

CS 342, Spring 2003 - Homework 1

Assigned: Feb 26, 2003

Due : March 3, 2003

1. What is the key difference between a trap and an interrupt?
2. Which of the following instructions should be privileged?
 - a. Set value of timer
 - b. Read the clock
 - c. Clear memory
 - d. Turn off interrupts
 - e. Switch from user to kernel mode.
3. How much video RAM is needed on the video controller to support
 - a. a 25 line x 80 row character monochrome text screen?
 - b. a 1024x768 pixel 24-bit color bitmap?
4. What is the essential difference between a character special file and block special file?
5. In an Intel machine, assuming that com1 and com2 serial port I/O address spaces are one after the other. What is the I/O address space range that com1 port can use (in bytes)?
6. What are the differences between multiprogramming and time-sharing?
7. Where is interrupt vector located on an Intel computer? In memory? on a separate chip? in OS address space?, ...?
8. Interrupts are asynchronous events. One consequence of this is synchronization problem. That is, a program (such as main() function) and interrupt handler may be accessing the same buffer or variable, and when an interrupt is received while the main program is in the middle of modifying this buffer or variable, there may be some inconsistencies in the results. Why? Can it be prevented? [for example, in the serial port programming example that we have provided in the class, both main() function and PORT1INT() interrupt handler functions are accessing the buffer, bufferin and bufferout global variables.
9. In the figure below, we have a computer connected to an external modem through serial port. Modem uses telephone line to connect to the ISP server. The modem in the figure modulates incoming data at rate of 2400 bps and sends it over the telephone line. The serial cable between computer and modem is configured to transfer data at a maximum rate of 19200 bps. The modem has internal buffer of 4K (4096 bytes) to remedy the effects of speed mismatch between the data-rate over the serial cable and the data-rate over the telephone line. Assume only one-directional traffic is going on, from computer to ISP server. Answer the following questions:
 - a. If computer is sending at maximum speed (19200), after some point, there will be overflows in the buffer of modem. By studying the RS-232 serial cable standard, describe a method to prevent buffer overflows.
 - b. What is the maximum time interval that the computer can send data to the modem at the maximum speed (19200) without overflowing the buffer in modem

