Jon Tice

**Chapter 1: Introduction**

1. Explain the boot process

The boot process is preformed when your computer is powered on and is responsible for getting the hardware, OS, and other software up and running. The BIOS first does a POST test to make sure all components are running correctly. The BIOS then chooses which device will then load the OS into RAM. After the OS has been loaded into RAM the boot process then transfers control to the OS.

1. How are BIOS and CMOS related?

The BIOS is an integrated circuit on the motherboard that manages the boot process so a operating system can load. CMOS is the memory storage for the BIOS and contains all of the settings the bios needs to save like memory speed, location and configuration of hard drives and other devices, and CPU frequency multiplier.

1. Symmetric multiprocessing architecture of computer system uses shared
   1. bus
   2. memory
   3. processors
   4. both a and b
2. What is the difference between timesharing and multiprogramming systems?

The difference between timesharing and multiprogramming systems is multiprogramming allows several programs to use the CPU at the same time making sure the CPU always has something to execute while timesharing is the sharing of computing resources among multiple users at the same time while each individual user is under the assumptions that they are using the CPU only. All time sharing systems are multiprogramming systems whereas multiprogramming systems can be run on systems with one user so not all can be timesharing systems.

1. On early computers, every byte of data was read and written was held by the CPU )(.I. ther ewaas no DMA). What implications does this have for multiprogramming?

If there was no direct memory access then the CPU would always be occupied by I/O which does not benefit multiprogramming. Multiprogramming was created to allow the CPU to do other things while waiting for I/O to finish.

1. What is the difference between kernel and user mode? Explain how having 2 distinct modes aids in designing an operation system.

The difference between kernel and user is kernel mode has full access to the hardware, memory and can execute any instruction while user mode cannot directly access hardware and memory also, instructions are limited in user mode. Having two modes allows programmers to run user programs in user mode preventing them from accessing instructions that could harm the system.

1. Which of the following instructions should be allowed only in kernel mode?
   1. Disable all interrupts
   2. Read the time of the day clock
   3. Set the time of day clock
   4. Change the memory map
   5. Open/read a file
   6. Set value of timer
   7. Clear memory
   8. Issue a trap instruction
   9. Turn off interrupts
   10. Modify entries in device-status table
   11. Switch from user to kernel mode
   12. Access I/O device
2. Interrupt table of pointers having addresses for each interrupt is located at
   1. High memory
   2. Low memory
   3. Mid memory
   4. Both and b
3. Interrupts are one method of communication between the CPU and other devices. Give at least two examples of how interrupts might be used. (What device sends the interrupt? Why? What kind of information is sent?)

The first example is your keyboard, when you press a key it raises a hardware interrupt telling the OS you pressed a key and its ready to be read, and the information sent is the key you pressed. The second example is a mouse, when the mouse is moved its raises an interrupt to update its position which is the information sent.

1. What is a trap instruction? Explain its use in operating systems

A trap instruction is a hardware interrupt and its use in an OS is that it switches from user mode to kernel mode to perform a system call (which can only be performed in kernel mode) then returns back to user mode. This allows the computer to distinguish between kernel tasks and user tasks.