NAME: _____ (FIRST NAME FIRST) **SCORE**: _____

COSC 4330 FIRST MIDTERM SEPTEMBER 26, 2006

*This exam is **closed book**. You can have **one page** of notes. UH expels cheaters.*

1. ***Short questions.*** Answer in a single sentence to each of the following questions: (6×5 points)\

- What is the main advantage of ***dual-mode CPUs***?

  They prevent users' processes from directly accessing the secondary storage.

- What is the function of the UNIX `kill()` system call?

  It sends a signal to another process.

- What is one of the main purposes of ***timer interrupts***?

  They prevent computationally-intense processes from monopolizing a processor.

- What is the main advantage of ***delayed writes***?

  They reduce the number of disk accesses.

- What is the main advantage of the ***symmetric organization*** for multiprocessor operating systems?

  They are bottleneck-free.

- Which feature of UNIX makes it ***more portable*** than previous operating systems?

  It was written in a high-level language.

2. Which of the following statements apply to (a) kernel-supported threads, (b) user level threads and (c) all threads? (5 points per correct line)

	Kernel-supported	***User-level***	***Both types***
They do not require kernel modifications.	_____	**YES**	_____
They share the address space of their parent.	_____	_____	**YES**
They allow the use of blocking system calls.	**YES**	_____	_____
They allow the kernel to allocate several processors to the threads sharing an address space.	**YES**	_____	_____

3. How many lines will the following program print out? (5 points)

```
main() {
      fork();
      printf("Hi!\n");
      fork();
      printf("How are you?\n");
} // main
```

The program will print out exactly **2 + 4 =6** lines.

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4. What is the purpose of the `dup(pd[0])` system call in the following code sequence? (5 points)

```
int pd[2];
pipe(pd);
close(0);
dup(pd[0]);)
```

It ensures that all reads from standard input will not be read from the pipe pd.

5. Which are the two states that can be reached by a process ***leaving the running state*** and which events or actions may occasion these transitions? (2×5 points)

- The process will go to the **WAITING/BLOCKED** state when

  it does a system call.

- The process will go to the **READY** state when

  it is preempted by another process.

6. ***Explaining why*** (5 points each).

- Why do most operating systems on the market continue to use ***monolithic kernels*****?**

  They are faster than microkernels.

- Why should we ***prevent*** users of a multi-user system from ***rebooting*** the OS from a CD-ROM?

  A user could reboot the system with a rogue OS.

- Why are ***layered kernel organizations*** impractical?

  There is no good way to decompose the functionality of a modern OS into distinct layers.

- Why will we never see hard drives with access times ***below one millisecond***?

  It would require the hard drive to do half a rotation in less than one millisecond and spin at 30,000 rpm.

7. Explain why we need to have both a dual-mode CPU and memory protection to be able to build a secure operating system? (2×5 points)

- **We need a dual-mode CPU to prevent unauthorized users to access and tamper with the files of the operating system and other users.**

- **We need memory protection to prevent unauthorized users to access and tamper with the address spaces of the operating system and other users.**