}$$

whose solution is  $x = 2^{13} \text{ B} = 16\text{KB}$

Hint: Anyone with weak foundations in algebra could have successively tried 4KB, 8 KB, and so on.

3. Why does the Fast File System subdivide each disk partitions into **cylinder groups**? (20 points)

It keeps the file i-nodes closer to their data blocks, thus reducing seek times whenever files are accessed.

4. What is the main advantage of **shared libraries**? (10 points) How does Mach implement them? (10 points)

Shared libraries save space in main memory by letting all the processes share a single copy of all the functions in the same shared library. (In addition, they also save space on disk and speed up the time it takes to fetch binaries in main memory.)

5. In the modified version of the BSD Clock policy with two hands, what is the main advantage of keeping these two hands **close together**? (20 points)

Having the two hands close together will ensure that pages are expelled faster.

6. What is the major advantage of **mapped files**? (20 points)

They reduce the number of context switches by letting processes access directly all file blocks that in main memory.