ECSE 427/COMP 310: Written Assignment #1

Due: January 24, 2004 @ 11:55pm

1. Which of the following instructions should be allowed only in kernel mode? Explain your answer very briefly.
    a. disable all interrupts
    b. read the time-of-day clock
    c. set the time-of-day clock
    d. change the memory map
2. A computer has a pipeline with four stages. Each stage takes the same time to do its work, namely 1 nsec. How many instructions per second can this machine execute?
3. Most UNIX operating systems including Linux uses device drivers to interact with devices such as disks, keyboards, and networks. You can see a partial collection of available devices under the directory **`/dev`** in a Linux machine. Examine these devices on a Linux machine and come up a classification of the devices (Hint: you need to search for device driver specific information on the WWW. Use the command **`man makedev`** to get some starting information). Give at least two examples for each class of devices.
4. Some processes running on a machine are due to daemons. What are daemons? How are they different from other programs (non daemons). List four example daemons that you find running in the lab machines.
5. You go to a computer store to buy a PC system (desktop and monitor). You notice several USB (universal serial bus) ports on the monitor. You remember that your digital camera has a USB interface and wonder whether your camera can be directly connected to the monitor and pictures viewed on the monitor. You ask the salesman whether the monitor can be directly connected to your camera and pictures viewed on it without the intervention of the PC. The salesman says you can directly connect the monitor the camera. Is he lying? Is it possible to display pictures on the monitor without the PC? Explain your answer briefly and completely.
6. What is the key difference between a trap and an interrupt? Explain concisely the techniques used by operating systems to implement system calls.
7. Suppose that you were to design an advanced computer architecture that did process switching in hardware, instead of having interrupts. What information would the CPU need? Describe how the hardware process switching might work.
8. The client-server model is popular in distributed systems. Can it also be used in a single-computer system?
9. List some differences between personal computer operating systems and mainframe operating systems.
10. What is multiprogramming? What is spooling?